Helmholtz Imaging Projects – Call 2025

funded by the Helmholtz Initiative and Networking Fund

Remark: This year's call provides the opportunity to apply for an extra budget for projects that have an additional focus on applicability across domains ("Generalizing Imaging Solutions track") see section 9.

1 Background

Helmholtz Imaging brings together expertise to promote and develop imaging science and to foster synergies across imaging modalities and applications within the Helmholtz Association. Helmholtz Imaging constantly and strategically advances imaging science for the benefit of all Helmholtz Centers. Helmholtz Imaging covers all aspects of digital information processing along the imaging pipeline (see figure below), from data acquisition to the analysis of processed imaging data.

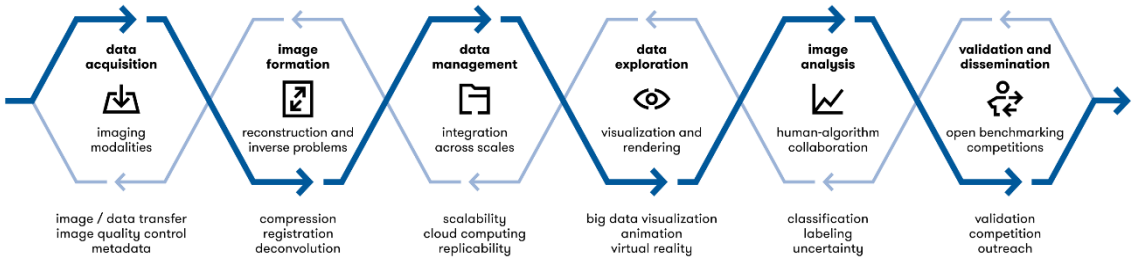

Figure: Helmholtz Imaging pipeline to visualize the many different steps in the imaging process from data acquisition to knowledge dissemination

One essential component of Helmholtz Imaging is the Helmholtz Imaging Projects, which are awarded to cross-disciplinary research teams that identify innovative research topics at the intersection of imaging and information & data science, initiate cross-cutting research collaborations, and thus support the growth of the Helmholtz Imaging network. These annual calls are based on the general concept of Helmholtz Imaging and are in line with the future topics of the Initiative and Networking Fund (INF): providing impetus for new research topics, networking research partners, transfer to business & society and promote talents.

Contrary to other grant programs, Helmholtz Imaging, together with the community, offers its projects a rich portfolio of services in addition to financial support.

- Each project accepted for funding can receive scientific and/or technical advice and benefit from the expertise of the Helmholtz Imaging Support and Research Units.
- The scientific results and software tools obtained in the Helmholtz Imaging projects and collaborations within the Helmholtz Imaging network will be made available as open-source Helmholtz Imaging Solutions and sustainability for their dissemination and re-usability will be supported, e.g., enabling application in other domains and transfer to industry and society.

- There is the opportunity to access and employ the computing resources of HAICORE[1].
- Helmholtz Imaging projects qualify for support in best practices for software development provided by HIFIS. In particular, if you aim for a solution with the potential to run as a cloud service, HIFIS colleagues will provide consultation from the beginning of your project through to the deployment of the running cloud solution. You can contact HIFIS[2] directly with your query, or reach out through Helmholtz Imaging support.

2 Objective of funding

The objective of this call for Helmholtz Imaging Projects is to initiate and facilitate activities that address challenges and methods across research fields and centers; special emphasis for Helmholtz Imaging Projects is laid on developing innovative approaches that significantly advance the processing of imaging data from sensor to publication. It is considered as a plus if the proposed developments have the potential to be beneficial for more than one imaging modality. Such projects often are characterized by higher risk, and will therefore have demonstration character. Projects that drive this cross-domain adaptability approach further and show an increased potential for developing a generalizing solution can apply for additional funding (compare below).

Consequently, Helmholtz Imaging will provide seed funding for new ideas and aims at collaborative projects with the potential to facilitate collaboration in a larger context.

