DATA

Data Acquisition Transfer and Analysis

Management practices @ JRC.IET

DATA Project Overview

The DATA project is concerned with data acquisition, transfer and analysis. The project has three main strands of activity:

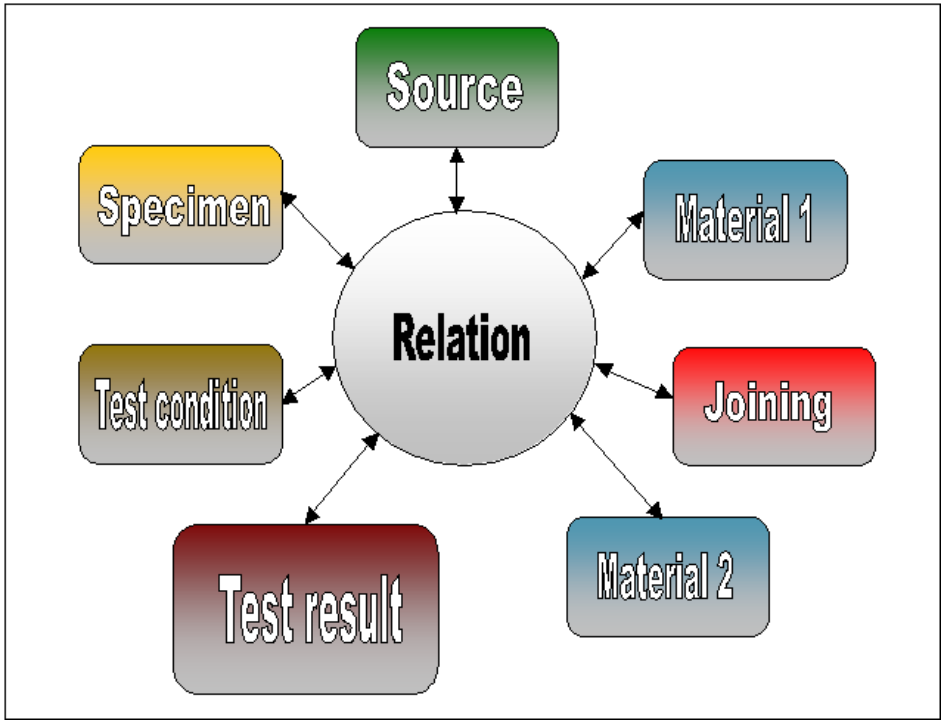
- European Nuclear Materials Aging Mechanisms Knowledge Base
  - 2014 — feasibility study
  - 2015 — prototype application
  - 2016 — database integration
- Standardization Website
  - A website to promote the standardization activities of the JRC in the domains of nuclear codes, standard data formats, and materials qualification.
- ODIN Portal (**Online Data & Information Network for Energy)**
  - 2014 — support to the H2020 Open Data policy
  - 2015 — systems integration (test facilities, GenIV Handbook)
  - 2016 — implement support for aging analysis

To support a scientific process with an increased reliance on data, data management service needs to address three key issues.

- Data acquisition
  - Problem—Manual / semi-automated entry procedures are time consuming
  - **Solution—ICT Standards**
- Data sharing
  - Problem—loss of ownership and competitive advantage
  - **Solution—data citation**
- Data reuse
  - Problem—data silos (i.e. no visibility) and lack of quality assurance
  - **Solution—data citation**

Data acquisition – ODIN MatDB data model

The data model on which MatDB is based on a defacto standard developed in collaboration national laboratories in the US and Japan.



Material entity
Chemical composition
Designation & production
Characterisation
Isotropic grain size
Duplex grain size
Directionally solidified grain size
Hardness
Microstructure
Phase
Physical constants
Thermo-mechanical heat treatment
Customer internals

Data acquisition – Technical aspects

- *Oracle as storage engine*
- *~ 20000 datasets*
- *Scalability*
- *Data complexity > data size*
- *Speed is not issue*

