



SOCIETY FOR  
RESEARCH SOFTWARE

“An environment for sustainable research  
software in Germany and beyond”

An update on *de-RSE*

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# Soc. f. Res. Soft.! Now what?

Development process

The development process for positions of the Society has been developed by its members and can be changed by its members if the need arises. It has three phases, which are set up as follows.

- 1. Call and work phase**
  - Call for Collaboration:** Initiators of a position announce the topic on the Society's mailing list ([rl@de-rse.org](mailto:rl@de-rse.org)), with subject [\[call for contributions\]](#), and invite all members to collaborate. The call names main authors of the position text, and explains the prerequisites for authorship.
  - Collaboration:** Collaboration starts on a - preferably public - platform of the initiators' choice (PaaS, repository, hackmd.io, Overleaf, etc.). At the same time, the project is presented and linked to on the de-rse.org website under "Positions" -> "Work in progress" (see Pull Request against the Positions pages (see) on <https://github.com/DE-RSE/de-rse.github.io>).
- 2. Review phase**
  - Publication:** Once a draft is deemed ready for publication, it is published for review:
    - If the position is to be published on the de-RSE website under "Positions", a respective pull request (PR) is created against <https://github.com/DE-RSE/positions/> (Draft files in a dedicated subfolder).
    - If the position is to be published in another format, a respective issue is created on <https://github.com/DE-RSE/projects>, which contains a link to the draft.
  - Call for reviews:** The draft publication is announced on the mailing list ([rl@de-rse.org](mailto:rl@de-rse.org)), with subject [\[call for reviews\]](#), and the link to the respective issue/PR is provided. All members are invited to review the draft until a suitable date.
  - Reviews:** Members review the draft publicly in the PR/issue. Should the draft initiate a controversial discussion, the PR/issue is marked with the label [\[controversial\]](#). Controversial discussions/reviews are those which, in a peer review process, would lead to a rejection or "major revision" decision.
- 3. Decision phase**
  - Decision:** The board decides if the developed position is to be classified as an "official" position of de-RSE e.V. - Society for Research Software:
    - When review discussions are not labeled as controversial, decisions on a position are made by at least one member of the board.
    - When review discussions are labeled as controversial, the board aims to make a decision by consensus. If no consensual agreement can be arrived at, the board makes a decision based on a simple majority vote.
  - Implementation:** An approval for publication as a position of de-RSE e.V. is implemented either by merging and closing the respective issue or pull request and publication of the position on the website, or through an approval comment in and subsequent closing of the respective issue or pull request. If a position draft is not approved, the board can either return the draft to the authors for revision, and note this in the respective issue/PR together with indication of necessary changes, or reject the draft, and close the respective issue/PR with a suitable comment, in which case the position will not be published.



DFG Deutsche Forschungsgemeinschaft

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### Call for Proposal "Research Software Sustainability"

In every phase of scientific work, many disciplines use research software, for example to generate, process, analyse and visualise research data. In this sense, the term "research software" refers to the software applications and software libraries specially created for scientific knowledge gain.

- 1) Call and work phase
- 2) Review phase

- 3) Decision phase
- 4) Publication

See next slide ...

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### An environment for sustainable research software in Germany and beyond: current state, open challenges, and call for action [version 1; peer review: 1 approved, 1 approved with reservations]

