Open eScience Call 2023 (OEC 2023)

Empowering researchers across all disciplines through advanced research software

Early Career & Spearhead Projects

Version 2

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1 Introduction

1.1   Purpose of this call

This call for proposals supports state-of-the-art and innovative research that requires the development and application of advanced research software. Each submitted proposal should address an urgent methodological research challenge that can count on broader support from the research community in which the applicants are active. The call reflects the eScience Center's strategy to advance the use of sustainable research software in academic research.

In this call, 'research software' refers to digital tools, methods or algorithms that contribute to the creation and/or analysis of research data and research results. Applicants are invited to propose a concrete research problem that requires a digital solution of this kind.

Projects receive in-kind support. This means that a team of research software engineers (RSEs) from the eScience Center will work together with the applicants to improve or build research software within the context of a larger research community, and as integral members of a research team. This call offers two types of projects: Early Career Projects and Spearhead Projects.

A competitive proposal should
- make clear why new or improved research software is required to solve the stated research problem;
- explain how the proposal strengthens and connects to research communities that require, and may be expected to contribute to, the research software;
- include a clear strategy for the future maintenance and sustainability of the research software resulting from the project, and a realistic and concrete plan describing the measures that will be taken to ensure its usability and availability beyond the duration of the project itself.

Applicants may submit a proposal in one of the following discipline areas:

1. Life Sciences, incl. biology, medical and health sciences, neuroscience;

2. Physical Sciences and Engineering, incl. agricultural sciences, astrophysics, chemistry, computer science, earth sciences, engineering, environmental sciences, mathematics, physics;

3. Social Sciences and Humanities, incl. anthropology, archaeology, communication studies, economics, education sciences, history, human geography, law, linguistics, literary studies, philosophy, political sciences, psychology, sociology.

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1.2 About the Netherlands eScience Center

The Netherlands eScience Center is the national centre for innovative software solutions in academic research. Established in 2012 as an independent foundation, it receives its funding from NWO and SURF. The eScience Center aims to bridge the gap between digital technologies on the one hand and scientific and scholarly inquiry on the other. Its vision is to establish a robust research community, in which all investigators in all domains are able to exploit advanced digital technologies and research software to answer innovative research questions, keeping the Netherlands at the forefront of cutting-edge international research.

The eScience Center employs more than sixty Research Software Engineers or RSEs. As experts in digital technologies and methodologies, they may be seen as the equivalents of postdocs, assistant and associate professors, and top-level technicians at universities. In addition to their specific focus on the development of advanced research software, RSEs at the eScience Center will help applicants interpret the results of their research and help make the tools and methods that emerge from the project (re)usable for the wider research community. They will co-author research and methodological publications together with members of the research team. Based at the Netherlands eScience Center in Amsterdam, RSEs perform their project activities both remotely and at project locations.

1.3 eScience Center expertise

Awarded projects are offered an in-kind investment in expertise in the form of RSEs employed by the eScience Center. To maximize the added value and impact for applicants, the technological needs and requirements of the project should match with the Center's expertise. Its current expertise areas are:
- AI: machine learning, image processing;
- Analytics: big data analytics, text analysis, visualization;
- Data processing: databases, real-time data analysis, interoperability and linked data;
- Computing: exploitation of hardware accelerators, high performance computing, cloud computing, combining simulations;
- Software quality: developing workflow technologies, improving software practices, advancing software sustainability.

For an overview of the eScience Center's expertise areas, see Appendix B (eScience Center Expertise) or our website. For an overview of the research software that has been developed and contributed to over the past few years, see software.esciencecenter.nl.

1.4 Available person years

This call offers two project types, which are described in Sections 2.1 and 2.2:
1. Early Career Projects
2. Spearhead Projects

The call makes available in-kind support by allocating to the awarded projects the time of Research Software Engineers (RSEs) employed by the eScience Center. The eScience Center's in-kind contribution is calculated in 'person years' or PYR, where 1.0 PYR represents 1,536 hours of RSE time available for the duration of the project.

