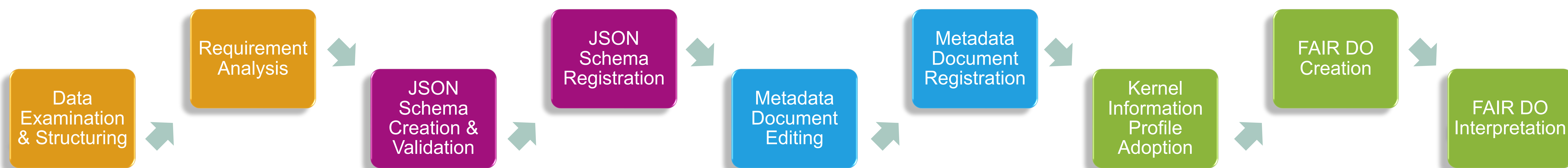


Creating Exemplary RDM Reference Datasets: Technical Process Overview

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Aims: To shape scientific datasets obtained through the PPs from a data management perspective conforming to the FAIR principles, making use of the FAIR Digital Object (FAIR DO) concept, including structured metadata and storage solutions. As an example, we apply PP18 (BAM) as a use case to demonstrate the proposed technical workflow.



Pre-requisites: Data Examination, Structuring & Requirement Analysis

BAM reference data: results of ASTM E139 -11 creep tests on a reference material of Nimonic 75 nickel-base alloy

Results of creep tests on a certified reference material at T = 600°C and a tensile creep load of 160 MPa are provided. The raw data are available in ASCII format (*.lis files). The file "inhalt_Content.pdf" contains further information about the files provided. The evaluated results include the times to reach 2% and 4% creep strain, respectively, and the creep rate after 400 h. The tests were carried out in an accredited test laboratory. The calibrations of all measurands and test and measuring equipment are documented. The calibrations meet the requirements of the test procedure and are metrologically traceable. The data were audited and are BAM reference data.

Mandatory	Recommended	Not mandatory
Category (BAM) I - EN	Category (BAM) II - EN	Category (BAM) III - EN
Item EN	Test info	Test order
Test date	Test info	Test order
Test ID	Test info	Test order
Project	Test info	Test order
Operator	Test info	Test order
Testing Standard	Specified test parameters	Specified test parameters
Specified Temperature	Specified test parameters	Specified test parameters
Initial stress	Specified test parameters	Specified test parameters
Test type (interrupted/not int)	Specified test parameters	Specified test parameters
End of experiment (time limit)	Specified test parameters	Specified test parameters
Test force	Specified test parameters	Specified test parameters
Material ID	Tested material	Tested material
Material and state	Tested material	Tested material
Manufacturing process	Tested material	Tested material
Heat treatment	Tested material	Tested material
Material and state	Tested material	Tested material
Single Crystal Orientation	Tested material	Tested material
Test piece ID	Tested material	Tested material
Type of test piece	Tested material	Tested material
Technical drawing	Tested material	Tested material
Location of the sample in the	Tested material	Tested material
Testing machine	Testing and measuring equipment	Testing and measuring equipment
Testing machine ID	Testing and measuring equipment	Testing and measuring equipment
max. applied force	Testing and measuring equipment	Testing and measuring equipment
Data acquisition equipment	Testing and measuring equipment	Testing and measuring equipment
Control via thermocouples on	Testing and measuring equipment	Testing and measuring equipment
Thermocouple type	Testing and measuring equipment	Testing and measuring equipment
Thermocouple quantity	Testing and measuring equipment	Testing and measuring equipment

GOALS & OBJECTIVES

Functional Requirements

- Define criteria for reference data
- Usage analytics (collect, analyze, present, exchange, and visualize data)
- DME backend (data registration, PIDs, authenticity of reference data)
- Metadata storage

SCC DEM Goals

- FAIR DO representation
- Automatically store data with their corresponding metadata
- Search, access, and analyze data irrespective of its location and file format
- Create and shape RDM reference datasets and to provide a recipe how to do that

WHAT DO WE KNOW ABOUT THE PP

Dataset*

Exists as (data formats)	.pdf	.lis
Size	mid 1 MB	
Published at	Zenodo	Zenodo
Created by	BAM-5.2	BAM-5.2
Purpose of the dataset	Information about test conditions; Metadata	Dataset files containing metadata and test results
Machine-readable or not	No	No
License		Creative Commons Attribution 4.0 International (CC BY 4.0)

Metadata Document Editing & Registration

id: URL

Value: https://www.scc.kit.edu/index.php

General Metadata

Title: SEM data

Start Time: 17:15:00

End Time: 2022-06-12T12:00:02

NFDI-MatWerk Metadata Repository UI
Manage and access your metadata schemas and documents on the MatWerk instance.

NFDI-MatWerk Data Repository UI
Manage and access your research data described by DataCite metadata on the MatWerk instance.

JSON Schema Creation, Validation & Registration

```

"specifiedTestParameters": {
  "type": "object",
  "required": [
    "testingStandard",
    "specifiedTemperature",
    "initialStress",
    "testType",
    "endOfExperiment"
  ],
  "properties": {
    "testingStandard": {
      "type": "string"
    },
    "specifiedTemperature": {
      "description": "Symbol usually indicated as T",
      "$ref": "#/$defs/ComplexValue"
    },
    "initialStress": {
      "description": "Symbol usually indicated as SR_{0}S",
      "$ref": "#/$defs/ComplexValue"
    },
    "testType": {
      "type": "string"
    },
    "endOfExperiment": {
      "type": "string"
    }
  },
  "testForce": {
    "$ref": "#/$defs/ComplexValue"
  }
}
          
```

MetaStore
A Research Data Repository Service for Managing Metadata Documents based on JSON or XML

General: The MetaStore Service

Documentation: Docker Images, News Archive

Users: GUI

Developers: The structure of each metadata document is formally described by a schema. The internal schema registry manages the metadata schemas (currently XML and JSON) by registering new schemas, persistent storage, versioning and access to stored schemas. In the MetaStore, all metadata documents are associated with a registered metadata schema. At ingest, all metadata documents are formally quality checked by validating them against the schema.

FAIR DO Lab

ePIC Data Type Registry (testing)

Search: HelmoltzKIP

Type: Kernel Information Profile

Identifier: 21.T11148/b9b761887845e32d29f7

Type Name: HelmoltzKIP

Description: Draft Kernel Information Profile used within the Helmholtz Metadata Incubator Platform (HMC).

Handle.Net®

Handle Values for: 21.11152/253e0f2a-4d4a-4916-a45a-ef7cd8ad1f9b

Index	Type	Timestamp
1	21.T11148/076759916209e5d62bd5	2022-09-15 13:03:03Z
2	21.T11148/397d831aa3a9d18eb52c	2022-09-15 13:03:03Z
3	21.T11148/aafd5fb4c7222e2d950a	2022-09-15 13:03:03Z
4	21.T11148/b8457812905b83046284	2022-09-15 13:03:03Z
5	21.T11148/c692273deb2772da307f	2022-09-15 13:03:03Z
6	21.T11148/1c699a5d1b4ad3ba4956	2022-09-15 13:03:03Z
7	21.T11148/1a73af9e7ae00182733b	2022-09-15 13:03:03Z
8	21.T11148/2f314c8fe5fb6a0063a8	2022-09-15 13:03:03Z
9	21.T11148/b415e16f6be4ca40f2270	2022-09-15 13:03:03Z
10	21.T11148/82e2503c49209e987740	2022-09-15 13:03:03Z
100	HS ADMIN	2022-09-15 13:03:03Z

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