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Research Software and Research Data: dissemination, evaluation and **reusability** in the **Open Science** context

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Our contribution: how to improve **REUSABILITY** conditions

The extended use of **CDUR** evaluation protocols for Research Data and Research Software will enhance the quality of the disseminated research outputs and will improve their **reusability** conditions. **CDUR** is one of the enablers to achieve **Open Science** objectives.

The Open Science Context

Open Science is the political and legal framework where research outputs are shared and disseminated in order to be rendered visible, accessible and reusable (Gomez-Diaz & Recio, 2020-21).

Other definitions for **Open Science** available at (Méndez, 2021, UNESCO, 2021, Vicente-Saez et al., 2018).

Three steps: RS and RD definitions, dissemination procedures, CDUR evaluation protocols

I - Definitions

Research software (RS) is a well identified set of code that has been written by a (again, well identified) research team. It is software that has been built and used to produce a result published or disseminated in some article or scientific contribution. Can include: documentation, specifications, use examples... (Gomez-Diaz & Recio, 2019).

Research Data (RD) is a well identified set of data that has been produced (collected, processed, analyzed, shared and disseminated) by a (again, well identified) research team. The data has been collected, processed and analyzed to produce a result published or disseminated in some article or scientific contribution. Can include: documentation, use examples, provenance information, instrument information... and references to the software needed for the RD manipulation. (Gomez-Diaz & Recio I & II, 2022).

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II - Dissemination Procedures

- Choose a name, avoid trademarks and proprietary names; associate date, version...
- (*) Research team. Establish list of authors, contributors, participants to produce the RS or RD. Consider legal issues related to copyright, and other RD legal issues.
- (*) Establish the list of included software & data components, their licences.
- Choose a license, have an agreement (signed) with rightholders and authors. Beware of licence compatibility and inheritance issues.
- Choose a website, forge, or deposit for dissemination, indicate licences and how to cite the work. Use PIDs if possible.
- (*) Research work. Establish the list of the main functionalities to facilitate **REUSE**.
- Inform your laboratories and head institutions (if not done in the license step).
- Set and indicate clearly a contact address.
- Distribute the software or data component. Inform the target community.

(*) To review for each new RS version.
(Gomez-Diaz, 2014, Gomez-Diaz & Recio II, 2022).

III - CDUR Evaluation Protocols

The **CDUR** protocol includes four steps:

(C) Citation, measure if the RS or RD is well identified as a research output: good citation form, but also metadata, best citation practices...

Legal point: authors, contributors, affiliations, copyright...

(D) Dissemination, best dissemination practices, in agreement with the scientific policy of the evaluation context

Policy point: **Open Science**. **Legal point:** licenses

(U) Use, "software" or "data" aspects of RS or RD: correct results, facilitate **reuse**, best software or data practices, can include documentation, use cases, test, install...

Reproducibility point: validation of scientific results, **REUSABILITY**

(R) Research, "research aspects": quality of the scientific work, proposed and coded algorithms & data structures, related publications, collaborations...

Research point: measures research impact

Flexibility of application: each decision maker or evaluation committee sets its own **CDUR** protocol adapted to the evaluation context and goals.
(Gomez-Diaz & Recio, 2019, Gomez-Diaz & Recio II, 2022).

