



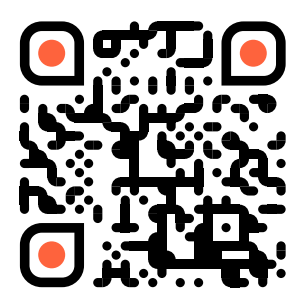


The ELN Format for the exchange of research data between open source projects

Brinckmann, Steffen¹  0000-0003-0930-082X, Parks, Nicole A.²  0000-0002-6243-2840, Bossert, Lukas C.²  0000-0003-3076-3968, Schwaiger, Ruth¹  0000-0001-8940-2361

¹ Forschungszentrum Jülich
² RWTH Aachen University

The ELN file format, defined by The ELN Consortium and licensed under the MIT License, is an open-source structure for efficient data exchange between electronic lab notebook (ELN) systems. An .eln file is essentially a ZIP archive compatible with standard utilities, allowing for options such as encryption. It contains one root folder, typically named after the archive, ensuring organization upon extraction. The core component with this structure is the RO-Crate, which maintains the integrity and comprehensibility of the data, making it a robust mechanism for scientific data management.



The RO-Crate Format

The RO-Crate (Research Object Crate) is a lightweight format for packaging and sharing research data and metadata in a machine-readable manner. It bundles raw data, documentation, software, workflows, and references to support reproducibility and long-term preservation.

An RO-Crate consists of a directory structure with files and a JSON-LD metadata file that describes the dataset's context and relationships to other resources.

```
.
├── Master thesis
│   └── measurement.png
├── Phd thesis
│   ├── Literature review
│   │   ├── literature.bib
│   │   └── interesting_paper.pdf
│   ├── DataFiles
│   │   ├── standProcedure.doc
│   │   ├── measurement.csv
│   │   ├── analysis.py
│   │   ├── measurement.png
│   │   └── report.odt
│   └── Notes.md
└── ro-crate-metadata.json
```

```
{
  "@context": "https://w3id.org/ro/crate/1.2/context",
  "@graph": [
    { "@id": "ro-crate-metadata.json", ... },
    { "@id": "./", "@type": "Dataset",
      "hasPart": [
        { "@id": "./PhDThesis/measurement.png" }
      ]
    }, {
      "value": "512 +/- 3",
      "name": "Metauser \\u2192 Imageheight",
      "@type": "PropertyValue",
      "@id": "./PhDThesis/measurement...metaUser.imageHeight",
      "unitText": "mm",
      "description": "Höhe des Bildes",
      "identifier": "http://purl.../ontologies/result#AFR_0002467"
    }, {
      "name": "measurement.png",
      "genre": "measurement/image",
      "@id": "./PhDThesis/measurement.png",
      "@type": "File",
      "variableMeasured": [
        { "@id": ".PhDThesismasurement...User.imageHeight" }
      ]
    }
  ]
}
```



Connecting RDM Tools

The .eln format connects tools for data management. For instance, large datasets can be stored on Coscine, while the associated documentation resides in the ELN. A Python script identifies and retrieves metadata from the .eln file, annotating the content in Coscine and creating references. This approach ensures searchability across systems and eliminates duplicate metadata entries.

This proof-of-concept demonstrates integrating solutions directly into ELNs or ingesting .eln files within other platforms.