Imaging is an enabling science within the Helmholtz portfolio. Helmholtz Imaging was initiated to overcome the traditional, usually long transition phases of knowledge transfer from theory to practice and from application domain to application domain. With this in mind, a central task of Helmholtz Imaging is to strengthen communication and collaboration between the various research partners, as well as companies and non-profits. This spirit should also be reflected in the projects. The present call promotes the co-development of solutions with potential users or customers and encourages the practical application of science-based know-how outside the scientific community to ensure the reusability of potential findings.

First, impactful results are expected one year after the funding starts. The project results shall contribute to the vibrant network within the Helmholtz Association, fertilize cross-research field and cross-center collaborations, incentivize transfer activities, and contribute to international visibility.

3 Goals

A Helmholtz Imaging Project combines two characteristic goals:

- to promote imaging science through innovative approaches in information & data science and synergies across imaging modalities and applications, and
- to foster cross-disciplinary research interaction and method transfer between applications and research fields (across Helmholtz Research Fields), and sectors (with industry or other partners).

Helmholtz Imaging projects are co-created and developed with users from other research areas and/or non-academic partners (e.g., industry, NGOs, or civil society) to ensure the quick adoption of results by a “customer”.

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[1] HAICORE https://www.helmholtz.ai/themenmenue/you-helmholtz-ai/computing-resources/index.html

[2] HIFIS https://hifis.net/consulting

To allow for vigorous exploration of new approaches and to encourage disruptive ideas, Helmholtz Imaging explicitly calls for 'high risk, high gain' project proposals.

Cooperation with highly qualified partners outside the Helmholtz Association are encouraged, not least to substantiate the transfer part of the project.

Helmholtz Imaging projects shall contribute to the Helmholtz Transfer objective[3]. For Helmholtz, transfer refers to the practical application of science-based know-how outside the scientific community in which the know-how was generated. It covers technology transfer (e.g., patents, spinoffs, cooperation...) and knowledge transfer[4] (e.g., bringing evidence-based knowledge into the economy, politics and society, knowledge-based information services, ...). It can be strengthened by advancing technology readiness levels (TRL), creating new applications that might be further advanced into viable products, designing potential future exploitation strategies, or through (international) cooperation that support development in these directions. If applicable, connecting the project to existing transfer-oriented activities at the Helmholtz Centers[5] or Innovation Labs[6] or to Innovation and Funding Programs[7] could be a contribution to the Helmholtz Transfer Objective. Also, Citizen Science approaches contribute to these objectives[8].

4 Criteria

Projects shall be aligned with the goals formulated in the Helmholtz Imaging concept[9]. Applications that meet the following criteria will be evaluated based on the evaluation criteria (see below in "Evaluation process, selection, and evaluation criteria").

4.1 Thematic Criteria

a) The projects aim at the development of new methods, algorithms, software solutions or benchmark data sets in imaging science and their (interdisciplinary, cross-disciplinary) application.

b) Projects with a substantial share of or focus on imaging hardware development are not eligible for funding.

4.2 General Requirements

a) Helmholtz Imaging Projects shall combine substantial and reasonably balanced contributions from scientists from at least two Helmholtz centers and with complementary research expertise.

b) Each project must have a 'problem – solution' fit at its heart and must identify early adopters willing to trial the solution and provide feedback ("customer"). An external partner can also serve as a customer (e.g., industry).

c) Helmholtz Imaging projects must contribute to implementing Helmholtz' transfer objectives through aspects such as (compare b) and above for transfer areas):

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[3] Regarding the Helmholtz Transfer Strategy see also https://www.helmholtz.de/transfer/transferstrategie/

[4] see also https://www.helmholtz.de/transfer/beratung-und-information/

[5] A list of transfer points at Helmholtz Centers can be found at https://www.helmholtz.de/en/transfer/contact-and-transfer-strategy/transfer-points-at-the-centers/

[6] Information regarding Innovation Labs are accessible via https://www.helmholtz.de/en/transfer/helmholtz-association-transfer-instruments/innovation-labs/

[7] see also https://www.helmholtz.de/transfer/innovations-und-foerderprogramme/

[8] https://www.helmholtz.de/transfer/citizen-science/

[9] See the Helmholtz Imaging concept and the concept for the distributed HIP core.

