An RDMO plugin to populate and query the MaRDI Knowledge Graph.
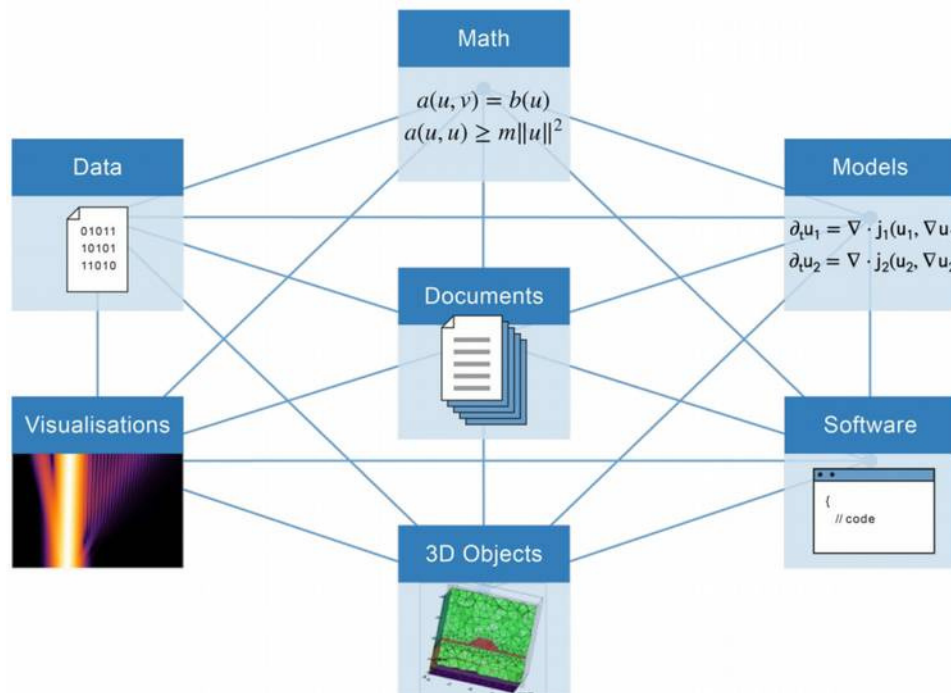
Marco Reidelbach – 29.03.2023

Mathematical Research Data Initiative

Math

$$a(u, v) = b(u)$$
$$a(u, u) \geq m\|u\|^2$$

Data

Models

$$\partial_t u_1 = \nabla \cdot j_1(u_1, \nabla u_1$$
$$\partial_t u_2 = \nabla \cdot j_2(u_2, \nabla u_2$$

Documents

Visualisations

Software

3D Objects

Key Aims of the NFDI:

systematically catalogize research data resulting from publicly funded research, to secure these for the future and make them findable and accessible

to develop and establish standards in research-data management and guarantee the (inter-)national linkage of research data

Model-Simulation-Optimization Workflows
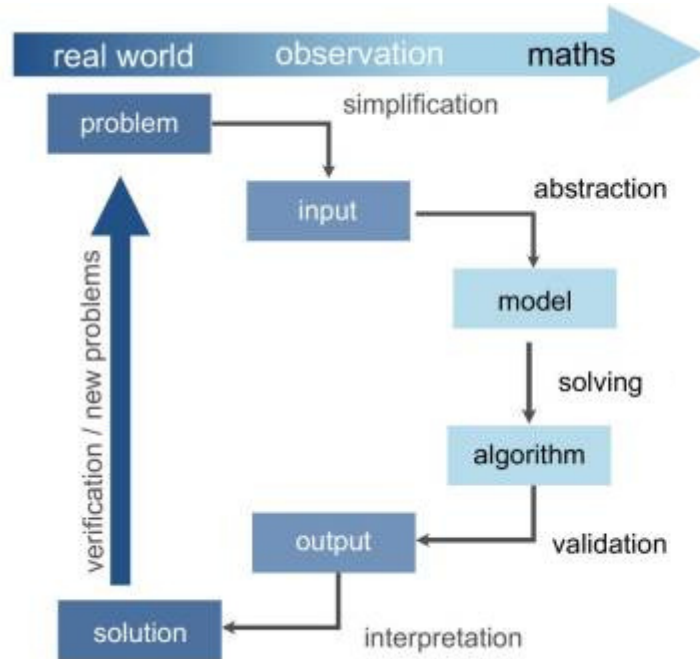
Which research question was adrdessed?
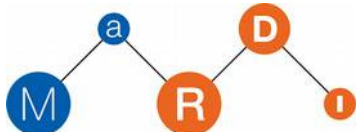
Which mathematical model was used?

