# Towards Sustainable Software Engineering and Citable Software Publications at GEOMAR

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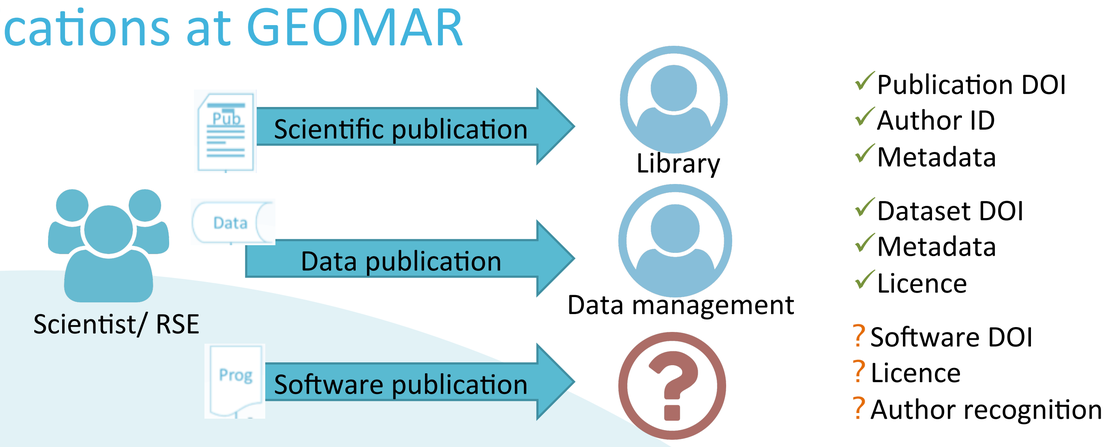
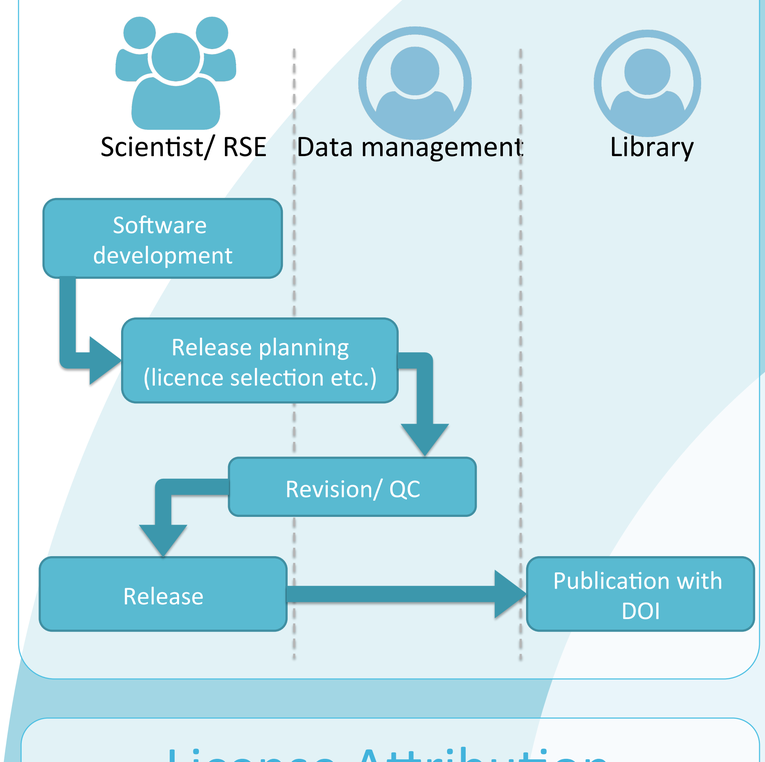
## A Common Process for Research Software Publications at GEOMAR

Libraries are essential in publishing scientific outcomes and are established in all research organisations.
In recent years, most research organisations have established central data management units to facilitate publication of scientific data following FAIR principles. Policies and processes in these areas are widely adopted.
For scientific software however, best practices, defined processes and central points of contacts for research software engineers are missing. This leads to open questions and uncertainties for software authors and contributors, e.g. regarding ownership, licencing as well as credit and recognition.

