



Growing awareness of the importance of research software and the people who develop it

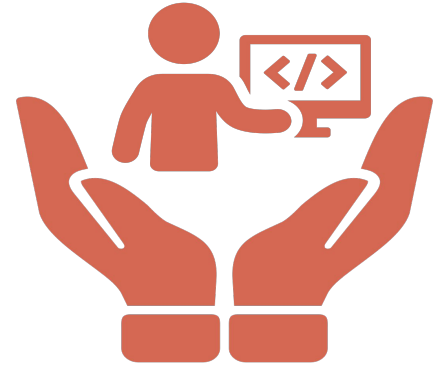
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ZA·REN Week '23
Cape Town
South Africa
<https://chpccconf.co.za/>



Why should we
care about
research
software and
the people who
develop it?



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Why do you think research software is important?

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Defining research software



Research software includes source code files, algorithms, scripts, computational workflows, and executables that were created during the research process or for a research purpose.

Different from “software in research” e.g. operating systems, libraries, dependencies, etc.

Gruenpeter, Morane, et al. (2021) doi.org/10.5281/zenodo.5504016z

When is research software used?

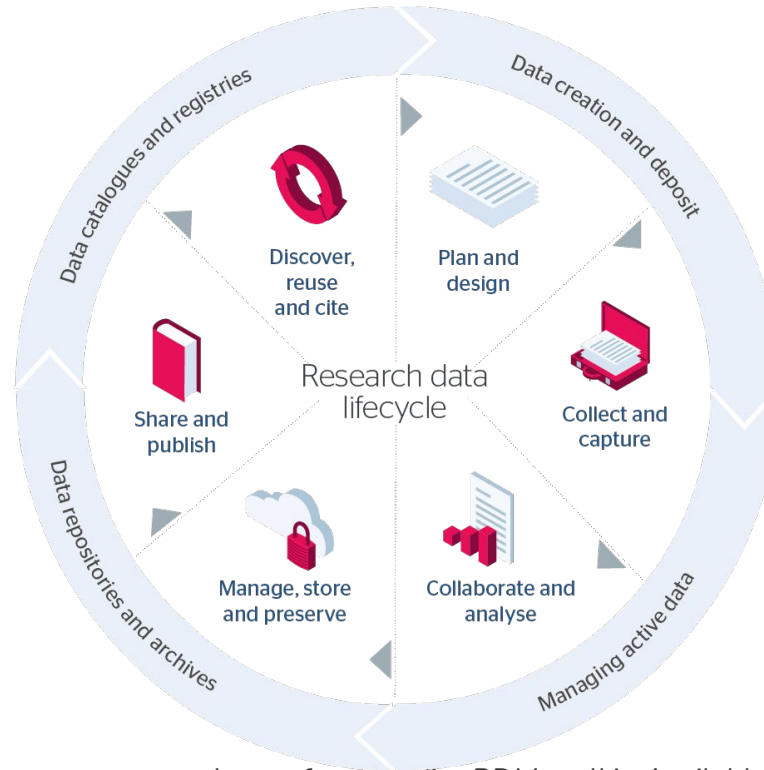


Image from the Jisc RDM toolkit. Available at [link](#) published under [CC BY-NC-ND](#)

Some statistics about research software

“Between 1995 and 2016, the National Science Foundation awarded **\$9.6 billion** in funding to projects that included software in their abstracts.[1]

80% of articles published in Science and Nature explicitly mention research software.[2]

95% of researchers report using research software, and 2/3 could not do their research without it.[3]

On average, scientists spend **30% of their time developing** research software and **40% of their time using** research software.[4]”

Christina Maimone. (2019). North Western Research Computing and Data Services Updates, Events, and Resources. ([link](#))

25%

International research produces new code!

OECD International Survey of Science 2018
<https://www.oecd-ilibrary.org/docserver/1b06c47c-en.pdf>

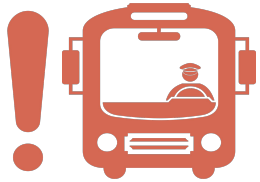
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>57% of projects: bus factor ≤ 1

“Bus factor: A measure of the number of developers who understand a specific software project and could, with only a cursory review of the project, maintain or extend the code.



BF = 1 : project is completely reliant on only one developer.

If this developer finds new employment, becomes ill or is hit by the proverbial bus, the project will fail.”

RSE International Survey , 2022

<https://softwaresaved.github.io/international-survey-2022/>

Who are the people developing research software?

- > 55% PhD
- > 40% not professional software developers
- > 20% previously in industry job
- > 50% part of a dedicated research software group in institution
- > 53% work as sole software developer or in a team of two
- ~ 49% use open source licenses for their code all the time



RSE International Survey , 2022
<https://softwaresaved.github.io/international-survey-2022/>



What do we know about the state of South African or African research software and the people who develops it?



We have a growing repertoire of software-producing research projects on the continent including

- astronomy
- genomics/bioinformatics
- machine learning applications
- health and public health
- geospatial
- physics
- computational social sciences
- digital humanities
- and more...