Hartwig Anzt<sup>1\*</sup>, Felix Bach<sup>2\*</sup>, Stephan Druskat<sup>3,4\*</sup>, Frank Löffler<sup>2,6\*</sup>, Axel Loewe<sup>7\*</sup>, Bernhard Y. Renard<sup>8\*</sup>, Gunnar Sieermann<sup>9\*</sup>, Alexander Struck<sup>10\*</sup>, Elke Achhammer<sup>11</sup>, Prash Agarwal<sup>12</sup>, Franziska Appel<sup>13</sup>, Michael Bader<sup>14</sup>, Lutz Brusch<sup>15</sup>, Christian Busse<sup>16</sup>, Gerasimos Chouridakis<sup>17</sup>, Piotr Wojciech Dabrowski<sup>18</sup>, Peter Ebert<sup>19</sup>, Bernd Flemisch<sup>20</sup>, Sven Friedl<sup>21</sup>, Bernadette Fritzsche<sup>22</sup>, Maximilian D. Funk<sup>23</sup>, Volker Gaal<sup>24</sup>, Florian Goth<sup>25</sup>, Jean-Noël Grad<sup>26</sup>, Sibylle Hermann<sup>27</sup>, Florian Hohmann<sup>28</sup>, Stephan Janesch<sup>29</sup>, Dominik Kutra<sup>30</sup>, Jan Linxweiler<sup>31</sup>, Thilo Muth<sup>32</sup>, Wolfgang Peters-Kottig<sup>33</sup>, Fabian Rack<sup>34</sup>, Fabian H.C. Raters<sup>35</sup>, Stephan Rave<sup>36</sup>, Guido Reina<sup>37</sup>, Mahe Reifig<sup>38</sup>, Timo Roginski<sup>39</sup>, Joerg Schwanenbach<sup>40</sup>, Heidi Seibold<sup>41</sup>, Jan P. Thiele<sup>42</sup>, Benjamin Uekermann<sup>43</sup>, Stefan Unger<sup>44</sup>, Rudolf Weeber<sup>45</sup>

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Open Peer Review

Reviewer Status: 1 approved, 1 approved with reservations

Reviewer	Version 1	Version 2
1. Will Hasselbring	read	read
2. Radwan Bast	read	read

Comments on this article: All Comments (1)

**An Environment for Sustainable Research Software in Germany and Beyond: Current State, Open Challenges, and Call for Action**

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**Abstract**

Research software has become a central asset in academic research. It optimizes existing and enables new research methods, implements and embeds research knowledge, and constitutes an essential research product in itself. Research software must be sustainable in order to understand, replicate, reproduce, and build upon existing research or conduct new research effectively. In other words, software must be available, discoverable, usable, and adaptable to new needs, both now and in the future. Research software therefore requires an environment that supports sustainability. Hence, a change is needed in the way research software development and maintenance are currently motivated, incentivized, funded, structurally and infrastructurally supported, and legally treated. Failing to do so will threaten the quality and validity of research. In this paper, we identify challenges for research software sustainability in Germany and beyond, in terms of motivation, selection, research software engineering, personnel, funding, infrastructure, and legal aspects. Besides researchers, we specifically address political and academic decision-makers to increase awareness of the importance and needs of sustainable research software practices. In particular, we recommend strategies and measures to create an environment for sustainable research software, with the ultimate goal to ensure that software-driven research is valid, reproducible and sustainable, and that software is recognized as a first class citizen in research. This paper is the outcome of two workshops run in Germany in 2019, at deRSEip - the first International Conference of Research Software Engineers in Germany - and a dedicated DFG-supported follow-up workshop in Berlin.

**Key words:** Sustainable Software Development; Academic Software; Software Infrastructure; Software Training; Software Licensing; Research Software

**Aims:**

- 1) Highlight the **importance** of research software
- 2) Stress the importance of software **sustainability**
- 3) Identify **challenges** (partly specific to Germany)
- 4) Address decision-makers to increase **awareness**
- 5) Recommend **strategies** & measures

**Topic areas:**

- Motivation (for sustainable software)
- Selection processes
- **RSEs**
- Funding
- Infrastructure
- Legal aspects

# CS: Motivation for sustainability

## An Environment for Sustainable Research Software in Germany and Beyond: Current State, Open Challenges, and Call for Action

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### Abstract

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## Claims:

- 1) All stakeholders benefit
- 2) Motivations differ

- General public
- Domain researchers
- RSEs
- Research leaders & organizations
- Funders
- Geopolitical units
- Infrastructure providers
- Industry
- OS developers

# Q: Selection processes

POSITION PAPER #001 (06 May 2020)

## An Environment for Sustainable Research Software in Germany and Beyond: Current State, Open Challenges, and Call for Action