- Inclusion of relevant external partners such as companies, non-profits, or other public-private scenarios and/or appointments with universities;
- Outlining how the project achieves the maturation of (preliminary) findings and results, e.g., advancing the Technology Readiness Level (TRL);
- Outlining the way towards a sound and implementable, future exploitation strategy.

d) Applications for Helmholtz Imaging projects must demonstrate methodological expertise to cover data science in the imaging field. Note that Helmholtz Imaging Support can cover up for some expertise. This has to be discussed beforehand and soundly described in the application (compare also intro to the "Application" section).

e) Funding will be provided only for Helmholtz centers; funding can be provided for university partners (within Germany) in well-justified cases.

f) A project collaboration and management plan that includes effective communication, participation, and decision-making mechanisms among partners (Helmholtz Centers and external partners).

g) Applications shall outline clear deliverables and measurable milestones that can be achieved over the course of the funding period and show tangible results. First deliverables need to be envisioned 12 months after the start of the project (non-limiting list: software, reference data set, policy/white paper, educational material, communication material). Towards the end of the project, a deliverable concerning sustainability and re-usability options shall be included. In particular, milestones have to allow for a decision on the advancement of the project that success or failure can be identified early on. The deliverables shall qualify as a Helmholtz Imaging Solution, with potential application to other imaging modalities. Potential use-cases beyond the studied modality have to be named. Applicants shall describe the expected results and impact of the project for the participating centers, the Helmholtz Association, and the respective research fields.

h) Applications shall describe how a swift start of the project is ensured upon the funding decision (e.g., hiring, data provision). The project should start as soon as possible, typically within 3 months after the funding decision. Ideally, the proposal should name, where appropriate, candidates for intended positions and describe where imaging expertise and support from the Helmholtz Imaging units is needed.

i) Helmholtz Imaging Projects can apply for a total volume of approximately € 500,000 for a funding period of up to 3 years. Half of the financial volume and at most € 250,000 will be funded by the INF and the other half will be contributed by the partners themselves. The latter has to be confirmed by a signed letter from the participating centers' board of directors when submitting the application. A maximum of 70 % of the INF funding can be assigned to one Helmholtz Center. Consideration should be given to using a relevant portion of the budget for early career researchers or young investigator groups.

j) Staff, travel expenses, and cost for consumables (including internal services) are eligible for funding; investments are excluded. The draft financial plan shall cover the full running time of the project.

k) A list of independent experts as potential reviewers may be provided. Proposed experts need to be unbiased (criteria are published with this call, see appendices).

l) Applications submitted for Helmholtz Imaging Projects must not have been submitted simultaneously to another funding line of the Helmholtz Association or to another organization. Revised re-submissions of previously unsuccessful Helmholtz Imaging project

proposals are welcome and shall be indicated as such with a brief statement summarizing the changes.

5 Rights and Obligations

a) During the funding period, project partners are encouraged to participate in Helmholtz Imaging events (e.g., training offers, seminars, workshops).

b) During the funding period, projects commit to actively participate in project topic-related cross-field activities of Helmholtz Imaging to a reasonable extent, such as progress workshops, method exchange workshops or hackathons, and to present their results.

c) Projects are encouraged to seek advice from the Helmholtz Imaging Research and Support Units. It is recommended to invite members of the Helmholtz Imaging team to project kickoff or similar, to keep the team in the loop.

d) Funded projects will be supported by Helmholtz Imaging, among other things, through an annual exchange about the situation in the project.

e) Funded projects commit to acknowledging financial support through the Helmholtz Imaging projects funding line in any published output.

f) Funded project PIs commit to share short updates about their progress and ongoing related activities (e.g., for publication on the Helmholtz Imaging website) on a regular basis upon request by the Helmholtz Imaging management unit.

g) Once a year and at the end of their respective funding period, all Helmholtz Imaging Projects will submit a short written (final) report demonstrating progress and results (referencing deliverables) to Helmholtz Imaging. These reports form part of the general reporting of Helmholtz Imaging.

