Peer-review of the Research Flow

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Context description

How do you peer-review a research activity?

With traditional peer-review only one type of research product, produced at the end of the research flow, is peer-reviewed: scientific literature.

But in Open Science all types of research products, produced at different stages of the research flow, should be considered for peer-review: software, protocols, intermediate data, negative results, etc.

The role of digital laboratories in Open Science

e-infrastructures are the place where researchers can grow and define the boundaries of their digital laboratories, i.e. the subset of assets they use to run an experiment. Researchers run their digital experiments (e.g. simulations, data analysis) taking advantage of the digital laboratory assets and generate new research data and computational products (e.g. software, R algorithms, computational workflows) that can be shared with other researchers of the same community, to be discovered, accessed and reused.

Digital laboratories:

- Support researchers in their advancement of science, by offering the facilities and assets needed for their daily activities;
- Foster the dissemination of research output within the research community;
- Support discovery, access to, sharing, and reuse of digital research products, including intermediate results of a research flow;
- Set the conditions for novel peer review methodologies and scientific reward policies.

Research flow assessed not only based on the scientific article, but also including other (intermediate) research products so that science can be **transparently** and **objectively** assessed, possibly with **machine-assisted peer-review processes.**

Peer-review of the research flow

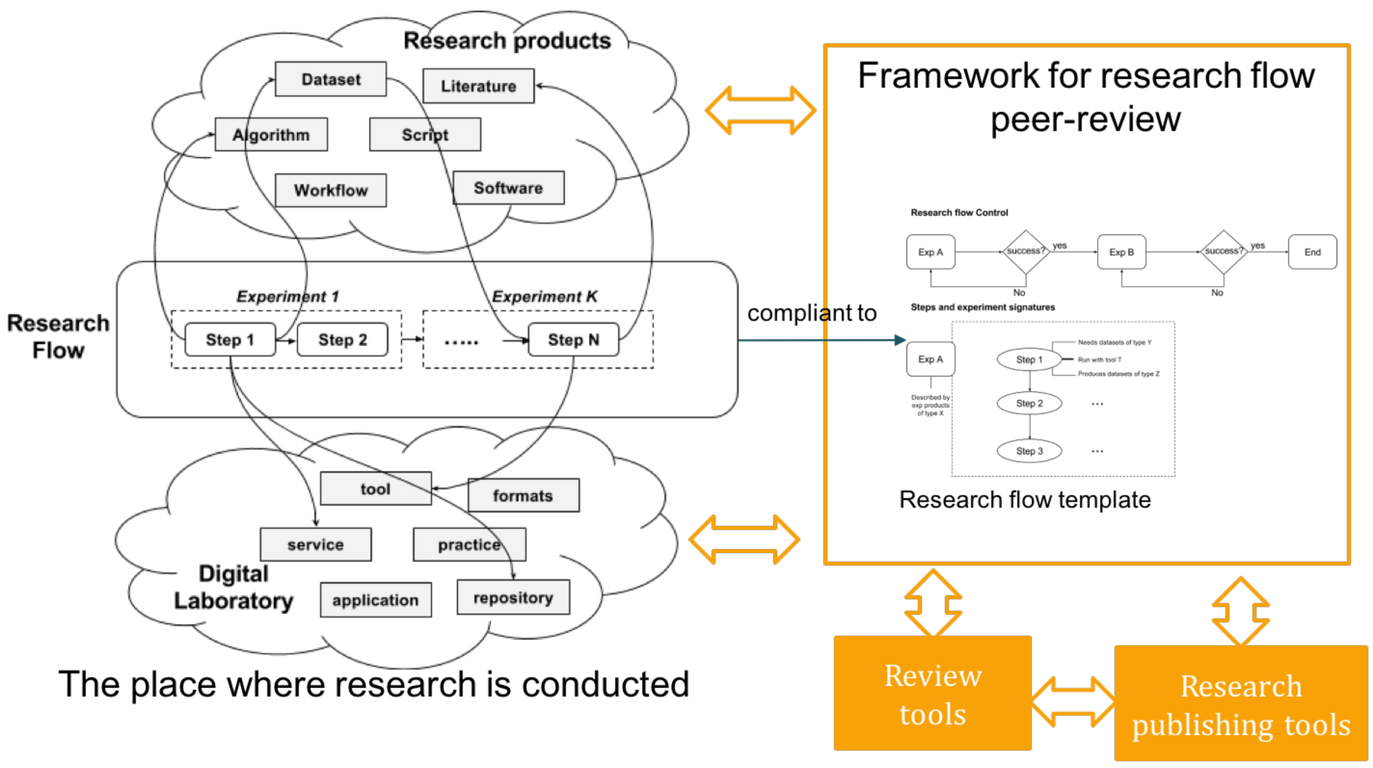
Current practices

- Literature products linked to other types of research products
  - Zenodo
  - Dryad
  - Pangaea
- Experiment / computational workflow products
  - Protocols.io
  - Research objects (myExperiment, BioVel)
- Digital representation of research flows
  - ArrayExpress
  - FAIRDOMHub

Open issues

- Partial representations of the research flow
- Oriented to reproducibility, not peer-review
- Sharing at the end of a successful research flow
- No negative results
- No support for machine-assisted peer-review

Framework for research flow peer review



Goal of the framework

- Representation of a research flow peer review for any discipline of science
- Enabling development of tools for ongoing peer-review of research flows, integrated with the underlying digital laboratory
  - Research publishing tools
  - Review tools

Research flow templates

- Representations of the scientific processes in terms of patterns (sequences and cycles) of experiments and relative steps to be peer reviewed
- Templates express common behavior, determine good practices, enable reproducibility and transparent evaluation of science.
- Like a recipe for cooking: define which types of research products are needed at each step (ingredients), provide a detailed description (machine actionable) of all steps to be executed (mixing and cooking) in order to reproduce the research results (the cake)

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