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### Abstract

Research software has become a central asset in academic research. It optimizes existing and enables new research methods, implements and embeds research knowledge, and constitutes an essential research product in itself. Research software must be sustainable in order to understand, replicate, reproduce, and build upon existing research or conduct new research effectively. In other words, software must be available, discoverable, usable, and adaptable to new needs, both now and in the future. Research software therefore requires an environment that supports sustainability. Hence, a change is needed in the way research software development and maintenance are currently motivated, incentivized, funded, structurally and infrastructurally supported, and legally treated. Failing to do so will threaten the quality and validity of research. In this paper, we identify challenges for research software sustainability in Germany and beyond, in terms of motivation, selection, research software engineering personnel, funding, infrastructure, and legal aspects. Besides researchers, we specifically address political and academic decision-makers to increase awareness of the importance and needs of sustainable research software practices. In particular, we recommend strategies and measures to create an environment for sustainable research software, with the ultimate goal to ensure that software-driven research is solid, reproducible and sustainable, and that software is recognized as a first class citizen in research. This paper is the outcome of two workshops run in Germany in 2019, at deRSIP – the first International Conference of Research Software Engineers in Germany – and a dedicated DFG-supported follow-up workshop in Berlin.

**Key words:** Sustainable Software Development; Academic Software; Software Infrastructure; Software Training; Software Licensing; Research Software

**Hypothesis:** Not all software can be funded

**Q:** Criteria for selection?

1. Usage and impact (5 criteria)
2. Software quality (10 criteria)
3. Maturity (5 criteria)

**Recommendations:**

1. Screening (software/scientific quality)
2. Open review
3. Funding based on iterative evaluation

# Q: Sustainability

**Q:** Whoyougonnacall?

**A:** Codecollapsebusters! **RSEs!**

**An Environment for Sustainable Research Software in Germany and Beyond: Current State, Open Challenges, and Call for Action**

Hartwig Anzt<sup>1,2,3,4</sup>, Felix Rack<sup>5,6</sup>, Stephan Druskat<sup>4,5,7</sup>, Frank Löffler<sup>2,3,4</sup>, Axel Loewh<sup>8,9,10</sup>, Bernhard Y. Remar<sup>10,11</sup>, Gunnar Seemann<sup>12,13,14</sup>, Alexander Struck<sup>15</sup>, Elke Achhammer<sup>16</sup>, Piyush Aggarwal<sup>17</sup>, Franziska Appert<sup>18</sup>, Michael Bader<sup>19</sup>, Lutz Busch<sup>20</sup>, Christian Busse<sup>21</sup>, Gerasilmos Chourakis<sup>22</sup>, Piotr W. Dabrowski<sup>23</sup>, Peter Eber<sup>24</sup>, Bernd Flemisch<sup>25</sup>, Sven Friedl<sup>26</sup>, Bernadette Fitzbach<sup>27</sup>, Maximilian D. Frank<sup>28</sup>, Volker Gane<sup>29</sup>, Florian Geth<sup>30</sup>, Jean-Noël Graff<sup>31</sup>, Shybe Herrmann<sup>32</sup>, Florian Hohmann<sup>33</sup>, Stephan Janosch<sup>34</sup>, Dominik Kurta<sup>35</sup>, Jan Linxweil<sup>36</sup>, Thilo Math<sup>36,37</sup>, Wolfgang Peters-Kottig<sup>38</sup>, Fabian Rack<sup>37</sup>, Fabian H.C. Raters<sup>38</sup>, Stephan Rave<sup>39</sup>, Guido Reina<sup>40</sup>, Malte Reiffig<sup>41</sup>, Timo Ropinski<sup>42,43</sup>, Joerg Schaarschmidt<sup>44</sup>, Heidi Seibold<sup>45,46,47</sup>, Jan P. Thiele<sup>48</sup>, Benjamin Uekerman<sup>49</sup>, Stefan Unger<sup>50</sup> and Rudolf Weeber<sup>51</sup>

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**Key words:** Sustainable Software Development; Academic Software; Software Infrastructure; Software Training; Software Licensing; Research Software

- RSEs make software more sustainable, **but**

1. No (little?) awareness/recognition
2. No career options
3. Lack of formal training

## Recommendations:

1. RSE role & career structures
2. Education & training
3. Resources for community-building

# CC: Funding

POSITION PAPER #001 (06 May 2020)

