2024 Open Call of the Scientific Software Center

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The Scientific Software Center

IWR

manages
supervises

Funding through ExStr*.

SSC - a research incubator at Heidelberg University

Researchers of Heidelberg University
All faculties, all career levels >= PhD student

Industrial Partners

Software Transfer
Stable Interface

Knowledge Transfer

Consulting
SE Teaching
Development
Synergy Identification

*the SSC receives its core funding through the Exzellenzuniversität initiative
The SSC’s target group

Users of specialized software/libraries
- Research critically depends on digital tools and specialized research software
- Adaptation of software to specific needs
- The generated data is used to provide scientific insight

Developers of own specialized software/libraries
- Software development and method development are core concepts that the research is based on
- The developed methodology and generated data are used to provide scientific insight
SSC mission and team

SSC Team

- Currently six Research Software Engineers (RSEs)
- Shared leadership:
  - Liam Keegan
  - Dominic Kempf
  - Inga Ulusoy
- System Administrator
- Administrative Support
Previous Open Call projects

2023:
- Improve performance of a Python photonic and acoustic simulation toolkit
- Refactoring a legacy fortran physics simulation codebase
- Best practices and software development guidance for a new astrophysics project
- Refactor, extend and add a GUI to a pipeline that quantifies cell morphology from electron microscopy
- Similarity search as a web service for identifying cultural heritage monuments from Nepal

2022:
- Image analysis
- Text analysis
- Training of NLP models
- Generation of experiments in motor skill acquisition
- Modernize existing research software and apply SE best practices
- Improve maintainability and portability of existing research software

2021:
- Automated text annotation
- Neuroscience data processing
- GUI development for existing research software
- High-performance C++ implementation of existing Python code
- Python interface to research software including data transformations and GUI components

https://ssc.iwr.uni-heidelberg.de/open-call-projects
What can you apply for in this call?

- Custom development of **new scientific software** for a research project
- Addition of **new functionality** into existing research software
- Development that **increases the software quality** of existing research software (e.g. performance, scalability, portability, usability, reusability etc.)
- Adoption of **best practices** for the development of scientific software

** SSC **

Research Software Engineers

** Your research group **

Software development aspects of your research

workforce
Example 1: Custom development of new scientific software

Great research idea: Expand into new methodological area

Methodology/concept has been developed on paper or in other research group; proof of concept

Implementation of the methodology using efficient algorithms and modern libraries

Test suite that ensures reproducibility; set up continuous integration

Documentation of the Software using modern tools and platforms; tutorials/examples

Version control and licensing models

Contribution of the SSC
e.g. 6 months of workforce

Your research group
- students
- Postdocs

knowledge transfer
Example 2: New functionality

**New Research Question**

**New User Base**

**Changes to State of the Art**

**New Requirements**

**Contribution of the SSC**, e.g. 1-3 months

Many important new features do not touch on the scientific core of a piece of research software, but rather require pure engineering work.

The SSC can develop new features e.g.
- New output/input formats
- Bridging two pieces of research software
- Alternative Algorithms
- Restructure software to enable new research methodology
- ...

**Existing piece(s) of research software**

- Self-developed program/framework
- Open Source Project
- Lab Code/Script
- Data Processing Workflow
- Database System

**Addition**
Example 3: Increase quality of existing research software

Contribution of the SSC
E.g. 3 months of workforce

Existing research software that has been developed in your group
- Low performance
- Low parallel scaling
- Dependence on a specific set of libraries (possibly outdated)

Analysis and improvement of serial performance
Analysis and improvement of parallel performance
Suggestion and implementation of interface to alternative libraries; updated build system

Involvement of students/postdoc knowledge transfer

Other examples could involve:
- Portability of the software (different environments/operating systems)
- Usability (user interface, code structure)
- Reusability (generalization of the software)
- ...
Example 4: Adoption of best practices

**Status Quo:** A research group develops a lab code that is passed on from PhD generation to generation. Everybody adds functionality and examples from their work.

- Code divergence
- Insufficient Testing
- “Grown” software design
- Lack of Documentation

**SSC Contribution:** A developer joins the group and introduces best practices that follow the state of the art in software development.

- Introducing Git + GitHub/GitLab
- Setting up CI + Introducing testing frameworks
- Code refactoring: Software Design consultation + Sprint supervision
- Introducing documentation tools E.g. Sphinx + Doxygen

**Implementation:** We set up tools and configurations for the group

**Training:** We teach the group to enable long term improvement
How to apply

- Applications can be submitted online:
  - [www.ssc.uni-heidelberg.de/en/development/the-sscs-open-call](http://www.ssc.uni-heidelberg.de/en/development/the-sscs-open-call)
  - [https://limesurvey.urz.uni-heidelberg.de/index.php/189384](https://limesurvey.urz.uni-heidelberg.de/index.php/189384)

- Applications can be written in English or German.
Evaluation criteria and process

The decision is taken by the scientific board of the SSC.

Criteria:

- Feasibility statement of the SSC
- Scientific merit of the proposal
- Clarity of what is expected from the SSC
- Leverage of project outcome
- Criteria about applicant:
  - Enabling interdisciplinary collaborations
  - Supporting Early Career Researchers
  - Aiding equal opportunities
Question Time!
Get in touch!

By email:

- scs@uni-heidelberg.de

Or have a closer look at our services on our website:

- https://ssc.uni-heidelberg.de