African respondents in SSI surveys since 2017

2017

South Africa: 22

2018

South Africa: 23
Botswana: 2
Malawi: 1
Nigeria: 1
Mauritius: 1
Ethiopia: 1

2022

South Africa: 2

2017 & 2018 survey: <https://github.com/software saved/international-survey>

2022 survey: <https://github.com/software saved/international-survey-2022>

African research software stakeholders mapped

ReSA 2022: Benin, Botswana, Cameroon, Democratic Republic of the Congo (DRC), Ghana, Kenya, Namibia, Nigeria, and South Africa.

39 Communities or organisations involved in Research Software

In South Africa:

- South African National Bioinformatics Institute
- Council for Scientific and Industrial Research
- UCT eResearch
- RSE at SUN

Martinez, Paula Andrea. (2022) doi.org/10.5281/zenodo.7179892

African research software stakeholders map v2.0

Talarify 2023: 26 African countries (67 in South Africa)

Type	Number mapped
Community	78
Research organisation	52
Research group	19
Training provider	7
Research infrastructure	5
Research software project	2
National Research and Education Network	1
Civic Tech organisation	1
Advisory body	1

Nomalungelo Maphanga, & Anelda Van der Walt. (2023). doi.org/10.5281/zenodo.7594454

Research Software Indaba - South Africa 2023



Is your organisation involved in...	Responses
Research software or systems (data/compute) development and/or maintenance for in-house research	16
Employ research software or infrastructure developers	13
Training in research software or infrastructure development, maintenance, etc.	13
Research software or systems (data/compute) development and/or maintenance as a service to others	11
Provide access to specialised infrastructure on which research software runs (cloud/HPC)	10
Develop policies related to the research software ecosystem	9
Provide funding for research software projects, infrastructure, research, training, etc	8
Research software project management	8
Other	8

Anelda Van der Walt, & Noxolo Chalale. (2023). doi.org/10.5281/zenodo.7980636

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<https://researchsoft.org/>

International Research Funders Workshop '23



[Funders Workshop](#) [About](#) [Declaration](#) [News](#) [FAQ](#) [Toolkit](#) [Contact](#) [🌐](#)

GET INVOLVED

International Research Software Funders Workshop

Amsterdam Declaration on Funding Research Software Sustainability (1.0).

<https://doi.org/10.5281/zenodo.8325436>

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Huge opportunities to benefit from work done globally since 2010 for

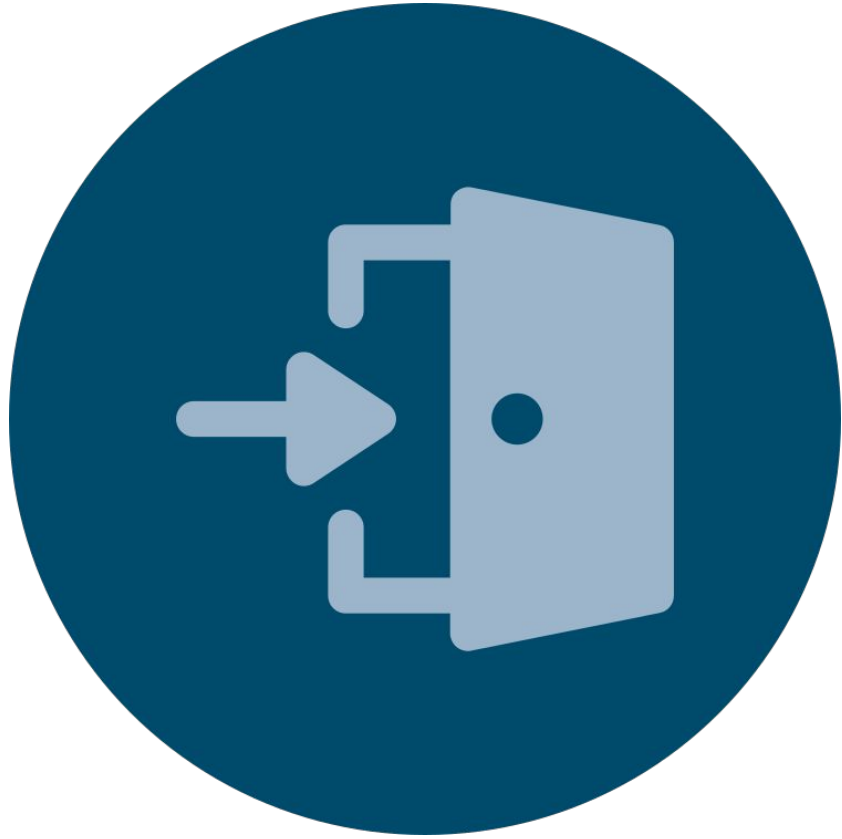
- individuals
- institutions
- research groups
- funders



<https://talarify.co.za>

<https://rsse.africa/>

<https://researchsoft.org/>



An invitation to
join the RSE
movement in
Africa and
beyond

Join the African research software community

RSSE-Africa



- Uniquely African forum for African RSSEs
- Explicitly includes research system engineers

e.g. data storage and computational infrastructure designers/developers (the extra “S”)

- Founded in 2019
- No membership fees
- <https://rsse.africa>

What we do in this community



Raise awareness of RSE



Share knowledge and resources



Share our work and collaborate



Showcase African expertise



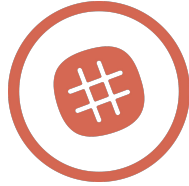
Help to connect African RSEs and the global community

RSSE-Africa



Online forum

Ask questions, share info, and meet peers.