h) The results of a Helmholtz Imaging Project are to be made available to the imaging community as a Helmholtz Imaging Solution hosted and communicated by Helmholtz Imaging. This means, e.g., that software and algorithms must be open source (complying with an OS-approved license) and methods, reference data, reports and publications of the project results must be open access. The Helmholtz Imaging Core Team will give support in compiling the Helmholtz Imaging Solution and other project results to make them available in a sustainable way, preferably via CONNECT (see also i).

i) The Helmholtz Imaging project shall contribute to the CONNECT Database of Helmholtz Imaging. By the start of the project at the latest all involved PIs are expected to have a profile on CONNECT. Additionally, any imaging instruments and modalities utilized during the project, if not already listed, must be added to CONNECT. Towards the end of the project, it is mandatory to add all Helmholtz Imaging solutions developed as part of the project to CONNECT.

6 Applications

Helmholtz Imaging offers support for projects, which can also be very helpful at the application stage. If, for example, expertise in specific areas is missing for the implementation of the project, it can be checked together with the Helmholtz Imaging Support Hub whether gaps can be closed, e.g., via a Helmholtz Imaging Collaboration (at no additional cost). Additions to the project expertise found with the Helmholtz Imaging Support Hub can then be specified in the project proposal.

It is strongly recommended to check the need for such an addition of expertise before submitting the application.

The application consists of:

a) Cover page including English abstract (max. 0.5 page), this cover page will be automatically generated by the online submission tool based on your input,

b) Main body (max. 5 pages),

c) Appendix (work packages, deliverables, milestones, budget, CVs, information about possible resubmission),

d) The main body and the appendices shall be submitted as one pdf-document via the respective page of the online submission tool.

e) The application shall be written in English and formatted in DIN A4, Arial, 11pt, 2.5 cm margin, and single line spacing. A full template specifying the structure and formatting is provided in Appendix 1 to this call.

f) The application's main body's structure is:

1. Scientific case,
2. Uniqueness, innovation, and main goals,
3. Imaging methods, applications and/or data sets,
4. Long-term impact/ transfer potential (e.g., impact beyond academia, and sustainability, including Helmholtz Imaging Solution),
5. Implementation and management.

g) Important elements on the cover page include (information to be entered in the online submission tool):

- Title and acronym,
- Up to 10 keywords,
- Names and contact information (including department/institute/section and research group) of primary contact Helmholtz Center and person, coordinator(s) and Principal Investigator(s),
- Names of participating centers and external partners,
- budget,
- Re-submission information (if applicable, differences to previous submissions shall be explained in an appendix of one page maximum).

h) CVs of the principal investigators should be submitted in the appendix. Please indicate the relevant expertise for the project. Please note that the CVs should also contain references to relevant accomplishments beyond scientific papers and citation metrics; such accomplishments may for instance be software packages, policy papers, standards, data sets, patent filings, entrepreneurship, and industry collaborations.

i) A budget plan has to be included.

j) A declaration, usually a signed letter, by the board of directors of participating centers must be included, guaranteeing that their own funds will match at least the amount applied for from the INF.

k) The application may include a list of six unbiased independent experts with expertise relevant to the application (experts could be invited to participate in the selection process). The list should be gender balanced.

l) Revised re-submissions of previously unsuccessful Helmholtz Imaging project proposals must be accompanied by a brief description of changes applied in the appendix (max. 1 page).

m) An incomplete application may lead to the exclusion of the application from the selection procedure.

7 Evaluation process, selection, and evaluation criteria

Proposals are subject to the following evaluation procedure. Proposals are checked with regard to formal requirements. The evaluation panel, composed of independent experts from a variety of domains, performs a pre-assessment of all applications prior to its meeting. Since panel members may not be specialized in the specific domain of the applicant, it is strongly recommended to formulate the application in a manner understandable to a broad scientific audience and to dedicate sufficient effort to explaining the background. Proposals are evaluated by a panel of independent experts (no presentation). Based on this evaluation, the panel will recommend a ranked list of projects for funding. The president will review the ranked list of proposals and decide which projects shall be funded.