The total available in-kind budget for this call is approx. 20.5 PYR.
- a total of 7 Early Career Projects may be awarded, with 1.5 PYR available per project
- a total of 4 Spearhead Projects may be awarded, with 2.5 PYR available per project

Only proposals that are assessed as 'excellent' or 'very good' will be eligible for awarding. Proposals of insufficient quality will not be eligible for awarding.

The maximum duration of an Early Career Project is 18 months; the maximum duration of a Spearhead Project is 30 months. Note that when a project starts, the project structure as outlined in the proposal may need to be adjusted; this will always happen in consultation with the Lead Applicant.

In operational and administrative terms, projects are overseen by the eScience Center's programme managers, who share responsibility with the applicant for monitoring progress and facilitating the delivery of project results.

Of the total requested PYR, 15% covers project management, as well as organizational and professional development activities of RSEs (training, work meetings, conferences, etc.).

1.5 Validity of this call

This call for proposals is valid for proposals submitted before the deadline of the Project Proposition, until the Board of the Netherlands eScience Center has taken the final decision, as specified in the assessment procedure.

2 Guidelines for applicants

2.1 Who can apply?

Proposals can be submitted only by researchers employed by a Dutch research performing organization. An overview of all eligible organizations is included in Appendix A.

Each proposal is to be formally submitted by a single named researcher (henceforth the 'Lead Applicant' or LA). The LA will act as primary contact for the eScience Center.

In the case of Spearhead Projects, a proposal is submitted by the LA on behalf of a group of researchers (the 'Research Team'). To encourage the practice of open science and collaboration across organizations, at least one member of the Research Team should be an active researcher working at a Dutch research performing organization other than that of the LA. Team members may also be employed by research organizations not mentioned in Appendix A.[1]

The LA must
- be in possession of a PhD;
- hold a permanent contract or tenure track position (for Spearhead Projects) or hold a contract for at least the duration of the requested project (for Early Career Projects);
- have demonstrable knowledge and experience in applying digital methodologies to research;
- ensure a minimal personal commitment to the project work for half a day per week on average for the duration of the project.

The activities of the LA and the RSE(s) should be integral to the proposed project structure. Public-private collaborations are possible, but the inclusion of industrial partners is not a requirement.

The LA is allowed to submit only one proposal in that capacity in this call. Moreover, researchers who are involved in a project awarded under the eScience Center OEC 2021 or OEC 2022 Calls in the capacity of Lead Applicant are not allowed to submit as LA in this call.

2.2 What can be applied for?

This call offers applicants two project types to choose from: Early Career and Spearhead (see Table 1).

1. Early Career Projects are open exclusively for researchers who obtained a PhD within the last six years;
2. Spearhead Projects are open for all researchers.

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[1] Employees of institutes for higher education (vereniginghogescholen.nl/hogescholen) may also participate in a research team.

Each project must include one or more workshops, as specified below. Workshops in the context of this call are defined as are focused, participatory events with the aim of creating or fostering a community of researchers, including (potential) users, around the digital technologies and research software produced within the project. Workshop expenses, to a maximum defined in Table 1, will be reimbursed by the eScience Center.

1.   Early Career Projects

Early Career Projects are targeted at LAs who are at an early stage of their academic career. Early career LAs must have obtained their doctorate within the last six years; this call is open to researchers who meet this criterion on 1 January 2023. The eScience Center applies NWO's *Extension clause for parents.*[2] A request for extension, to be made directly to the eScience Center, must be approved before submission of the Full Proposal.

An Early Career Project may be requested for an in-kind budget of 1.5 PYR. The project duration should be between 12 and 18 months.

If successful, LAs must write a proposal for a workshop aimed at building a research community around the project's software. The workshop proposal is not part of the Full Proposal; it should be written after the project is awarded. The eScience Center will cover the costs of the workshop up to a maximum amount (see Table 1). For all Early Career Projects, the eScience Center has set up a collaboration with the Lorentz Center in Leiden, which hosts prestigious international meetings of typically one week, characterized by an open and interactive atmosphere.[3] The eScience Center will help applicants submit their workshop proposal to the Lorentz Center.

2.   Spearhead Projects

Spearhead Projects are open to all researchers. They involve a community of multiple researchers (PhDs, postdocs, tenured research and support staff) from more than one research performing organization.

