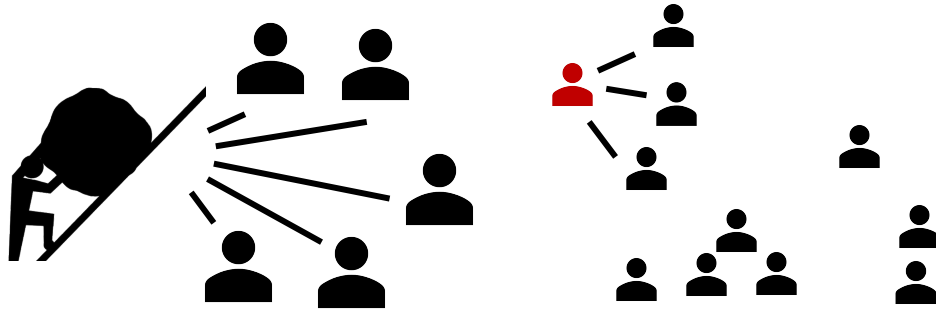


People fostering sustainable research Software Engineering at GFZ sections

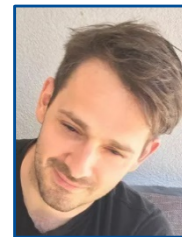
It's about personal engagement

- people fostering sustainable SW development mainly engage „bottom-up“
- outreach: mostly only closest colleagues related to their direct work
- invisible, voluntary add-on work to actual responsibilities
- work often falls back to the „same shoulders“
- „GFZ-wide“, steered support available only in a passive way (SW-development guidelines, GitLab, templates...)



*let's meet some
representatives...*

Markus Bradke



Section: Sec. 1.1 Space Geodetic Techniques

Position: DevOps Engineer for GNSS applications
Coordinator: Infrastructure Committee of the International GNSS Service (IGS)

Work:

- Leading and operating the GNSS data centre at GFZ
- Developing infrastructure solutions for the processing of GNSS data and metadata

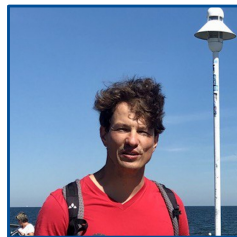
Challenges:

- Scale/Containerize the system(s) to allow the processing of unlimited number of stations
- Explore cloud-based data storage and access methods for GNSS data

Take-away message:

- Independent from the programming language, start to get familiar with Git platforms and the DevOps tools they offer ASAP
- Even while working alone, get in the habit of applying a sustainable workflow (e.g., use issue trackers, branches, CI/CD)

Hannes Vasyura-Bathke



Section: Sec. 2.1 Earthquake and Volcano physics

Position: PostDoc since 2014 (since 2022 GFZ)
3rd party funded project DEEPEN

Work:

- Develop, implement, document & support algorithms for various geophysical forward and inverse problems
- Integration of data from geodesy and seismology
- Write and present scientific publications
- Teaching and application for funding

Challenges:

- Balance various aspects of work within limited time
- raising awareness for value of long-term supported software in scientific community
- Help community to get started and to overcome the learning curve of developed software

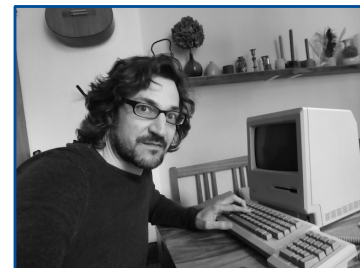
Take-away message:

- Open source helps to increase the quality of published work and to accelerate and reproduce scientific results
- Transition away from Matlab as soon as possible - it is crippling
- Code-style is important for maintenance

Sebastian Heimann

Section: Sec. 2.1 Earthquake and
Volcano Physics (2012-2021)
Now: Uni Potsdam

Position: Scientific Software Developer at
UPCODES Lab, Uni Potsdam
Code Development for Seismology



Work:

- Pyrocko – Software for Seismology
- Grond – Probabilistic Earthquake Source Inversion



pyrocko.org

Challenges:

- How do you encourage new contributors to join your project?
- How do you convince contributors to bring up the effort to grow a prototype into a product?
- What is the essence of good code, beyond best practices?