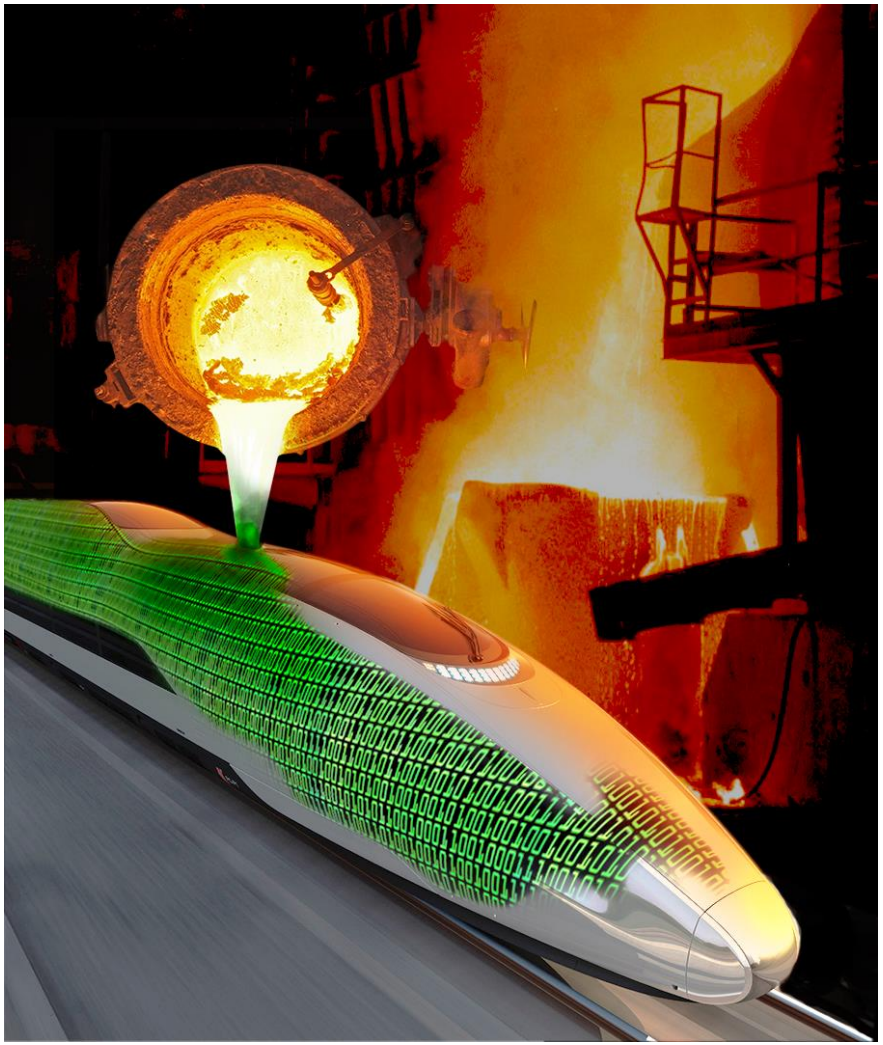
Data acquisition – ICT standards

What do ICT standards offer?

- CEN Workshops on engineering material data
- CEN software specifications

Some issues

- Disruption to the existing procedures
- Difficult to synchronize a big community



European Commission

ELSSI-EMD (Economics and Logistics of Standards-compliant Schemas and ontologies – Engineering Materials Data)

SERES (Standards for Electronic Reporting in the Engineering sector)

ELSSI-EMD focused on test data, while SERES focuses on materials data. For each Workshop, three common strands of activity:

- **Business—examine the business case for Standards for engineering materials data.**
- **Standards—address ownership and publication issues in anticipation of a promotion of the prenormative technologies to informative/normative status.**
- **Technical—develop prenormative technologies (schemas and ontologies) for improved storage and exchange of engineering materials data.**

What is data citation?

Open Data (H2020); Open Access, Visibility of data

Acknowledgement of work and ownership

Capitalization possible (for closed data sets) through increased visibility

Data Sharing

At JRC.IET the use of DataCite DOIs for data citation and publication is considered to provide the most effective means of encouraging data sharing in both the industrial and research sectors.