A Spearhead Project may be requested for an in-kind budget of 2.5 PYR. The project duration should be between 24 and 30 months.

The eScience Center will cover the costs for the organization of at least two substantial mandatory workshops (for maximum expenses for all workshops combined, see Table 1). LAs should negotiate the format and costs of the workshops with the eScience Center.

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[2] See nwo.nl/en/extension-clause

[3] See www.lorentzcenter.nl

Table 1. *Overview of options in the Open eScience Call*

	Early Career Projects	Spearhead Projects
Requirements for LA	PhD, not more than 6 years ago	PhD
	Contract for duration of project	Permanent contract
	Demonstrable experience in applying digital methodologies to research	
	LA commitment of on average half a day per week for the duration of the project	
	Software Management Plan ~~signed by authorized representative of a formal entity~~ with optional support letters	
Conditions projects	Duration: 12-18 months	Duration: 24-30 months
	Support from eScience Center RSEs: 1.5 PYR	Support from eScience Center RSEs: 2.5 PYR
	Single LA, team members are not mandatory but *encouraged*	Single LA, team members *required* (at least one from a different Dutch research institute)
	No. of workshops: 1	No. of workshops: at least 2
	Max. workshop expenses: 15.000 EUR	Max. workshop expenses: 25.000 EUR
	A clearly defined research challenge from one of the following discipline areas: Life Sciences (LS) / Physical Sciences and Engineering (PSE) / Social Sciences and Humanities (SSH)	
Available projects	7 (2 each for PSE and LS; 3 for SSH)	4 (1 each for LS and SSH; 2 for PSE)

2.3 When can applications be submitted?

Project Proposition phase
Applicants are required to submit a Project Proposition before they can submit a Full Proposal. The closing date for the submission of Project Propositions is Thursday 16 March 2023, 14:00 CET.

Full Proposal phase
The closing date for the submission of Full Proposals is Thursday 8 June 2023, 14:00 CET.

2.4 Software Management Plan

A Software Management Plan must be submitted together with the Full Proposal. The Software Management Plan needs to specify how the sustainability (long-term storage, dissemination, use and re-use) of the research software during and after the project's completion will be ensured, and for which period of time.

There is no one-size-fits-all solution for software sustainability. Different possibilities and combinations are acceptable. For some examples of measures and strategies please consult the Software Management Plan template; note that the list in that template is not exhaustive.

The Software Management Plan should be completed using the appropriate template available on the eScience Center website (www.esciencecenter.nl/calls-for-proposals/).

It is encouraged, though not required, to include one or more letters of support from software sustainability partners, such as an institute providing long term support for the software, or a research infrastructure in which the software will be integrated.

2.5 Specific conditions

The following general conditions hold for all project proposals:
- An identical proposal may not have been submitted or awarded elsewhere.
- The proposal must match with the eScience Center's areas of expertise (see Section 1.3).
- Awarded projects must commence within twelve months after the awarding date. The starting date of the project will be determined by the eScience Center in consultation with the LAs.

Furthermore, the following conditions apply:

Software and data accessibility and quality
The eScience Center expects a basic level of accessibility and quality for the data and software used in its projects. In all cases where existing data and software serve as starting points of the research, applicants must provide convincing arguments that they are usable. See the application forms for more information.

Data Management Plan

Concerning the management of research data, the policy followed by NWO applies. Responsible research data management is an essential component of good research practice. In addition to being safely stored and carefully curated, research data should be made available for reuse as widely and as early as possible. The guiding principle in this respect is: 'as open as possible, as closed as necessary'. In case data is collected, created or processed during the project, the submitted proposal must make clear how they will be managed and curated, so that they can be made publicly available.

A formal Data Management Plan must be provided to the eScience Center within a maximum of 4 months after the project has started. The Data Management Plan can be adjusted during the project but in all cases requires the explicit consent of the eScience Center. The eScience Center requests the LA to use one of several approved *data management templates*,[4] to best match the details of the awarded project and/or any specific requirements of the LA's research institute.

