

Helmholtz AI projects 2023 call

1 August 2023

Background

The Helmholtz AI Cooperation Unit¹ (Helmholtz AI) continuously and strategically drives and coalesces the field of applied Artificial Intelligence within the Helmholtz Association. As an interdisciplinary platform, Helmholtz AI compiles, develops, fosters, and promotes Artificial Intelligence-based approaches for all Helmholtz Centers.

One essential component is funding research projects that address the topics of applied Machine Learning (ML) and Artificial Intelligence (AI). These annual calls for projects are based on the general concept for Helmholtz AI and are in line with the future topics of the Initiative and Networking Fund (INF). Supported projects initiate cross-cutting research collaborations and identify innovative research topics in this area; they underpin the growth of the Helmholtz AI network within Helmholtz and with external partners; they support the transfer of scientific knowledge from research into practice; they include the opportunity to access and employ computing resources of HAICORE.

Objective

The objective of this fifth call for Helmholtz AI projects is to initiate and facilitate activities that address cross-center challenges and methods; it aims at several smaller collaborative projects with the potential to facilitate larger follow-up projects; it fosters co-development of solutions with potential users and encourages the practical implementation of science-based know-how outside the scientific community (e.g. with companies & non-profits).

In addition, this year's project call includes an opportunity for projects generating AI-related use cases for quantum computing (see section thematic criteria and general requirements): up to three projects can be funded.

For all projects, first results are expected by mid-2025, i.e., one year after funding starts. The results shall contribute to the vibrant Helmholtz AI community, fertilize cross-center collaborations, incentivise transfer activities and contribute to international visibility.

¹ Concept for Helmholtz AI: https://www.helmholtz.de/fileadmin/user_upload/01_forschung/Helmholtz_Inkubator_HAICU.pdf

Goals

A Helmholtz AI project addresses two overarching goals:

1. exploit innovative Machine Learning, Statistical Learning and Artificial Intelligence approaches and solutions in the applicants' research field(s)², and
2. foster interaction and method transfer between application domains, research fields (in and between Helmholtz Research Fields), and sectors (with industry or other partners).

In order to allow for vigorous exploration of new approaches and to encourage transformative ideas, Helmholtz AI projects explicitly call for proposals of 'high risk, high gain' projects and projects that choose to fail fast over safe incremental advances. Projects should address, if appropriate, reproducibility and explainability. Where applicable, projects are co-created and iteratively developed with users and further stakeholders (including universities and entities from outside the scientific community). Activities within projects should strongly impact research at participating Helmholtz centers and should contribute to the overall development of the Helmholtz AI community within Helmholtz and transfer activities (e.g. with external application-oriented partners).

Criteria

Projects shall be aligned with the goals formulated in the Helmholtz AI concept. Applications that meet the following criteria will be evaluated based on the award criteria (see below in "Evaluation process, selection, and award criteria").

1. Thematic criteria

Projects shall focus on data analysis, method application and method development (or similar activities) in line with the above goals. Projects with a substantial share of or focus on data collection, data preparation/ cleaning, validation or labeling are not eligible for funding.

2. Ambition

Helmholtz AI projects are high risk, high gain i.e. they have the potential to result in significant scientific breakthrough but can also carry a high degree of uncertainty and risk. Projects should be seed-like, collaborative and have the potential to quickly generate larger follow-up projects. Scientific breakthroughs can be either in the scientific domain or in the ML methodology or both.

3. Applicants and Eligibility

- a. Helmholtz AI projects shall combine substantial and reasonably balanced contributions from scientists from at least two Helmholtz centers.
- b. For those applying for the add-on opportunity this year, Helmholtz AI projects one partner must, at minimum, contribute guaranteed compute time on quantum

² Helmholtz Research Fields: <https://www.helmholtz.de/en/research/research-fields>

machines and implementation support i.e. interface development.

- c. Ideally, the proposal should name, where appropriate, candidates for intended positions. The proposal shall describe how the AI/ ML expertise needed for the project will be provided (e.g. Helmholtz AI consulting, in-house through proposed PIs or new hires, or through the involvement of external partners).