What algorithms were applied? Parameters?

Implemented in which software?

Input/Output Data Properties? Location?

Workflow reproducible? Under which conditions?

⟶ Read publication, supplementary, previous publication, ...

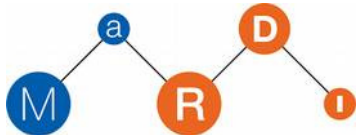# Workflow as Wiki Page on MaRDI Portal

Marco Reidelbach   4

Workflow as Entity in MaRDI Knowledge Graph

Search workflows…

    … answering specific research question ...

    … using specific mathematical model ...

    … using specific algorithm ...
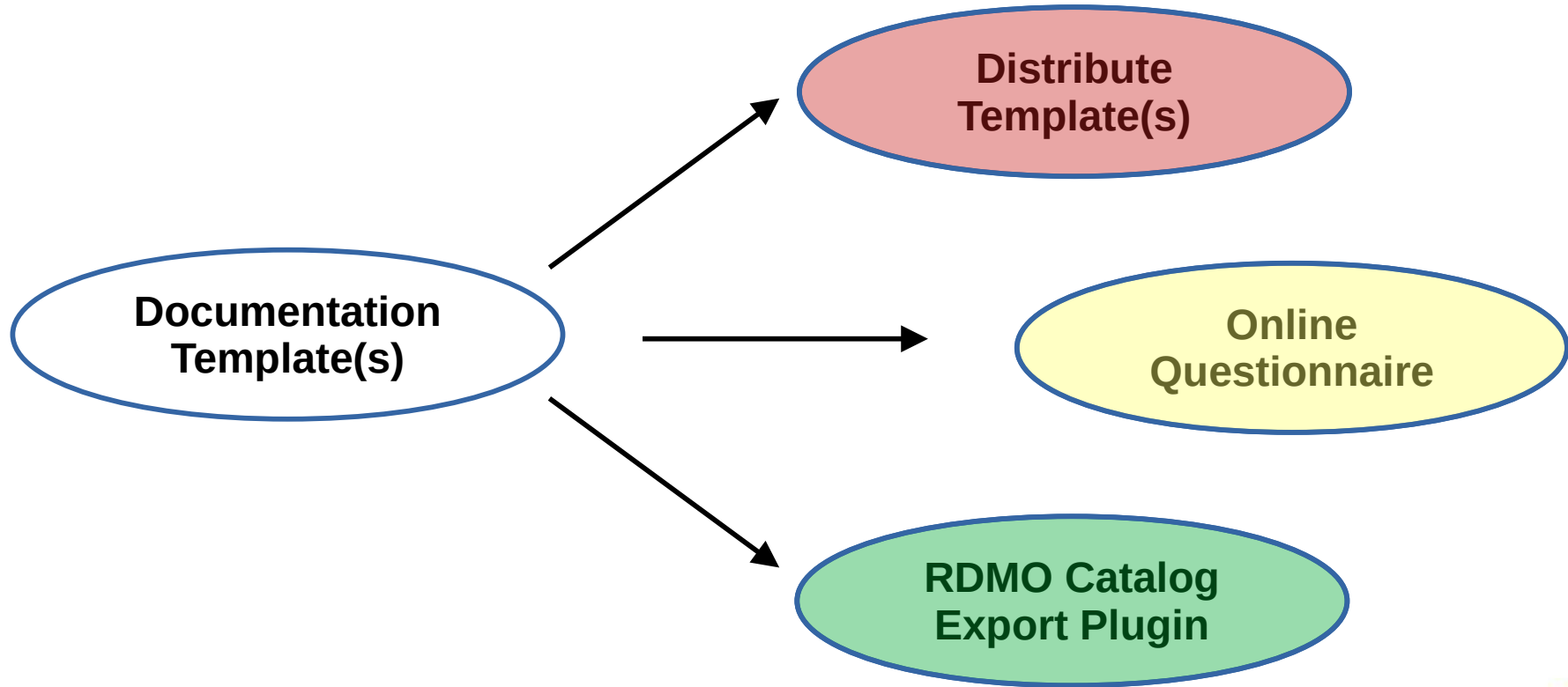
    … using specific input data ...