Take-away message:

- No permanent position – no sustainability.
- Keep up the fun in coding and sharing code!

Peter Evans

Section: Sec. 2.4 Seismology

Position: Software Developer for GEOFON
Operating GEOFON data centre



Work:

- GEOFON web site and tools for managing metadata
- WebDC portal for downloading seismic waveforms
- new EqExplorer with a group from the eScience Centre
- other tools mentioned at <https://geofon.gfz-potsdam.de/software/>

Challenges:

- coding standards, linters, CI etc. would be great but tend to be too hard and get abandoned/bypassed

Take-away message:

- web-based git front ends like GitLab are great
- maintaining long-running services across updates in hardware and software is a part of life
- It's always a team effort, so there will always be the need to share. "Document or it isn't there".

Knut Günther

Section: Sec. 4.4 Hydrology

Position: Section Sys-Admin, technical generalist,
staff council member



Work:

- Systems administration
- Clients + server systems
- Hard- and software procurement
- Technical contacts person for all about IT, Software (proprietary + development)
- Data (primary + secondary)
- Documentation git + dokuwiki
- ...

Challenges:

- Conservative vs. modern methods – gradient is tearing
- Helping to establish best practices since 2015
- Leaving drivers – brain drain
- Sustainable workflows
- Detailed „good enough“ documentation
- Trying to keep overview

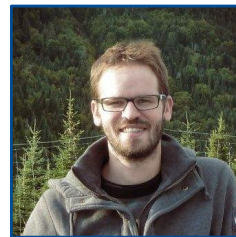
Take-away message:

- GFZ wide guidelines would help - if followed
- Strong pool of experts necessary with (some) unlimited members
- Peer reviews (at least GFZ internal) for software will raise quality
- Better software - better research

Benoît Bovy

Section: Sec. 4.7 Earth Surface
Process Modeling

Position: Scientific software engineer
(ext. collaborator since 2019)



Work:

- Maintain software for landscape evolution modeling (<https://fastscape.org/>)
- Contribute to libraries of the Python scientific ecosystem (Xarray core developer)
- Misc. support at the section

Challenges:

- Scientific software ecosystems become more powerful but also more complex
- So are software development tools
- FOSS landscape is evolving fast

Take-away message:

- Write code for humans
- Read FOSS code written and reviewed by many people
- Develop skills beyond coding: evaluating 3rd-party software, reporting bugs (MCVE), making contributions to FOSS, etc.
- Don't be scared: go and learn step by step

Wilhelm Becker

Section: Sec. 5.3 IT Services and Operation

Position: Software Developer



Work:

- Developing a self service for GFZ employees to manage storage and share data with modern standards
- Collaborative development over section and institutional borders for projects in the DataHub context

Challenges:

- Create a project from scratch with requirements from scientific use cases, security and system limits
- Investigate and evaluate new technologies to handle and connect those adequately to services
- Keep track of modern security standards to include those into projects

Take-away message:

- Give your project a good structure including a well tended issue board, wiki and an effective readme – this helps yourself and your team
- Set up a CI for a staging/production environment can be challenging, but in the end is worth the effort

Julia Neelmeijer

Section: Sec. 1.4 Remote Sensing and Geoinformatics

Position: PostDoc since 2018
Lead Helmholtz Innovation Lab FERN.Lab since 2020



Work:

- manage multiple projects/people for dealing with remote-sensing-related software Technology Transfer
- try to establish minimum standards for SW (GitLab usage, repo structure, documentation) at the section
- offer support choosing suitable FOSS licences

Challenges:

- motivate people to change their coding habits - overcoming the „no time“ argument
- rise awareness about GFZ software development guidelines
- rise awareness for the software distribution process

Take-away message:

- find a team that supports you in establishing changes
- start the habit of using version controlled coding - branching, merging, issue handling from the beginning of your PhD
- learn from your colleagues' projects - ask for their support

Let's try to synchronize our efforts

- join forces: request to Martin Hammitzsch to become a member of the mail group „GFZ Interest Group Research Software Engineers RSE“:
rse@gfz-potsdam.de
- discuss and revive activities - see you in the afternoon!

Workshop A with Ambassadors: Establishing sustainable software development in GFZ sections