4. Budget

- a. Helmholtz AI projects can apply for a total volume of €500k or more for a running time of 2-3 years. A maximum of € 250k can be applied for from the INF, and matching financing of at least the same amount must be provided by the participating centers themselves. The latter has to be confirmed with a signed letter from the board of directors (DE: “Vorstand”) when submitting the application.
- b. For projects applying for AI-based use cases for quantum computing, a maximum of €250k can be applied for from the INF, and matching financing of at least the same amount must be provided by the participating centers themselves. The latter has to be confirmed with a signed letter from the board of directors (DE: “Vorstand”) when submitting the application.
- c. A maximum of 70% of the INF funding can be assigned to one Helmholtz Center.
- d. Helmholtz AI projects aiming for the add-on opportunity shall include significant contribution by one partner in monetary value or in-kind contributions, which, at minimum, will constitute guaranteed compute time on quantum machines and implementation support e.g. interface development. If this is an external partner, they must submit a letter of support (LoS) stating their knowledge of and commitment to the project and to their guaranteed contributions.
- e. Funding will be provided only for Helmholtz centers; in clearly documented cases of indispensable expertise, funding may also be provided for a highly qualified university partner (within Germany).
- f. Staff, travel expenses and cost for consumables are eligible for funding; investments are excluded. The draft financial plan shall cover the full running time of the project.

5. Duration of projects

- a. Applications shall outline deliverables that can be achieved over the course of the funding period and demonstrate tangible outcomes.
- b. First deliverables need to be envisioned 12 months after the start of the project (non-limiting list: e.g. publication of a software or generated reference dataset, policy/white paper, educational material, communication material).
- c. Applications shall describe how a swift start of the project is ensured following the funding decision (e.g. hiring, data provision), as projects are expected to commence as soon as possible after the funding decision.
Projects should start in June or July 2024. Projects must start **no later than six months** after the official funding approval. If a later start date is foreseen, a 2-sentence justification will need to be provided.

6. Transfer

- a. Helmholtz AI projects shall contribute the goals described in the Helmholtz transfer strategy³ and proposals must outline anticipated interactions with specified application partners.

7. Cooperation

A concise cooperation and management plan of the project should comprise effective communication, participation and decision-making mechanisms between the Helmholtz centers and any external partners.

8. Exclusion Criteria

Projects with a substantial share of or focus on data collection, data preparation/ cleaning, validation or labeling are not eligible for funding.

The following may lead to the exclusion or delay of your application:

- a. An incomplete application
- b. The addition of superfluous information in the cover page, main body or appendices of the application
- c. Going over the word/page limits
- d. Submitting multiple PDFs
- e. Not including the signed declaration or guarantee of matching funding from each Helmholtz center, or LoS from external partner providing quantum resources (for add-on opportunity)
- f. Financial discrepancies
- g. Incorrect CV format and not adhering to page limit

Policy on Resubmissions

Applications submitted for Helmholtz AI projects must not have been funded through another funding line of the Helmholtz Association; revised resubmissions of previously unsuccessful project proposals of the Helmholtz AI project call or other funding lines within the Helmholtz Association are welcome.

Rights and Obligations

- During the funding period, project leaders commit to actively participate in Helmholtz AI cross-field activities, such as progress or method exchange workshops, the Helmholtz AI conference, seminar series or hackathons.
- Funded project Principal Investigators (PIs) commit to acknowledging financial support through the Helmholtz AI projects funding line in any related published output.

³ Overview Helmholtz Transfer Strategy:

https://www.helmholtz.de/assets/helmholtz_gemeinschaft/user_upload/Transferstrategie_Kompakt_EN_web_update.pdf

- Funded project PIs commit to share short updates about ongoing related activities (e.g. for publication on the website www.helmholtz.ai and associated social media channels) requested by the Helmholtz AI science management regularly.
- Annually and at the end of their respective funding period, all Helmholtz AI project PIs shall submit a short written (final) report demonstrating progress and results (referencing deliverables) to Helmholtz AI central and the Helmholtz AI scientific advisory committee. These reports form part of the general reporting of the Helmholtz AI platform.

Applications

1. The application will be submitted through an online submission tool and consists of a cover page, main body (max. 5 pages) and appendices (work packages, deliverables, financial plan, board's confirmation letter, CVs and, if applicable, resubmission statement) in a single PDF file
2. The cover page should include the project title and acronym only, an abstract will be submitted directly in the online submission tool
3. The application's main body structure is (please follow the template Appendix 1):
 - a. Scientific case (report here if you are planning an AI-based use case for quantum computing)
 - b. Unique and ambitious approach
 - c. Utility of AI/ML methods and/or data sets
 - d. Long-term impact and transfer potential
 - e. Implementation and management
4. Application appendices must include:
 - a. List of work packages
 - b. List of deliverables
 - c. Financial Plan
 - d. CVs of Participating PIs and, if available, of candidates for intended positions
 - e. Confirmation of matching funds
 - f. Ethics and compliance assessment
 - g. For add-on funding applicants - signed LoS from external partner providing quantum resources (if applicable, only if they are an external partner)
 - h. Resubmission statement (if applicable)
5. The following information is to be entered in the online submission tool:
 - a. Abstract
 - b. Up to 10 keywords
 - c. Names and contact information of the lead center's (coordinator) and further centers' Principal Investigators
 - d. Names of participating centers
 - e. Budget

6. The application shall be written in English. The main body and appendices shall be formatted in DIN A4, Arial, 11pt, 1" margins and single line spacing (a template is published with this call, see appendices).