via SPARQL queries.

© Randy Glasbergen / glasbergen.com
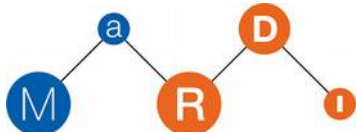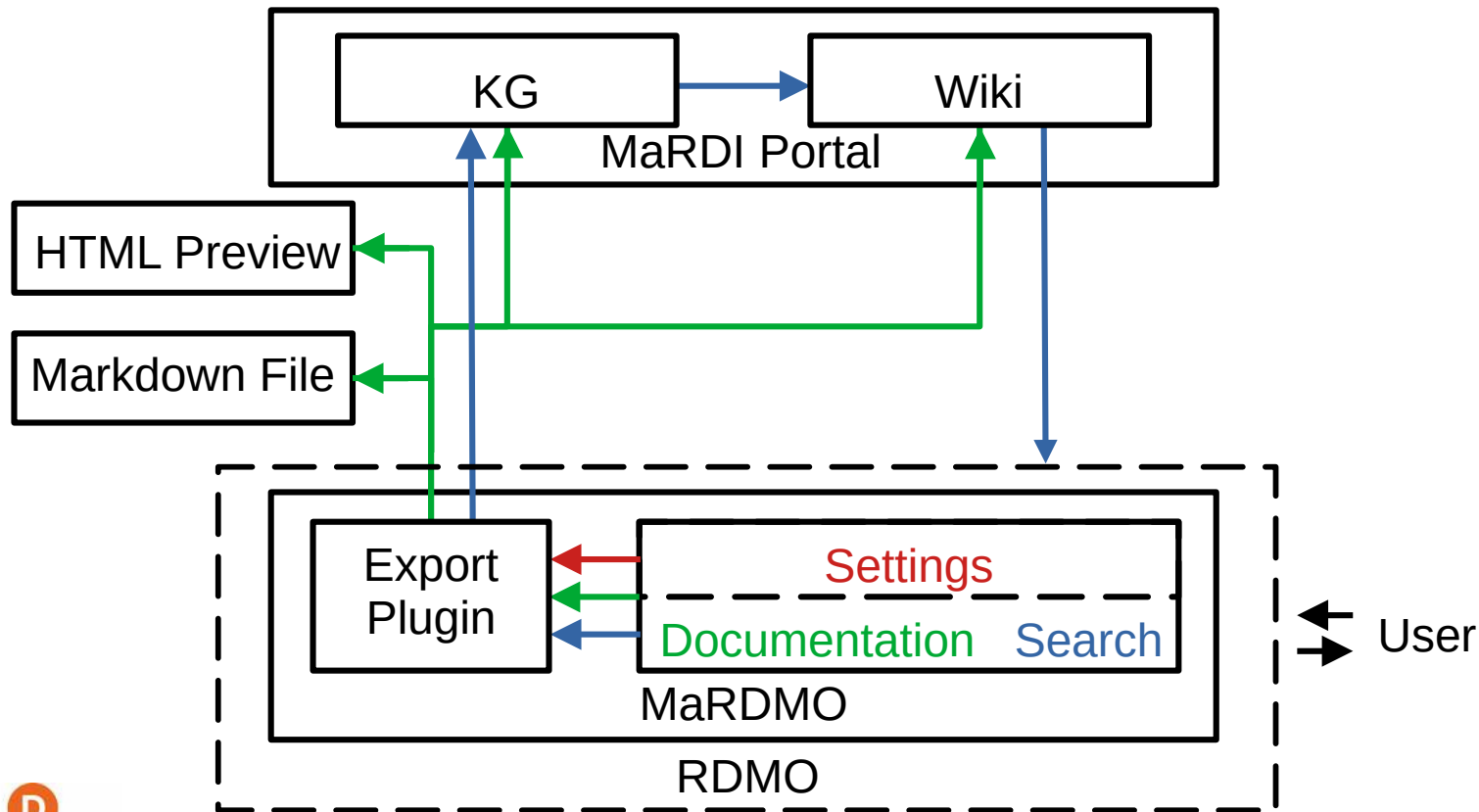
"Which is better for soul searching, Google, Yahoo or Bing?"