Proposals will be evaluated on the basis of the evaluation criteria 'innovative potential', 'methodology impact', 'research impact', and 'quality and effectivity of the implementation'.

Evaluation criteria	Aspects
Innovative potential	• Extent to which the proposed project is beyond the state of the art and demonstrates unique innovation potential in digital information processing along the imaging pipeline (e.g., ground-breaking objectives, novel concepts, and approaches), • Clarity of the objective(s), • Soundness of concept and credibility of proposed methodology,
Methodology impact	• Extent to which the output(s) of the project would contribute to advance the development, implementation, or use of the specified method, • The potential to transfer and disseminate the methods, including a concept to make the expected results a sustainable Helmholtz Imaging Solution for Helmholtz Imaging, Helmholtz, and/or external partners,
Research impact	• Extent to which the output(s) of the project would contribute to advance the specified research field(s), • Potential to contribute to establishing and strengthening long-term cooperation between the partners, • The potential to transfer and disseminate the research results,

Evaluation criteria	Aspects
Quality and effectivity of the implementation	• 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 (if applicable including the involvement of Helmholtz Imaging expertise), • Readiness of applicants to commence the project within the timeline indicated in the call.

The evaluation will be managed by the Helmholtz Association Head Office. Helmholtz Imaging is not involved in the evaluation process. At the beginning of the assessment, the Helmholtz Imaging Management Unit verifies the formal criteria.

8 Schedule

Date	Event or action
5 May 2025	Publishing of the call for Helmholtz Imaging Projects. Submissions are accepted via projects.helmholtz-imaging.de
23 May 2025 10:00-11:30	Information meeting on the application process; for agenda and registration see https://events.hifis.net/event/1464/
1 June 2025	The application portal https://projects.helmholtz-imaging.de/site/index.php will be opened.
30 July 2025	Application deadline
until end of October 2025	Assessment by the panel members, funding decision by the president.
until end of November 2025	Funding contracts between Helmholtz Association and submitting centers are being drawn up.
November 2025 onwards	Start of Helmholtz Imaging Projects

9 Additional funding via the “Generalizing Imaging Solutions Track”

The call offers the opportunity to apply for additional funding through the “Generalizing Imaging Solutions Track”. This track is designed to support projects that develop imaging solutions that can be applied out-of-the-box across multiple domains. In this sense, these projects take the core idea of Helmholtz Imaging Projects to the next level by further strengthening the cross-domain character. This goes beyond merely demonstrating conceptual potential within the project phase; it requires systematic evaluation across imaging domains, a high degree of reusability (i.e., software that can be used by most users without in-depth computational expertise), and comprehensive documentation.

Projects applying for that additional funding have the possibility to apply for an extra budget of a maximum of € 100000 (€ 50000 funded by INF plus matching fund by the same amount by the applying centers).

9.1 Background

In many cases, related imaging tasks are tackled independently within specific domains, often leading to duplicated efforts and inefficiencies. The “Generalizing Imaging Solutions Track” aims to tackle these redundancies by fostering the development of versatile imaging methods, algorithms, and software tailored to diverse use cases. By identifying and leveraging common patterns across domains, generalizing solutions enhance the scalability, impact, and adaptability of imaging solutions, enabling their application to novel domains.

A **Generalizing Solution** systematically addresses common imaging-related problems by providing methods that work across a broad range of tasks without requiring manual intervention, manual tuning of parameters, or extensive, compute-cost-intensive empirical experiments. What makes generalizing solutions particularly powerful is that it offers an out-of-the-box experience, making advanced imaging solutions accessible to users with moderate IT skills. An example is nnU-Net, which has successfully solved 3D semantic segmentation without the need for extensive model customization, demonstrating how generalizing solutions can streamline imaging workflows and maximize usability across different domains.

