

Reproducible research is not so hard.

Why do so few researchers do it?

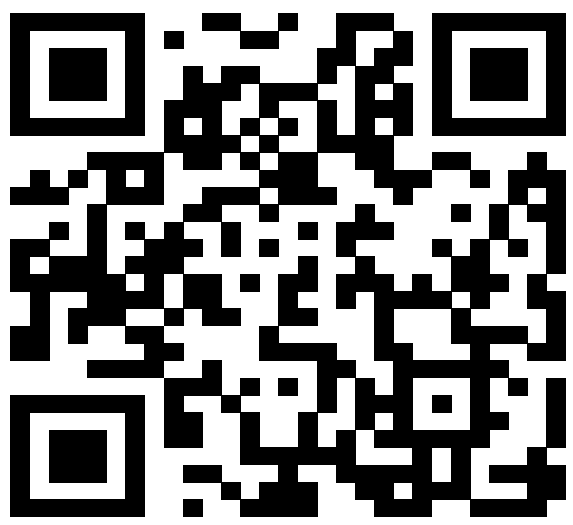
Researchers find it difficult to reproduce a computational analysis conducted some years ago. Beyond the mere text of a publication, data or code might not be accessible or functional. Used base software or libraries have been updated or discontinued. Creating a reproducible workflow in the first place is a burden. The reward for publishing reproducibly is low.

How does Opening Reproducible Research improve the situation?

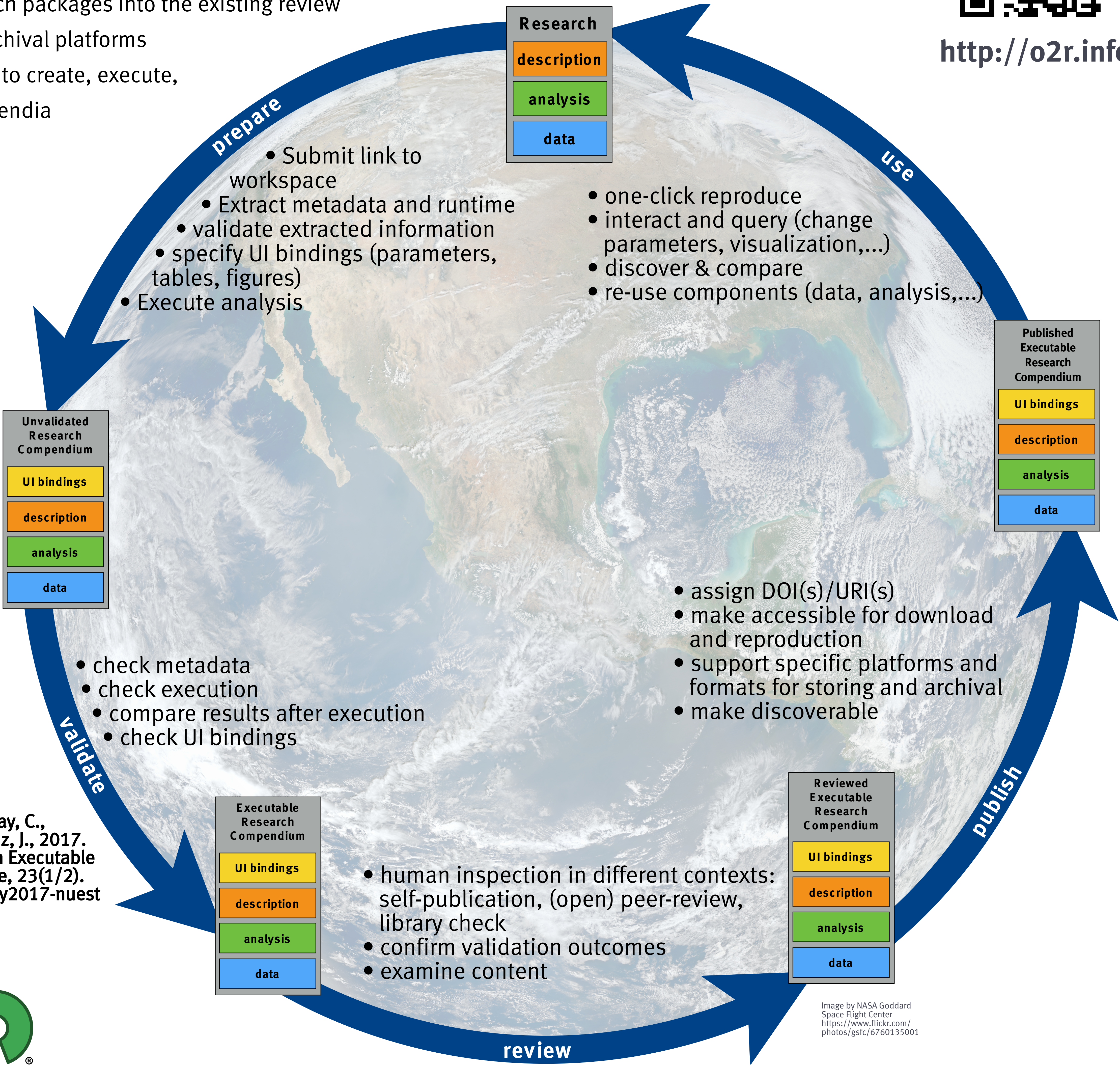
- Develop a specification for packaging all components of reproducible research in an executable research compendium (ERC)
- Understand desired and potential interactions with digital research objects, then implement and evaluate them
- Integrate reproducible research packages into the existing review and publication cycle, and archival platforms
- Provide an API and interfaces to create, execute, and manipulate research compendia

The project

The DFG-funded project *Opening Reproducible Research* aims to improve the exchange and archiving of geoscience research results that are published over the Internet, by facilitating access to them and by simplifying their reuse in the form of a research compendium. The project focuses on the publication process and the interaction with digital research objects as technical challenges to increase publication of open reproducible research. Combining these goals will set a clear innovation in the area of reproducibility, which is at the heart of the scientific method.



<http://o2r.info>



For more information, see:
Konkol, M., Nüst, D., Pebesma, E., Kray, C., Przibytzin, H. metadata documents.nz, J., 2017. Opening the Publication Process with Executable Research Compendia. D-Lib Magazine, 23(1/2). doi: <https://doi.org/10.1045/january2017-nuest>

Technologies



Executable research compendium

The executable research compendium provides a formal structure for packaging all elements of a reproducible research workflow. It has three parts: (i) the researcher's workspace with all files (scripts, configuration, text, documentation) used for an analysis and the final publication, (ii) a snapshot of all software used (libraries, tools, base software, OS), and (iii) metadata to denote core contents. The software environment is available both in an executable form (Docker image) and as a complete machine readable recipe (Dockerfile). The metadata provide the basis for tools that execute research compendia and interact with them. It also clearly defines licenses.

Integration with publication cycle and digital preservation

Scientific journals have well-established review and publication workflows, which are used by scientists. *Opening Reproducible Research* supports scientists by integrating executable research compendia into the review processes of existing journal management systems. The digital preservation community creates standards and tools for long term archival of digital assets. Executable Research Compendia follow these standards by extending the BagIt standard and integrating extensive standardized metadata.

Interacting with research compendia

Executable research compendia enable us to create dynamic papers instead of static documents. For example, readers can drill deeper into the research by:

- inspecting code and data underlying a figure
- manipulating what is shown in the figure, for example, by interactively changing parameters
- changing the visualization
- exchanging the input data by a dataset from a different paper

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