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How to document?

MaRDMO – An Overview

MaRDMO – The Question Catalog

Sections:

1) MaRDI Plugin Operation Modus (1 Set, 1 Question)

2) Workflow Finding (1 Set, 2 Questions)

3) Workflow Documentation (1 Set, 2 Questions)

4) General Description (3 Sets, 7 Questions)

5) Model, Variables and Parameter (4 Sets, 14 Questions)

6) Process Information (7 Sets, 59 Questions)

7) Reproducibility (2 Sets, 9 Questions)

MaRDMO – The Export Plugin

- Simple Django App

- Workflow Documentation:

    - export:
        - download as markdown file
        - preview as html file
        - send to MaRDI Portal as mediawiki file

    - knowledge graph integration:
        - query existing databases
        - use, copy or create required entities with WikibaseIntegrator

- Workflow Finding:

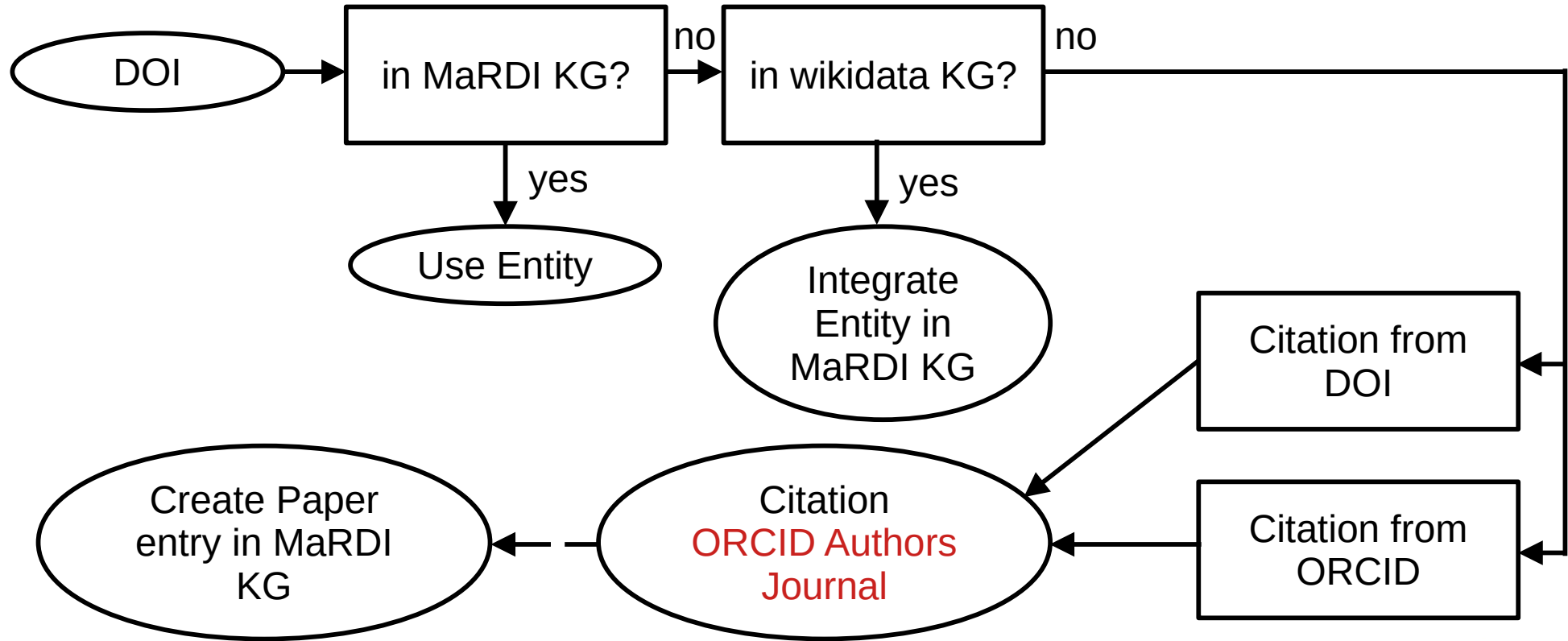   - SPARQL queries to MaRDI knowledge graph