- *What is a DOI? A digital object identifier #permanent #unique*
- *Widely used for conventional publications*
- *DataCite DOI's can be used on datasets to identify unique sets*
- *It is effectively free(1.000euro) to assign an unlimited number of DataCite DOI's*

How to get a DOI

Who are the DOI issuers

DataCite consortium (recognized technical libraries)

↓

National DataCite member (TU Delft-NL, CRUI-IT)

↓ prefix

Naming authorities (ODIN at JRC.IET.F4 Unit)

↓ DOI

End users

European Commission

Meta data repositories store information about DOI's from many repositories

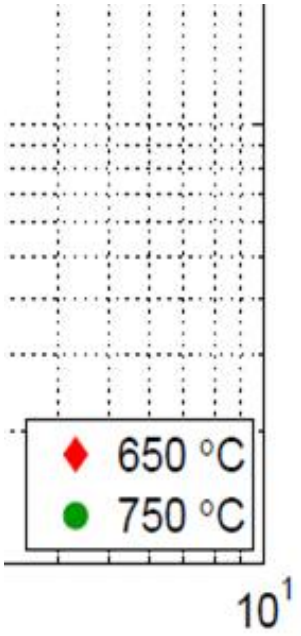
DataCite Statistics Beta

Registrations by Allocators | Registrations by Datacentres | Registrations by Prefixes | Resolut

Allocator	Total
ANDS - Australian National Data Service	3 254
BL - The British Library	537 694
CDL - California Digital Library	788 140
CISTI - Canada Institute for Scientific and Technical Information	32 448
CRUI - CRUI2011	21 164
DATACITE - DataCite	9
DELFT - TU Delft Library	8 897
DK - Technical Information Center of Denmark	3 580
ETHZ - ETH Zurich	762 059

European Commission

Example of DataCite DOI usage



[8] G. Odette, M. Alinger, B. Wirth, Annual Review of Materials Research 38 (2008) 471–503.

[9] H. Cho, A. Kimura, S. Ukai, M. Fujiwara, J. Nucl. Mater. 329–333 (2004) 387–391.

[10] J. Chen, P. Jung, J. Henry, Y. de Carlan, T. Sauvage, F. Duval, M. Barthe, W. Hoffelner, J. Nucl. Mater. 437 (2013) 432–437.

[11] M. Bruchhausen, F. de Haan, Test data for low cycle fatigue on material 14Cr 1W ODS at 650 °C and 750 °C, JRC Petten, 2013. http://dx.doi.org/10.5290/1000021 to http://dx.doi.org/0.5290/1000033 inclusive, v1.0, [data set].

European Commission

Meta Data | Test Data

DOI Metadata:

Identifier	http://dx.doi.org/10.5290/1000021
Creators	Bruchhausen, M; Turba, K; de Haan, F; Haehner, P; Fischer, B; Pantry, C
Creator organization	EC - JRC Petten, Institute for Energy and Transport
Title	Test data for low cycle fatigue - strain control on material 14 Cr 1 W ods at 650 Ce
Publisher	European Commission JRC Institute for Energy and Transport
Publication year	2014
Subject	Elevated temperature material properties
Project Leader	Bruchhausen, M; Haehner, P
Date issued	2014-2-17
Resource type	Dataset
Resource subtype	Test data
Format	text/plain
Version	1.1
Language	en
License	By arrangement with the creator organization
Description	After analysing the running projects on different innovative reactor and transmutation systems and their related needs in terms of structural materials assessment, the focus of GETMAT has been put on F/M and ODS steels, as cross-cutting structural material choice for core and primary components. Moreover, the GETMAT project aims as well to streamline and integrate, in a comprehensive way, the R&D effort of the European materials laboratories for a wide-range study of the performance of the two classes of alloys, in terms of (i) availability, fabricability and fundamental properties, (ii) compatibility with coolants and (iii) response to irradiation, including (iv) an effort to understand the physical reasons for their behaviour under these conditions. In detail, the priorities and objectives GETMAT are: - Improvement and extension of 9-12 Cr F/M steels qualification - ODS alloys development and characterisation - Joining and welding procedures qualification (relevant for both ODS and F/M steels)

View Metadata as XML

JRC.IET.F4 will be using OAI-PMH Data Provider service hosted at http://oai.datacite.org

- Meta data harvesting
- Dataset aggregation

Thank you from the DATA project