



**BETTER
SOFTWARE
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```
import heat as ht          # HeAT for distribu
import opencarp as oc      # Hypothetical Open

# Initialize tissue domain (e.g., 1000 cardiac cells)
num_cells = 1000
domain = ht.zeros(num_cells, split=0) # distributed over

# Set up initial membrane potential (e.g., -85 mV)
Vm = ht.full((num_cells,), -85.0, split=0)

# Load a simplified OpenCARP cell model (e.g., ten Tusscher)
model = oc.models.TenTusscher()

# Time stepping loop (simplified)
dt = 0.01 # ms
for t in range(1000): # simulate 10 ms
    I_ion = ht.array([model.compute_ionic_current(v) for v in Vm])
    Vm += dt * (-I_ion) # Update Vm based on ionic current

# Output final Vm
if ht.comm.rank == 0:
    print("Final Vm snapshot:", Vm[:10])
```

2nd Workshop on Research Software Engineering (RSE) @ KIT

Achim Streit

Software in Research – Research Software

- Netherlands eScience Center Strategy Paper “**Raising the Profile of Research Software: Recommendations for Funding Agencies and Research Institutions**”,
([DOI: 10.5281/zenodo.3378572](https://doi.org/10.5281/zenodo.3378572))
 - *“If open science is to truly lead towards better, more transparent, and reproducible research, then research software needs to be treated in equal footing to research data and publications at the policy level and in practice.”*

(Open
Source)
Research
Software

=

- Key component of scientific work
- Software \approx data \approx devices
- Software = research infrastructure
- Valuable assets

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Sources: <https://www.software.ac.uk/about>

What is Research Software Engineering (RSE)?

https://en.wikipedia.org/wiki/Research_software_engineering

- **Research software engineering** is not, as the name might suggest, just the use of [software engineering](#) practices, methods and techniques for [research](#) software, i.e. software that was made for and is mainly used within research projects. It also includes aspects of other (varying) research fields as well as [open science](#).^{[1][2]} The term was proposed in a research paper in 2010 in response to an empirical survey on tools used for software development in research projects.^[3] It started to be used in [United Kingdom](#) in 2012,^{[4][5]} when it was needed to define the type of software development needed in research. This focuses on [reproducibility](#), [reusability](#), and accuracy of data analysis and applications created for research.^[6]

ChatGPT: What is Research Software Engineering in 2 sentences?

- Research Software Engineering (RSE) is the practice of developing, maintaining, and optimizing software that enables and supports scientific research. It combines deep knowledge of research domains with professional software engineering skills to ensure software is reliable, sustainable, and reproducible in a research context.

Research Software in the KIT Strategy 2025, Chapter 9 Digitalization

Aim 9.1.5 (Research Software):

- "KIT understands Research Software Engineering (RSE) and the development of research software as an essential task in the digitized research process and strives for new research projects, which are increasingly data and computation intensive."
- Source: <https://www.sts.kit.edu/kit2025.php> and https://www.sts.kit.edu/downloads/intern/kit_2025_strategiepapier.pdf (only available in German, freely translated)

Measure 9.1.5.1: "Support and expansion of the Research Software Engineering (RSE)"

➔ KIT-internal, unfunded Project LP 9.1.4 „Research Software“



LP 9.1.4 Research Software


„Projektsteckbrief“ developed in Q4-2022

- Project owners: VP Kraft and VP Kristof
- Project lead: Achim Streit (SCC)
- Project Team: René Caspart (SCC), Tim Drees / Felix Böhringer (RECHT), Jürgen Engelmann (IAI), Dirk Feuchter (IRM), Jörg Meyer (SCC)
- Project Duration: Q1-2023 – Q2-2025

Work Packages

1. Identification of services and support offers for research software at KIT
2. Requirements and communication
3. Impulses for license and legally compliant development and distribution of research software

LP 9.1 Dig. in Forschung und Innovation
9.1.4 Forschungssoftware 1/2



MASNAHMENZUORDNUNG

M9.1.5.1 Unterstützung und Ausbau des Research Software Engineerings

M9.1.7.1 Förderung und Transfer innovativer digitaler Lösungen (Technologien, Geschäftsideen und Grundlagen)

■ **Project-Owner:** VP F und VP D
■ **TP-Leitung:** SCC-D Achim Streit
■ **Projektstart:** 2022 (wg. Strategie-Entwicklung RSE)
■ **Bezug zu anderen Projekten:** tbd
■ **Anmerkung:** Beinhaltet „Unterstützung und Ausbau des RSE; Förderung und Transfer innovativer digitaler Lösungen“

Zielsetzung:

■ Das KIT begreift Research Software Engineering und die Entwicklung wissenschaftlicher Software als eine wesentliche Aufgabe im digitalisierten Forschungsprozess und strebt neue Forschungsvorhaben an, deren Bearbeitung zunehmend daten- und rechenintensiver wird.

10 09/2022

https://www.do.kit.edu/english/lead-project-digitalization_728.php

Project Activities

- 2-monthly online meetings of the project team
- Bi-yearly meetings of all LP 9.1.x project leads
- Regular reports of the project status in IV-Governance bodies and to the project owners
- 1st Workshop on RSE @ KIT on May 9, 2023
 - <https://www.scc.kit.edu/en/aboutus/16927.php>
- 2nd Workshop on RSE @ KIT today
 - <https://indico.kit.edu/event/4819/>

All further results from the work packages of LP 9.1.4 will be presented in the following talks