Scientific case

Please describe your scientific case and your objective(s) clearly and coherently, laying out the challenges, urgency and potential impact. Please reference your key deliverables.

Unique and ambitious approach

Please explain the uniqueness of your approach in the context of it being a Helmholtz-specific opportunity, highlighting the complementarity of and contributions from the participating centers (and external partners, e.g. academia, industry or non-profits). Ideally, Helmholtz AI projects are co-created and iteratively developed with users (and where appropriate non-academic stakeholders) to ensure the quick adoption of results.

It should be outlined how the project has the potential to result in significant scientific breakthrough and what degree of uncertainty and risk it carries. Please note that projects should be seed-like, collaborative and have the potential to quickly generate larger follow-up projects. Scientific breakthroughs can be either in the scientific domain or in the ML methodology or both.

Please detail the potential risks and associated gains of your project in contrast to a more conservative, incremental approach.

For the add-on opportunity please outline the contributions of the partner assuring quantum compute time and implementation support. Additionally, include how the project will generate use cases for quantum computing while retaining the focus on AI and ML, e.g. quantum inspired codes for AI.

Utility of AI/ML methods and/or data sets

Please explain your project's potential to improve, implement, transfer and/or disseminate the applied techniques, methods and joint usage/exploitation of datasets. Please note that the methodology description should not merely list options or remain at the surface level, but explain in detail which choices are made and how these will help address the research question(s) and challenges at hand. Please reference your deliverables.

Helmholtz AI projects aiming for the add-on opportunity this year, ensure to clarify how quantum computing will be utilized to support and advance AI/ML methods.

Long-term impact and transfer potential

Please discuss the expected long-term results and impact arising from the joint endeavor, particularly for the research field and for method development/application at the participating centers and other centers within the Helmholtz Association.

Describe the expected or potentially pioneering transfer activities beyond the scientific

community (e.g. industry uptake, spin-offs, economic & social contributions) and its contributions to the goals described in the Helmholtz transfer strategy⁴ (e.g. inclusion of external partners, outlining how the project achieves the maturation of (preliminary) findings and results, advancing the Technology Readiness Level (TRL), outlining a exploitation strategy etc.)

Implementation and management

Please lay out the plans for staff recruitment and all expenditures, and describe the intended project management, decision-making and oversight measures you will apply, including communication between participating centers and collaboration mechanisms with external partners.

Appendices

1. Work Packages
 - a. Projects must provide a list of work packages indicating the leading center as well as a descriptive title, work package budget and a timeline.
2. List of deliverables
 - a. Set out clear and verifiable deliverables, define the associated work package, the responsible project partner and the delivery month.
 - b. Indicate which deliverables are jointly produced with or intended to be used by external partners ('destination').
 - c. Note that first deliverables are expected within 12 months.
3. Financial Plan
 - a. Your budget planning must include a break-down of the allocated budget for each work package defining their aggregate in-kind and cash contributions for the entire funding period.
 - b. Overhead is not eligible for funding, please do not calculate any.
 - c. Your budget planning must also include a break-down of the annual budget for each participating center according to type of funding (staff and expenses).
4. CVs of Participating PIs and potential candidates for intended positions
 - a. CVs of the principal investigators and, if available, CVs of likely prospective candidates for a specific position should be submitted in the appendix. Please note that your CV should also contain references to relevant accomplishments beyond scientific papers and citation metrics (e.g. software packages, policy papers, standards, datasets, patent filings, entrepreneurship and industry collaborations). Please make sure to highlight people with ML and AI expertise required for the project.

⁴ Overview Helmholtz Transfer Strategy:
https://www.helmholtz.de/assets/helmholtz_gemeinschaft/user_upload/Transferstrategie_Kompakt_EN_web_update.pdf

- b. CVs must be prepared using the provided template and not exceed page limit.
5. Confirmation of matching funds

A declaration, usually a signed letter, by the CEO/board of directors of each participating center must be included, which guarantees that their own funds will match at least the amount applied for from the INF.
6. Ethics and compliance assessment

Submit a short assessment of whether the project raises potential ethical concerns or a negative societal impact, please consult with your Institutional Review Board(s) and report the outcome. If the project involves sensitive data, please describe the process of data handling and compliance. In general, it is recommended to assess the proposal according to the NeurIPS ethics guidelines and briefly report on that: <https://neurips.cc/public/EthicsGuidelines>.
7. Signed LoS from external partner providing quantum resources (if applicable)