## An Environment for Sustainable Research Software in Germany and Beyond: Current State, Open Challenges, and Call for Action

Hartwig Anzt<sup>1,2,3</sup>, Felix Koch<sup>1,3</sup>, Stephan Druskat<sup>4,5,6,7</sup>, Frank Löffler<sup>2,8,9</sup>, Axel Lowow<sup>6,7,9</sup>, Bernhard V. Reiser<sup>10,11</sup>, Gunnar Semmann<sup>12,13,14</sup>, Alexander Struck<sup>14,5</sup>, Elke Achhammer<sup>15</sup>, Pius Aggarwal<sup>16</sup>, Franziska Appel<sup>17</sup>, Michael Bader<sup>18</sup>, Lutz Busch<sup>19</sup>, Christian Bruse<sup>20</sup>, Gerassimos Chourakis<sup>21</sup>, Piotr W. Dabrowski<sup>22</sup>, Peter Ebert<sup>23</sup>, Bernd Flemisch<sup>24</sup>, Sven Friedl<sup>25</sup>, Bernadette Fritzsche<sup>26</sup>, Maximilian D. Funk<sup>27</sup>, Volker Gane<sup>28</sup>, Florian Gohl<sup>29</sup>, Jean-Noël Graff<sup>30</sup>, Sibylle Herrmann<sup>31</sup>, Florian Hohmann<sup>32</sup>, Stephan Janosch<sup>33</sup>, Dominik Kutra<sup>34</sup>, Jan Linxweiler<sup>35</sup>, Thilo Math<sup>36,37</sup>, Wolfgang Peters-Kottig<sup>38</sup>, Fabian Rack<sup>37</sup>, Fabian H.C. Raters<sup>39</sup>, Stephan Rave<sup>40</sup>, Guido Reina<sup>41</sup>, Malte Reiffers<sup>42</sup>, Timo Ropinski<sup>43,44</sup>, Joerg Schaarschmidt<sup>44</sup>, Heidi Seibold<sup>45,46,47</sup>, Jan P. Thiele<sup>48</sup>, Benjamin Uekerman<sup>49</sup>, Stefan Unger<sup>50</sup> and Rudolf Weeber<sup>51</sup>

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**Key words:** Sustainable Software Development; Academic Software; Software Infrastructure; Software Training; Software Licensing; Research Software

## Four pillars:

1. Education and training
2. RSEs
3. Infrastructure
4. Community management and events

**Challenges:** e.g., fixed-term contracts & legal restrictions (§); dynamic hardware evolution; expertise; community funding

## Recommendations:

New funding schemes for

- Longer-term software funding
- Dedicated sust. resources (CC/HPC)
- OERs, documentation, community care

## OCI: Infrastructure

- Project management tools
- Training, knowledge exchange
- Software publication & discovery
- Archiving

POSITION PAPER #001 (06 May 2020)

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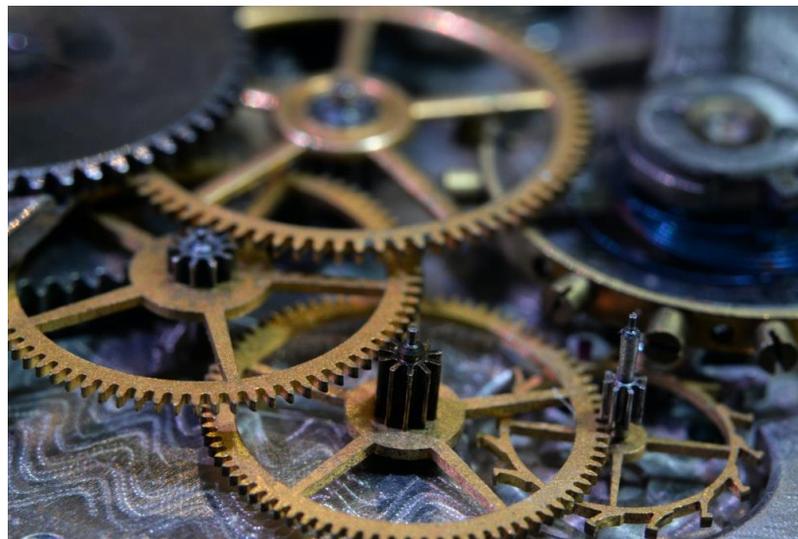