Slack channel

We host a channel on the international RSE Slack workspace.



Meetups

Join our monthly meetups. Showcase your work. Learn about resources and opportunities.



Newsletter

Stay up to date with community news. Subscribe to our monthly newsletter.

<https://talarify.co.za>

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Share this info

Please tell your students, colleagues, employers, and funders about resources and opportunities shared in this presentation.

<https://talarify.co.za>

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Make your voice heard



Help shape policy, funding, and research by sharing information about your research software work through a variety of surveys:

- What to fund: <https://bit.ly/what-to-fund>
- Usability and Design in Scientific Open Source Software Projects: <https://bit.ly/usability-and-design>
- International RSE survey: Next iteration coming soon...

Acknowledgements

We'd like to thank the following people for their support, contributions and collaboration

- Peter van Heusden (SANBI, South Africa)
- Kim Martin (RSE @ SUN founder and RSE advocate)
- ReSA community managers (Saranjeet, Paula, and Kim)
- Members of the UK RSE community who joined our community meetups
- Member of RSSE-Africa for being part of the community
- The global community for being open and collaborative!

Thank you for your time!

**We look forward to seeing you in
the community!!**

Questions?

A selection of fantastic resources and events

- Annual RSECon - <https://rsecon23.society-rse.org/>
- Research Software Funders Forum - <https://www.researchsoft.org/funders-forum/>
- Collaborations Workshop - <https://www.software.ac.uk/programmes-and-events/collaborations-workshops>
- RSE Fellows - <https://society-rse.org/community/rse-fellows/>
- SSI Fellows - <https://software.ac.uk/programmes-and-events/fellowship-programme>
- Mentorship - <https://openlifesci.org/>
- Research software community forum - <https://www.researchsoft.org/events/2022-06/>
- Did you know that there's an International RSE Day (12 OCT 2023)?
- Research software directory - <https://research-software.dev/>
- Practical guide to software management plans - <https://doi.org/10.5281/zenodo.7038280>
- Job descriptions: <https://www.software.ac.uk/blog/2022-08-12-how-do-we-assess-candidates-rse-jobs>
- Loads of other resources: <https://www.software.ac.uk/resources/guides>
- Research software studies in Zenodo: <https://zenodo.org/communities/researchsoftwarestudies/>
- Links to work done by Dr Kim Martin around RSE@SUN through collaboration with SSI:
<https://www.software.ac.uk/blog/2023-04-27-presenting-rsecon22-and-starting-rse-group-south-africa>

Overview of organisations

- ReSA - <https://www.researchsoft.org/>
- Society of Research Software Engineering - <https://society-rse.org/>
- Research Software Funders Forum - <https://www.researchsoft.org/funders-forum/>
- Software Sustainability Institute - <https://www.software.ac.uk/>
- RSSE-Africa - <https://rsse.africa/>
- South African National Bioinformatics Institute (SANBI) - <https://www.sanbi.ac.za/>
- Talarify - <https://talarify.co.za>

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Please cite it as follows:

Anelda van der Walt & Michelle Barker. (2023). Growing awareness of the importance of research software and the people who develop it. ZA-REN Week 2023. <https://doi.org/10.5281/zenodo.10013668>



References for slide 5

- [1] Katz, D. S., McHenry, K., Reinking, C. & Haines, R. Research Software Development Management in Universities: Case Studies from Manchester's RSDS Group, Illinois' NCSA, and Notre Dame's CRC. in 2019 IEEE/ACM 14th International Workshop on Software Engineering for Science (SE4Science) 17–24 (2019). doi:10.1109/SE4Science.2019.00009
- [2] Nangia, U. & Katz, D. S. Understanding Software in Research: Initial Results from Examining Nature and a Call for Collaboration. in 2017 IEEE 13th International Conference on e-Science (e-Science) 486–487 (2017). doi:10.1109/eScience.2017.78
- [3] Nangia, U. & Katz, D. S. Track 1 Paper: Surveying the U.S. National Postdoctoral Association Regarding Software Use and Training in Research. (2017). doi:10.6084/m9.figshare.5328442.v3
- [4] Hannay, J. E. et al. How do scientists develop and use scientific software? in 2009 ICSE Workshop on Software Engineering for Computational Science and Engineering 1–8 (2009). doi:10.1109/SECSE.2009.5069155
- Original source: Christina Maimone. (2019). North Western Research Computing and Data Services Updates, Events, and Resources. ([link](#))