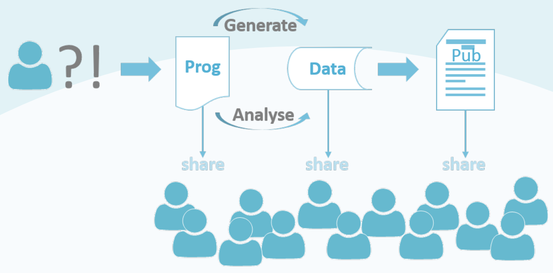


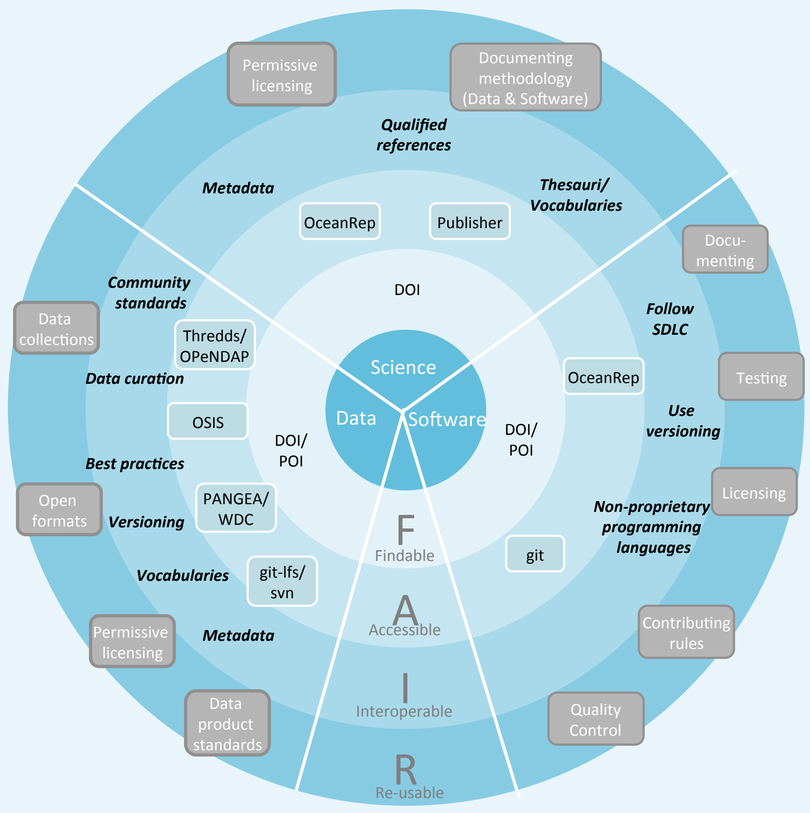

## Software Publication Process



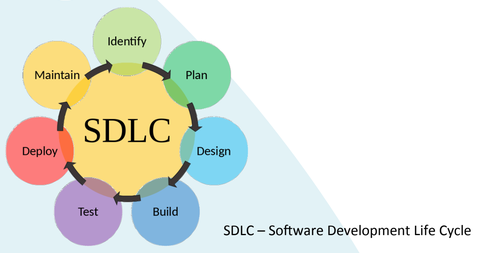

## FAIR Data, Software and Science

The FAIR principles applied to all three aspects of gaining and sharing knowledge: data, software and the scientific outcome.