Open Science

Open Science is central to the eScience Center. Open Science enables verification, reproducibility, and transparency in all phases in the research process, and maximizes the chance for adoption, reuse and impact of outputs resulting from the projects.[5] When writing the project proposal, the LA should be aware that:

- All source code will use permissive open-source licenses. Software will be published in publicly accessible repositories such as GitHub, allowing community contributions. Software also will be made available in the Research Software Directory (software.esciencecenter.nl), so as to make the software findable for search engines, provide citation options and add relevant metadata (such as documentation and related projects, tools and publications).
- Substantial effort is put into making software sustainable. Preference should be given to extending, improving and strengthening existing research software supported by existing research communities. Developing new software should only be proposed when no other viable alternatives exist.
- Reproducible research is supported (e.g. by using workflow technologies, computational notebooks, virtual environments, container solutions), so that researchers with access to the data and software are able to reproduce the research results.
- All research data and academic publications resulting from research awarded under this call for proposals are to be freely publicly accessible, at the earliest possible stage (in open access) under open licences, at the time of publication.

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[4] nwo.nl/en/research-data-management

[5] nwo.nl/en/open-science

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Requirements regarding digital infrastructure

Applicants are asked to indicate the project's infrastructural needs (if any), in terms of computing power, data storage capacity, fast data transfers, or otherwise, and explain how they expect to fulfil those needs.

The Dutch national infrastructure includes facilities offered by SURF and DANS. For more information, it is advisable to contact the organizations and institutes responsible for these resources directly, in particular SURF (www.surf.nl) and DANS (dans.knaw.nl). Proposals may suggest the use of local, international and/or commercial (e.g. web, cloud, etc.) hardware and services. In all cases a brief explanation of the choice for specific infrastructures is required.

In case the project is awarded, any required access to the Dutch national infrastructure needs to be arranged by the LA after the start of the project using the relevant procedures. The eScience Center can assist, if necessary.

2.6 Submitting the application

- Applications (covering the proposal itself and the Software Management Plan) must be completed in English.
- Use of the application forms (Project Proposition Template and Full Proposal Template) from the eScience Center website is obligatory.
- Project Propositions and Full Proposals can be submitted only via NWO's electronic application system ISAAC: www.isaac.nwo.nl. For technical questions, contact the ISAAC helpdesk (see Section 4).
- Project Propositions and Full Proposals must be submitted no later than the deadlines set in Section 2.3.
- As part of the submission process in ISAAC, you may be requested to provide additional information. Please take this into account with regard to the set deadline.
- Please take into account that the proposal summary provided in ISAAC, and the summary for non-experts, may be used for publication purposes, should your application be awarded, and that it will be subject to editing.
- Please note that applicants should inform their employing institute of the submission by sending a copy of the Project Proposition and the Full Proposal to the director or dean of the department/institute. It is therefore assumed that the employing institute or university is informed of, and accepts, this call's conditions.
- Possible letters of support or intent from, for example, software sustainability or private partners should be added to the ISAAC fact sheet in a separate PDF file in ISAAC as an attachment to the application form.
- A proposal must be submitted to one of the discipline areas mentioned in Section 1.1: 1) Life Sciences, 2) Physical Sciences and Engineering, 3) Social Sciences and Humanities. In case of doubt, please contact the eScience Center.

3 Assessment procedure

3.1 Procedure

The evaluation and selection procedure consists of three main steps. NWO will be involved to guarantee proper procedure. The procedure is intended to be as light-weight as possible.

Information Event
To inform interested applicants of the specific aims of this call for proposals, and of the role and expertise of the eScience Center RSEs, an Information Event will be organized on Tuesday 14 February 2023 (13:00-15:30). The event will take place online. More information can be found on www.esciencecenter.nl/calls-for-proposals.

Step 1: Project Proposition phase
The Project Proposition stage is intended to select the proposals that may proceed to Step 2 (the Full Proposal stage).

The LA must submit a Project Proposition outlining the project ambitions. The Project Proposition should outline the research challenge and clarify the requirements to be fulfilled by the research software the LA would like the eScience Center RSEs to work on.