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# CC: Legal aspects

## An Environment for Sustainable Research Software in Germany and Beyond: Current State, Open Challenges, and Call for Action

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### Abstract

Research software has become a central asset in academic research. It optimizes existing and enables new research methods, implements and embeds research knowledge, and constitutes an essential research product in itself. Research software must be sustainable in order to understand, replicate, reproduce, and build upon existing research or conduct new research effectively. In other words, software must be available, discoverable, usable, and adaptable to new needs, both now and in the future. Research software therefore requires an environment that supports sustainability. Hence, a change is needed in the way research software development and maintenance are currently motivated, incentivized, funded, structurally and infrastructurally supported, and legally treated. Failing to do so will threaten the quality and validity of research. In this paper, we identify challenges for research software sustainability in Germany and beyond, in terms of motivation, selection, research software engineering personnel, funding, infrastructure, and legal aspects. Besides researchers, we specifically address political and academic decision-makers to increase awareness of the importance and needs of sustainable research software practices. In particular, we recommend strategies and measures to create an environment for sustainable research software, with the ultimate goal to ensure that software-driven research is solid, reproducible and sustainable, and that software is recognized as a first class citizen in research. This paper is the outcome of two workshops run in Germany in 2019, at deRSE - the first International Conference of Research Software Engineers in Germany - and a dedicated DFG-supported follow-up workshop in Berlin.

**Key words:** Sustainable Software Development; Academic Software; Software Infrastructure; Software Training; Software Licensing; Research Software

## Challenges:

- Knowledge and awareness
- Chain of rights
- Identification of right holders
- (Liability)

## Recommendations:

- Document chain of rights
- Use FLOSS licenses
- Institutional research software task forces

# de RSE: Donus

de RSE | SOCIETY FOR RESEARCH SOFTWARE

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## An Environment for Sustainable Research Software in Germany and Beyond: Current State, Open Challenges, and Call for Action

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### Abstract

Research software has become a central asset in academic research. It optimizes existing and enables new research methods, implements and embeds research knowledge, and constitutes an essential research product in itself. Research software must be sustainable in order to be sustained, replicate, reproduce, and build upon existing research to conduct new research effectively. In other words, software must be available, discoverable, usable, and adaptable to new needs, both now and in the future. Research software therefore requires an environment that supports sustainability. Hence, a change is needed in the way research software development and maintenance are currently motivated, incentivized, funded, structurally and infrastructurally supported, and legally treated. Failing to do so will threaten the quality and validity of research. In this paper, we identify challenges for research software sustainability in Germany and beyond, in terms of motivation, selection, research software engineering personnel, funding, infrastructure, and legal aspects. Besides researchers, we specifically address political and academic decision-makers to increase awareness of the importance and needs of sustainable research software practices. In particular, we recommend strategies and measures to create an environment for sustainable research software, with the ultimate goal to ensure that software-driven research is solid, reproducible and sustainable, and that software is recognized as a first-class citizen in research. This paper is the outcome of two workshops run in Germany in 2019, at deRSEip - the first International Conference of Research Software Engineers in Germany - and a dedicated DFG-supported follow-up workshop in Berlin.

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Meet Kim, who is currently a post-grad PhD student in researchonomy at the University of Arcadia (UofA). We will follow Kim's fictional career in order to understand different aspects of research software sustainability.



# In other news ...

## **Surveying the German RSE landscape**

- 15 self-identified groups
- Different funding models (mostly underwritten + project grants)
- 3 university groups
- Rocket Science .. Romano-Germanic Archaeology



# In other news ...

## **Working Groups (forthcoming)**

1. Job description & vacancy templates
2. de-RSE Leaders Meeting
3. Training & Carpentries in Germany via de-RSE
4. NFDI
5. ~~Conference~~

**Qs:** Are these good topics to start with?  
What do we need to know?



# Thanks!

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Talk to me on the UK RSE Slack 😊

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