Sharing in Science

Openness as a solution to improve reproducibility
Open Science
The Internet has fundamentally changed the practical and economic realities of distributing scientific knowledge and cultural heritage. For the first time ever, the Internet now offers the chance to constitute a global and interactive representation of human knowledge, including cultural heritage and the guarantee of worldwide access.

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Berlin Declaration on Open Access to Knowledge in the Sciences and Humanities signed by more than 550 research institutions world-wide including TUHH
Why should we care?

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"If we wait 5 years for (Arctic) data to be released, the Arctic is going to be a very different place"

Parsons, Arctic Research Scientist

Source: http://www.nature.com/nature/journal/v461/n7261/index.html

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Why do you care about Open Science?

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If you’re looking for more motivation...

- Become pioneers
- Have gained valuable experience
- Distinguish from the crowd
- Plan successful research proposals
- Receive higher citations
- Demonstrate research and societal impact

Created by Pham Duy Phuong Hung from Noun Project
Research Data Management
Research Data Management

How do you keep your data, regarding . . .

- your research (dissertation, papers, . . .)
- your students’ research (theses, HiWi, . . .)
- your (third-party-funded)-projects
- . . .
Sad facts...

- On your own device, unstructured, undocumented
  - each for themselves, not for others
  - difficult to reference
  - difficult to reproduce (what were these parameters again?)

- On some cloud storage (NextCloud, . . .)
  - collaborative between the partners
  - each partner applies their own structure

- Backup and transfer: hard drive in some closet...

- Dilemma: openness vs documentation quality
Good facts...

• TUHH is dedicated to
  • Open Science
  • Open Access
  • Open Education
  • Open Source
• Policy of Openness in Research and Teaching
• We have TORE
What’s ahead?

FAIR

Findable, Accessible, Interoperable and Reusable

A practical tell-tale of our attempts at open science

- Student management
- Project management
- Open publications
- Open document formats in industry projects
- Reproducing complicated environments (simulation models, . . .)
GitLab for student management

Is an open source ...

- **Git** repository
  - (originally designed to develop the Linux kernel)
- Wiki
- Project management tool
  - Issues, due dates, labels, milestones, comments, ...
- Version control tool $\rightarrow$ go back to any version
- While made for software it is general enough to apply to anything
GitLab for student management at ComNets

- 1 Student’s thesis repository
  - thesis file management
  - auto-backup
  - shared issues and milestones
  - ready to archive upon submission

- 1 Student management board
  - We hijack an issue board
  - Let’s have a look
• Really good project management with milestones and issues
  • → Kanban-style board
• there is a learning curve, but it’s worth it
  • → auto-diary
  • → shared with Prof
  • → versioning for code and thesis (→ auto-backup)
Publishing research data

- Develop on GitLab (internal)
- Put on GitHub (public)
- Archive on Zenodo (CERN-hosted)

→ obtain DOI
→ reference DOI in your paper

“Machen Sie Ihre Software auf GitHub zitierfähig”

Beate Rajski, Fachreferentin, Digitale Dienste und Forschungsdaten an der TUHH
Mattermost
Team communication with Mattermost

- Open source Slack alternative
- Linked to GitLab repositories
  - automatic messages about activity, issues, ...
  - have student groups communicate in teams
  - for tinkerers, have a bot post today’s Mensa menu
    - or brag about your lunch in lockdown days
- Mattermost is hosted at communicating.tuhh.de
- GitLab is hosted at collaborating.tuhh.de

→ your university credentials are all you need to start
→ there is/should be a team for your institute
Open document formats
Abstaining from closed-source data formats

- Closed-source formats could vanish with time
- Open-source formats have a better chance of survival
- We’re experimenting with Markdown docs
- We use Pandoc to convert Markdown → PDF, Word
- Find an example of this workflow at Journal kommunikation@gesellschaft
- Explanation of the framework at Modern Publishing
Docker
Sharing the entire workflow

• To publish not just the generated data:
  • in some cases (e.g. simulations) Docker can help
  • (simulator, model, analysis scripts) \(\rightarrow\) Docker container
  • publish this container
  \(\rightarrow\) anyone can replicate your code on their own machine
    • run \(\rightarrow\) simulation data \(\rightarrow\) feature extraction \(\rightarrow\) graphs

(Disclaimer! Didn’t try this yet. Check back again next year. ☺️)
How can I learn to use these tools?
18. and 25.03.2021: Einführung in GitLab

22. and 29.04.2021: Kollaborativ forschen und entwickeln mit GitLab

Thank you for listening! 😊