9.2 Objective of the additional funding in the Generalizing Imaging Solutions Track

The **Generalizing Imaging Solutions Track** aims to maximize the impact of developments across the diverse research fields of the Helmholtz Association, ensuring a more sustainable investment by serving a broader user community. The focus is on creating solutions that provide tangible value to anyone facing similar imaging challenges, regardless of their specific research domain. This goes beyond mere benchmarking—while in-depth evaluation on diverse datasets is essential to demonstrate inter-domain usability, the ultimate goal is to deliver reusable, well-documented, and user-friendly software that can be easily adopted across different fields. To ensure a degree of re-usability the developed solution shall align to the FAIR Principles for Research Software (FAIR4RS Principles)[10].

9.3 Goals & requirements

Projects applying for the additional funding track "Generalizing Imaging Solutions" shall meet the following goals and requirements in addition to the requirements listed in sections 1 to 8 above:

9.3.1 Goals

Mandatory:

- Demonstrated Cross-Domain Applicability: Present concrete examples or case studies where the imaging solution has been successfully applied in multiple domains.
- Competitiveness: The solution has to be tested against state-of-the-art methods from at least three distinct imaging domains.

[10]Chue Hong, N. P., Katz, D. S., Barker, M., Lamprecht, A.-L., Martinez, C., Psomopoulos, F. E., Harrow, J., Castro, L. J., Gruenpeter, M., Martinez, P. A., Honeyman, T., Struck, A., Lee, A., Loewe, A., van Werkhoven, B., Jones, C., Garijo, D., Plomp, E., Genova, F., … RDA FAIR4RS WG. (2022). FAIR Principles for Research Software (FAIR4RS Principles) (1.0). Zenodo. https://doi.org/10.15497/RDA00068

- The software shall align with the FAIR Principles for Research Software (FAIR4RS Principles) and include a user-friendly interface for scientists without a computational background.
- Beneficial: Ensure Scalability and Flexibility: Design solutions that can be easily adapted or scaled to meet the specific needs of different application areas, for example by providing a plan for scalable cloud computing capability or workflow integration.
- Interoperability: Develop standards or interfaces that facilitate the integration of imaging solutions into various systems and workflows across domains.

9.3.2 Requirements for the proposal:

- List at least three distinct imaging domains the generalization aims for.
- Include a concept to prove the applicability of the proposed developments to the aforementioned imaging domains (e.g., identification of representative benchmarks or challenges).
- Describe how you want to ensure best practices in research software developments (testing, versioning, documentation, (re-)usability).
- Describe how you aim to provide a user-friendly solution which aligns with the FAIR Principles for Research Software (FAIR4RS Principles).
- (Optional) Sketch the interfaces (APIs) to facilitate the integration of imaging solutions into various systems and workflows across domains.

9.4 Criteria, Rights and Obligations, Applications

In addition to the requirements in section 9, the requirements described in sections 1 to 8 must also be met by projects applying for the additional funding.

For this “Generalizing Imaging Solutions Track” the consultation with the HIFIS Software Engineering Consulting Team is compulsory.

Projects applying for the “Generalizing Imaging Solutions Track” funding can apply for an extra budget of a maximum of € 100000 (€ 50000 funded by INF plus matching fund by the same amount by the applying centers).

9.5 Evaluation criteria

For projects applying for the additional “Generalizing Imaging Solutions Track”-funding the following specific criteria will be applied during the evaluation process:

Evaluation criteria	Aspects
Generalizing Imaging Solution	• Planned Effectiveness Across Domains: Strategies and methodologies to achieve effectiveness in multiple applications. • Adaptability and Scalability: Approaches to design the solution for flexibility and growth across different domains. • Interoperability: Development or usage of standards or interfaces that facilitate integration into various systems. • Software Quality Assurance Plan: Alignment with FAIR Principles to ensure quality, accessibility, and reusability of the software.

10 Contact information

For further inquiries, please contact:

- Helmholtz Imaging: Knut Sander via projects@helmholtz-imaging.de
- Helmholtz Head Office: Florian Grötsch via florian.groetsch@helmholtz.de

11 Appendices

- Application template (Proposal template for proposal submission, Templates for budget tables, Template for Gantt Chart, Template for CV, Template for additional funding)
- Criteria for bias/ conflict-of-interest (for suggested reviewer),
- Data protection information.