If applying for add-on funding, a signed LoS from any external partner contributing compute time on quantum machines and implementation support stating their knowledge of and commitment to the project and to their guaranteed contributions is required. For partners providing this within Helmholtz, this is not applicable.
8. Resubmission statement (if applicable)
 - a. Revised resubmissions of previously unsuccessful project proposals from Helmholtz AI or other Helmholtz project calls must be accompanied with a brief description of the significant changes applied based on feedback they received from reviewers (max. 1 page). Feedback requests for previously unsuccessful Helmholtz AI project applications can be directed to the Helmholtz AI Science Management Team at projects@helmholtz.ai
 - b. Resubmitters are strongly encouraged to consult with an AI/ML expert, e.g. the Helmholtz AI consultant team, prior to resubmission. For more information on the Helmholtz AI Consultant team: <https://www.helmholtz.ai/themenmenue/you-helmholtz-ai/ai-consulting/index.html>
 - c. Resubmitters are also strongly advised to check the updated proposal template to ensure that all required sections are included and to ensure there is a significant improvement to previous submission.

Evaluation process, selection, and award criteria

Proposals are subject to the following evaluation procedure. Proposals are first checked regarding formal requirements and then evaluated by a panel of independent experts. The panel performs a pre-assessment of all applications prior to the selection meeting (no presentation). Based on the pre-assessment, the panel deliberates to reach a final assessment and recommends a list of projects for funding. Ultimately, the President of the Helmholtz Association decides which projects shall be awarded INF funding.

All proposals will be evaluated by a panel of experts, on the basis of the award criteria ‘ambition’, ‘research impact’, ‘methodology impact’ and ‘quality and efficiency of the implementation’. In line with Helmholtz AI’s ‘high risk, high gain’ aim for its projects, the criterion ‘ambition’ is weighted with 2.0. The AI-based use case for quantum computing application will be subject to the same criteria.

Award criteria	Aspects
Ambition (weight 2.0)	<ul style="list-style-type: none"> • Extent to which the proposed project is beyond the state of the art, demonstrates unique innovation potential (e.g. ground-breaking objectives, novel concepts and approaches) and takes on risk • Clarity of the objective(s) • Soundness of concept and credibility of the proposed methodology
Research impact (weight 1.0)	<ul style="list-style-type: none"> • The extent to which the output(s) of the project would contribute to advance the specified research field(s) • The potential to contribute to establishing and strengthening long-term cooperation between the partners.
Methodology impact (weight 1.0)	<ul style="list-style-type: none"> • The extent to which the output(s) of the project would contribute to advance the development/implementation/use of the specified method • The potential to exploit and disseminate the project results within Helmholtz and with further partners
Quality and efficiency of the implementation (weight 1.0)	<ul style="list-style-type: none"> • Quality and effectiveness of the work plan, including the extent to which the resources assigned to work packages are in line with their objectives and deliverables • Appropriateness of the allocation of tasks, ensuring that all participants have a valid role and adequate resources in the project to fulfill that role • Complementarity of the partners and balance of expertise • Readiness of applicants to commence the project within the timeline indicated in the call • If applicable: ethics and compliance

The evaluation procedure and the handling of proposals will be jointly managed by staff at the Helmholtz Association Head Office and Helmholtz AI central (at Helmholtz Munich). The panel evaluation meeting will be managed by the Head Office.

The scientific leadership of Helmholtz AI (i.e. the scientific director and steering board members) will have no access to submitted proposals or assessments at any stage during and after the evaluation procedure. They will not contact the panel of experts.

Schedule

Date	Event or action
1 August 2023	Announcement of Helmholtz AI 2023 project call
15 September 2023	Submissions accepted for Helmholtz AI projects via online submission portal: https://application.helmholtz.ai
1 December 2023	Application deadline
December 2023	Proposals are checked according to formal criteria. Proposals meeting the selection criteria are reviewed and scored by panel members according to award criteria
January 2024 - March 2024	Panel members review and score proposals according to award criteria and meet to decide which projects to recommend. Based on the panel's recommendations the President of the Helmholtz Association decides which projects to fund.
April-May 2024	Funding contracts between Helmholtz Association and submitting centers are drawn up.
June 2024 onwards	Start of Helmholtz AI projects

For further inquiries, please contact via email:

- Helmholtz AI central: Science Management Team via projects@helmholtz.ai
- Helmholtz Head Office: Inkubator Team via inkubator@helmholtz.de

Appendices

1. Application template: see [LINK](#)
2. Template CV
3. Criteria for bias/conflict-of-interest
4. Information about the processing of personal data