# Call for Pilot Foundations: Helmholtz Foundation Model Initiative

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# < Project Acronym: Project title >

Submission deadline 15.3.2024

Project Description

* 1. Abstract

Must be identical to the abstract submitted in the submission portal.

* 1. Key personnel

List names and contact info of PIs, their host institutions, and principal expertise (e.g. AI, HPC, research domain). Identify lead PI(s) for principal contact.

* 1. Project Objectives

Describe the principal project objectives, success criteria, and how the intended Foundation Model will catalyse future research.

* 1. Approach

Please describe the specific approach you will take to meet each of the above objectives. Also make reference to:

* What data will be used and how its extent and complexity is expected to give rise to a Foundation Model.
* How the proposed consortium merges domain, AI, and compute expertise to build domain-leading Foundation Models, including proof of ability to scale to large-scale HPC.
* The amount of compute resources required.
* A detailed, convincing plan (e.g. GCS application) to obtain the required compute resources.
  1. Expected Outcome

Please describe the expected outcome of your approach, as well as its expected scientific and technical innovation potential and impact in the field of AI research.

1. Technical requirements
   1. Data sources and management

Provide details about data provenance, access, and availability.

* 1. Model Architectures and Algorithms, Code

Provide a specific description of the Foundation Model approach, i.e. architecture, training & tuning paradigms, etc., how existing state-or-the-art approaches will be employed or improved, and whether new approaches will need to be developed within the project.

* 1. Compute resource requirements

List algorithms/codes/packages/libraries required, which architecture it is supposed to run on (CPU, GPU, mixed,…).

Provide quantitative estimates of compute- and storage resources in terms of the quantities requested (CPU/GPU hours, storage amounts etc). A proof-of-concept that your code(s) perform at scale on the available HPC infrastructure(s), e.g. via scaling plots, memory- and I/O requirements may be included. The requirements of the Gauss Centre for Supercomputing can serve as a guide ([Sec. 5.1 and Sec. 5.2](https://jards.gauss-centre.eu/PublicFiles/Description/GCS-Template-project-application.pdf)).

Describe the HPC system available in each phase of model development. A reliable plan to obtain the required compute resources must be provided. This plan is crucial in the evaluation of the proposal.

1. Project planning, implementation, and monitoring
   1. Work plan with Milestones, Deliverables, Dependencies

Please describe work packages with milestones and deliverables that measure and document project progress, including their due dates. All items must correspond to items listed in the workpackage/deliverable tables and gantt chart to be provided in the appendix.

In line with the three-stage plan devised in the [HFMI concept](https://syncandshare.desy.de/index.php/s/2Jo6aXZPCEsirAN), we recommend to plan work packages to align with three principal project phases, with deliverable targets preferably after 12, 24, and 36 months.

Expected deliverables:

* A trained foundation model publicly available in a trusted repository.

Recommended deliverables include but are not limited to:

* Fine-tuned models for several downstream tasks, each publicly available in a trusted repository.
* Quantitative evaluation and benchmarking against baselines for at least three downstream tasks, publicly available with a DOI.

Document availability and access to adequate compute infrastructure.

* 1. Risk analysis

Provide a risk analysis for the project, focusing on dependencies between milestones, deliverables, workpackages, critical inflection points of the work plan, and provide a strategy for mitigation.

* 1. Compute Budget

Please describe how you plan to monitor and document the use of the required compute budget.

* 1. Data Monitoring

Please describe how you plan to monitor data use in the project; In particular please provide a concept how you will prevent data leakage. Please specify if i) trained models can be released given the datasets and ii) under which license will you be able to release trained models.

1. Broader Impacts

Please reflect how the broader impacts of the successful project could affect the field, stakeholders, and society at large.

Discuss the benefit will the Foundation Model bring to the research field, e.g. whether the model is necessary to advance research, or if there is an expectation of spill-over effects to other research domains.

Considering the completed project, discuss potential stakeholders and how they will be approached for dissemination of the project results and to maximize their impact.

Discuss how society at large could potentially benefit directly from the project results and from expected long-term impact.

1. Sharing of Project Results
   1. Helmholtz Open Science Policy

All data, models, code should be shared according to FAIR principles. Shared results should fulfil the obligations of the [Helmholtz Open Science Policy](https://os.helmholtz.de/en/open-science-in-helmholtz/open-science-policy/): “as open as possible and as closed as necessary”. Maximum openness is a principal focus of the HFMI.

* 1. Code

Describe how the code developed in this project will be shared to maximize utility for the scientific community.

* 1. Models

Describe how the model(s) resulting from this project will be shared. Describe plans to make the trained models publicly accessible, whether they will be deposited in a trusted repository, at which level (full parameter access?), under which license, etc.

5.3 Data

Describe how the training data for the model will be published.

5.4 Roll-out to the community

Describe plans to roll out the models to the scientific community for productive use, including consideration on modalities of access and documentation for end users. Consider use case scenarios of various scale, from toy applications to full-fledged research projects. Discuss how the necessary compute infrastructure for hosting models could be provided, e.g. through resources provided by the center, or through sharing the model code and requiring the user to host it, or through a third party.

6. Budget

6.1 Requested FTEs

Please provide a detailed plan for the use of the requested funding, including job description and hosting center for each requested FTE.

Note the requirement to submit a letter by the CEO/board of directors of each participating center underwriting funding of the project in funding period 2026/27, in case central funding will not be available. Proposals without such letter will be rejected without review.

7. Collaboration Plan and Team Science

Please lay out how you will ensure efficient and effective team work and communication. Consider the location of consortium members and how their interaction can most effectively be supported, e.g. through virtual and/or physical meetings on various levels, e.g. PIs only, or whole consortium, or subgroups; at regular intervals and/or ahead of project inflection points like e.g. milestone or deliverable due dates, roll-out events.

Define project speaker and coordinator roles.

Describe a credit attribution/authorship policy for research products like publications, code, models, talks, etc.