Export

RDMO XML
CSV comma separated
CSV semicolon separated
MaRDI Export/Query

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MaRDMO – Knowledge Graph Integration

Documentation on the MaRDI Portal...

Knowledge Graph Entry

Wikipage

Search a Workflow on the MaRDI Portal...

MaRDMO Knowledge Loop
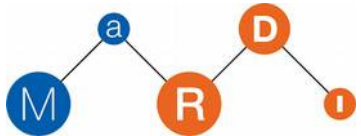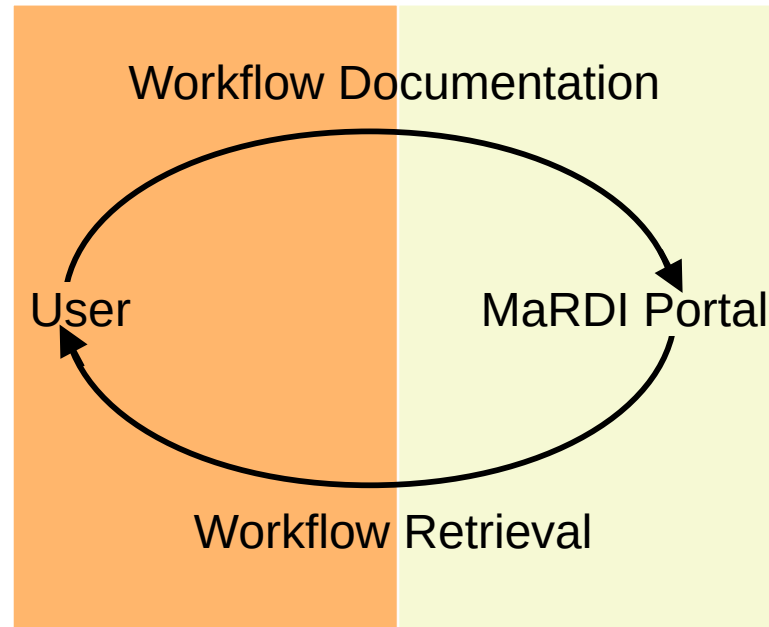
Summary

- Workflows should be documented explicitly

- MaRDMO provides a question catalog and export plugin to…

    … document workflows locally.
    … publish workflows as wikipage on the MaRDI portal.
    … integrate workflows into the MaRDI knowledge graph.
    … query the MaRDI knowledge graph to find specific workflows.

- Future Tasks:

    Quality Control?
    Authorship?

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Thank you
for your attention!

Check out the MaRDI Portal:

portal.mardi4nfdi.de

Check out MaRDMO:

github.com/MarcoReidelbach/MaRDMO