The Project Proposition should be submitted to the eScience Center using the appropriate template (www.esciencecenter.nl/calls-for-proposals) before the closing date for submission of Project Propositions mentioned in section 2.3. It is important that the LA should already make certain at this stage that all the conditions mentioned in Section 2 can be met realistically.

The Project Proposition will be checked for eligibility by the eScience Center and NWO based on the criteria listed in Section 2. If the number of Project Propositions is higher than two times the number of projects that can be awarded, the eScience Center reserves the right to make a random selection out of the pool of all eligible Project Propositions. Only eligible Project Propositions will be included in the random selection, should it take place. The outcome is binding.

All *selected* LAs / teams will be invited for a personal consultation session with eScience Center experts. In this meeting, applicants are given advice on how to best exploit the competences of the eScience Center in full, and how to best cover all eScience-specific review criteria.

Step 2: Full Proposal phase and assessment

Full Proposals must be submitted before the closing date for submission of full proposals mentioned in section 2.3. The following procedure will then be adhered to:

Eligibility check

A formal eligibility check will be performed by the eScience Center and NWO regarding the eligibility of the LA, the correct completion of the template, the inclusion of the Software Management Plan, the extent to which the Specific Conditions of Section 2.5 have been met, and the presence of information required for a check of software and data availability and quality (Section 2.5).

Panel assessment

An assessment panel will assess the proposals. The panel will consist of expert representatives from each of the discipline areas (Section 1.1), experts in applied computer science, and experts from the eScience Center. The assessment will be based on the criteria outlined in Section 3.2, and will also take into account the Software Management Plan and the results of the software and data availability and quality checks. The assessment panel will rank the proposals on the basis of their scores. Proposals in different discipline areas (as defined in Section 1.1) do not compete against each other. The ranking will be submitted, together with a recommendation, to the Board of the Netherlands eScience Center.

Step 3: Awarding decision

The Board of the Netherlands eScience Center formally decides on awarding of projects based on the assessment panel recommendations. The findings of the assessment panel will be sent to the applicants. This call aims to allocate projects over the three discipline areas defined in Section 1.1 as described in Table 1. However, if an area receives insufficient submissions, the eScience Center can decide to allocate more projects to another area.

Timetable

14 February 2023	Information Event
16 March 2023, 14:00 CET	Deadline Project Proposition
March-April 2023	Eligibility check, selection, and notification
April-May 2023	consultation sessions
8 June 2023, 14:00 CET	Deadline Full Proposal
June 2023	Eligibility check
September-October 2023	Panel assessment
November-December 2023	Applicants informed of final decision

3.2 Assessment criteria

Project Proposition phase
To proceed to the selection phase, a Project Proposition should propose a realistic match with eScience Center expertise areas (see Section 1.3).

Full Proposal phase
Full Proposals will be assessed by the assessment panel based on the criteria below:

Academic quality (34%)
- the proposed research should aim to solve a specific, urgent research challenge in the selected discipline area;
- the proposal must indicate how the proposed research is connected with efforts within the broader research community to address the methodological issue at hand;
- the LA should have demonstrable knowledge of and experience in applying digital methodologies to research;
- the Research Team including the LA should have a strong track record in the research area under consideration;
- the Research Team including the LA should make clear its availability for, and track record concerning, a collaborative effort, and argue why this is sufficient on the basis of a realistic project structure outline.

Technological state-of-the-art (33%)
- the proposal should discuss relevant existing technologies (if any) and methodologies and indicate why these do not suffice;
- the proposal must indicate the technological and/or methodological challenges that need to be overcome;
- the proposal must indicate which research outcomes the projected software solution(s) are expected to lead to.

Sustainability (33%)
- the proposal must indicate how the technology and software will find use beyond the proposed work itself, preferably across institutional, national or disciplinary borders, both during and after finalization of the project;
- the technological and software deliverables must be open source/open access and permit use and/or interpretation by other researchers;
- the proposal must indicate how the project will build further collaborations, in academic research, industry, or both;
- the proposal must indicate how long-term maintenance and sustainability of project results (in particular software and data) will be secured and managed;
- the proposal must indicate which efforts are made to promote the results of the project, in terms of both academic publication and of research community (demonstrations, posters, presentations, workshops, training, etc.).