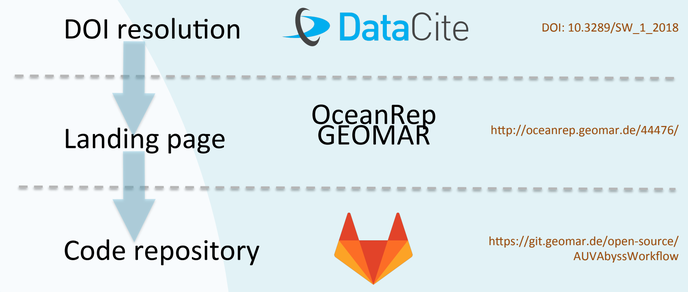




## Living Software



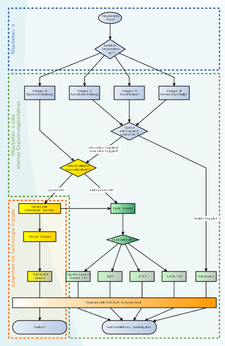

SDLC – Software Development Life Cycle

Software changes constantly due to updates and new features. A DOI in contrast is assigned to unchangeable assets. We solve this by associating the DOI with OceanRep, which in turn references the published revision of the software as well as the most recent version.



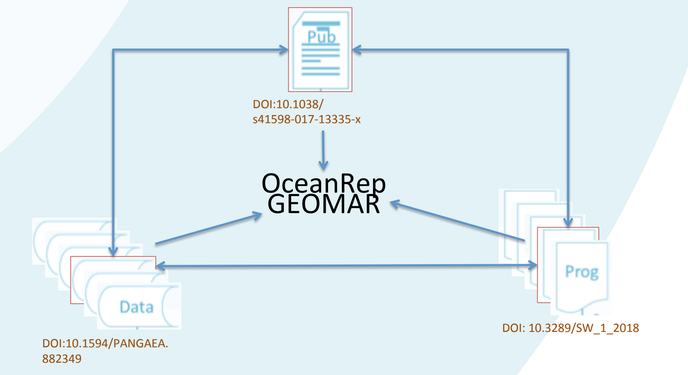

## License Attribution

- Workflow for finding a suitable license
- Four software classes to simplify the licensing process
- Open Source Licenses preferred but closed licences considered
- Involvement of Technology Transfer group as needed



## Linking Code, Data and Science

Persistent object identifiers (POI), such as the well known DOIs, identify the exact version of scientific publications, datasets and software. They enhance transparency and repeatability by linking inputs- and outputs with the software used in processing and the scientific conclusions gained from the analyses.

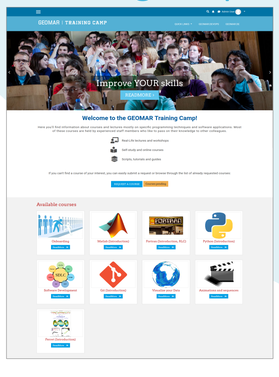



## Community

- Developers Group: Open forum for programming staff members
- Internal DevOps Platform*: information about all aspects of software development and available services
- Training Camp*: Online Learning Platform for organizing hands-on sessions and providing material

### DevOps


### TrainingCamp




*) Services under construction

## Citability and Recognition

Software published with a DOI is easy to cite. Re-use is made trackable, authors receive credit and recognition. A well curated repository is essential to ensure completeness and correctness of publication metadata. Supporting institutions, projects and funding agencies are fully acknowledged.

## Connections outside of GEOMAR

- **Bundesministerium des Inneren**: „*Rechtliche Aspekte der Nutzung, Verbreitung und Weiterentwicklung von Open-Source-Software – Migrationsleitfaden 4.0*“
- Allianz der deutschen Wissenschaftsorganisationen – Working Group ***Wissenschaftliche Software***: „*Handreichung zum Umgang mit Forschungssoftware*“
- Arbeitskreis *Open Science* der Helmholtzgemeinschaft – Taksgroup ***Wissenschaftiche Software***: „*Empfehlungen zur Implementierung von Leit- und Richtlinien zum Umgang mit wissenschaftlicher Software an den Helmholtz-Zentren*“

Some images courtesy of https://fontawesome.com

http://dx.doi.org/**10.3289/conf_item_1_2019**

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