Repurposing Open Source Tools for Open Science: a Practical Guide
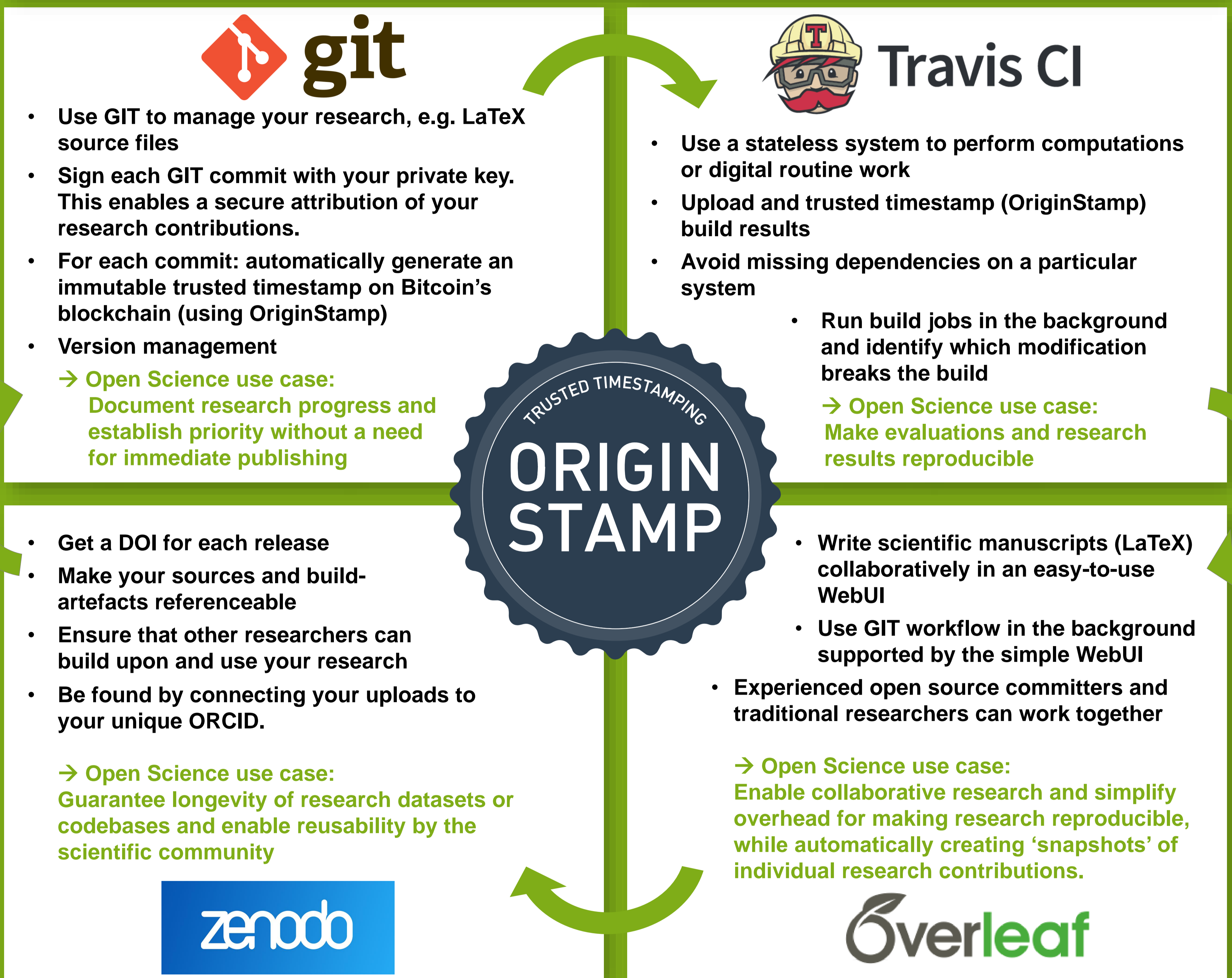
Moritz Schubotz, Corinna Breitinger, Thomas Hepp, Bela Gipp

OPEN SCIENCE

Abstract: The scientific community faces a reproducibility crisis. As a supplement to the efforts of major funding organizations, such as Europen Comission and national funding agencies, we showcase how researchers can conduct open science by repurposing open source tools. For experienced open source contributors, this requires only a minimal behavior change. Additionally, we present tools that help less experienced open source committers to collaborate with experienced open source contributors.

git

- Use GIT to manage your research, e.g. LaTeX source files
- Sign each GIT commit with your private key. This enables a secure attribution of your research contributions.
- For each commit: automatically generate an immutable trusted timestamp on Bitcoin's blockchain (using OriginStamp)
- Version management
  - → Open Science use case: Document research progress and establish priority without a need for immediate publishing

Travis CI

- Use a stateless system to perform computations or digital routine work
- Upload and trusted timestamp (OriginStamp) build results
- Avoid missing dependencies on a particular system
  - Run build jobs in the background and identify which modification breaks the build
    - → Open Science use case: Make evaluations and research results reproducible

TRUSTED TIMESTAMPING
ORIGIN STAMP

- Get a DOI for each release
- Make your sources and build-artefacts referenceable
- Ensure that other researchers can build upon and use your research
- Be found by connecting your uploads to your unique ORCID.

  → Open Science use case:
  Guarantee longevity of research datasets or codebases and enable reusability by the scientific community

- Write scientific manuscripts (LaTeX) collaboratively in an easy-to-use WebUI
- Use GIT workflow in the background supported by the simple WebUI
- Experienced open source committers and traditional researchers can work together

  → Open Science use case:
  Enable collaborative research and simplify overhead for making research reproducible, while automatically creating 'snapshots' of individual research contributions.

zenodo

overleaf

Find step-by-step instructions at: https://github.com/ag-gipp/OpenScienceTemplate

Moritz Schubotz, Corinna Breitinger, Thomas Hepp, Bela Gipp*

*Chair of Digital Media
University of Wuppertal
School of Electrical, Information and Media Engineering
Rainer-Gruenter-Str. 21 • D-42119 Wuppertal • Office: FC 1.14
www.gipp.com/contact • phone: +49 202 439 18 74

Arbeitsgruppe Gipp
Fakultät VI (Elektrotechnik, Informationstechnik und Medientechnik)

BERGISCHE UNIVERSITÄT WUPPERTAL

Foto: John Doe

SCIENCE OPEN SOURCE