4   Contact details

Specific questions about this call

If you have specific questions about this call for proposals and the assessment procedure, please contact:

Sam Woldringh, Program Officer NWO
Tel.:   +31 (0)70 349 4101
Email: e-science@nwo.nl

For questions about the Netherlands eScience Center, or the eScience requirements for this call, please contact:

Programme Management Netherlands eScience Center
Tel.:   +31 (0)20 460 4770
Email: open-calls@esciencecenter.nl

Questions about ISAAC

For technical questions about the electronic application system ISAAC, please contact the ISAAC helpdesk. Applicants are requested to read the ISAAC manual before consulting the helpdesk.

The ISAAC helpdesk is available from Monday to Friday from 10:00 to 17:00 hours at +31 (0)20 346 7179. You can also send your questions to isaac.helpdesk@nwo.nl. You will receive a reply within two working days.

The eScience Center adheres to NWO's Code for Dealing with Personal Interests (see nwo.nl/en/code-dealing-personal-interests).

Appendix A
Eligible organizations

1. Universities

Erasmus Universiteit Rotterdam
Open Universiteit Nederland
Protestantse Theologische Universiteit
Radboud Universiteit Nijmegen
Rijksuniversiteit Groningen
Technische Universiteit Delft
Technische Universiteit Eindhoven
Theologische Universiteit Apeldoorn
Theologische Universiteit Kampen
Universiteit Leiden
Universiteit Maastricht
Universiteit Twente
Universiteit Utrecht
Universiteit van Amsterdam
Universiteit van Tilburg
Universiteit voor Humanistiek
Vrije Universiteit Amsterdam
Wageningen Universiteit en Researchcentrum

2. University Medical Centers

Amsterdam UMC (locations: AMC and VUMC)
Erasmus MC
Leiden UMC
Maastricht UMC+
Radboud UMC
UMC Groningen
UMC Utrecht

3. KNAW institutes

Hubrecht Instituut voor Ontwikkelingsbiologie en Stamcelonderzoek

Huygens ING

Internationaal Instituut voor Sociale Geschiedenis (IISG)

Koninklijk Instituut voor Taal-, Land- en Volkenkunde (KITLV)

Meertens Instituut

Nederlands Herseninstituut

Nederlands Instituut voor Ecologie (NIOO)

NIOD Instituut voor Oorlogs-, Holocaust- en Genocidestudies

Nederlands Interdisciplinair Demografisch Instituut (NIDI)

Westerdijk Fungal Biodiversity Institute

4. NWO institutes (NWO-I)

AMOLF - Physics of Functional Complex Matter

ARCNL - Advanced Research Center for Nanolithography

ASTRON - Netherlands Institute for Radio Astronomy

CWI - Centrum Wiskunde & Informatica

DIFFER - Dutch Institute for Fundamental Energy Research

Nikhef - Nationaal instituut voor subatomaire fysica

NIOZ - Koninklijk Nederlands Instituut voor Onderzoek der Zee

NSCR - Nederlands Studiecentrum Criminaliteit en Rechtshandhaving

SRON - Netherlands Institute for Space Research

Appendix B
eScience Center expertise

The Netherlands eScience Center has advanced expertise in the following areas:

Software quality
- developing workflow technologies: setting up an optimal and reproducible workflow
- improving software practices: robust programming to enable reuse
- advancing software sustainability: embedding software in the open science community

AI
- machine learning: using data to train computer models
- image processing: understanding patterns in images and video

Analytics
- big data analytics: exploring large volumes of complex data
- text analysis: understanding patterns in texts
- visualization: creating images to drive interpretation

Data processing
- databases: making data accessible and searchable
- real-time data analysis: processing sensor data ultra-fast
- interoperability and linked data: interconnecting data sets

Computing
- exploiting hardware accelerators: increasing speed at lower cost
- high performance computing: increasing computational scale
- cloud computing: easily accessing computing power
- combining simulations: replicating complex systems

For more information, see also: https://www.esciencecenter.nl/where-we-focus/