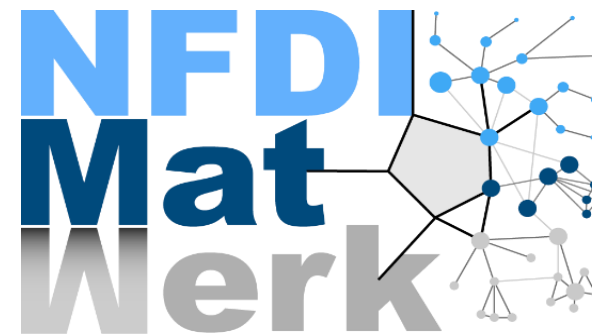




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Karlsruhe Institute of Technology (KIT)  
Scientific Computing Center (SCC)

NATIONAL RESEARCH DATA  
INFRASTRUCTURE FOR  
MATERIALS SCIENCE &  
ENGINEERING



Funded by the Deutsche Forschungsgemeinschaft (DFG, German Research Foundation) under the National Research Data Infrastructure – NFDI 38/1 – project number 460247524

# Outline

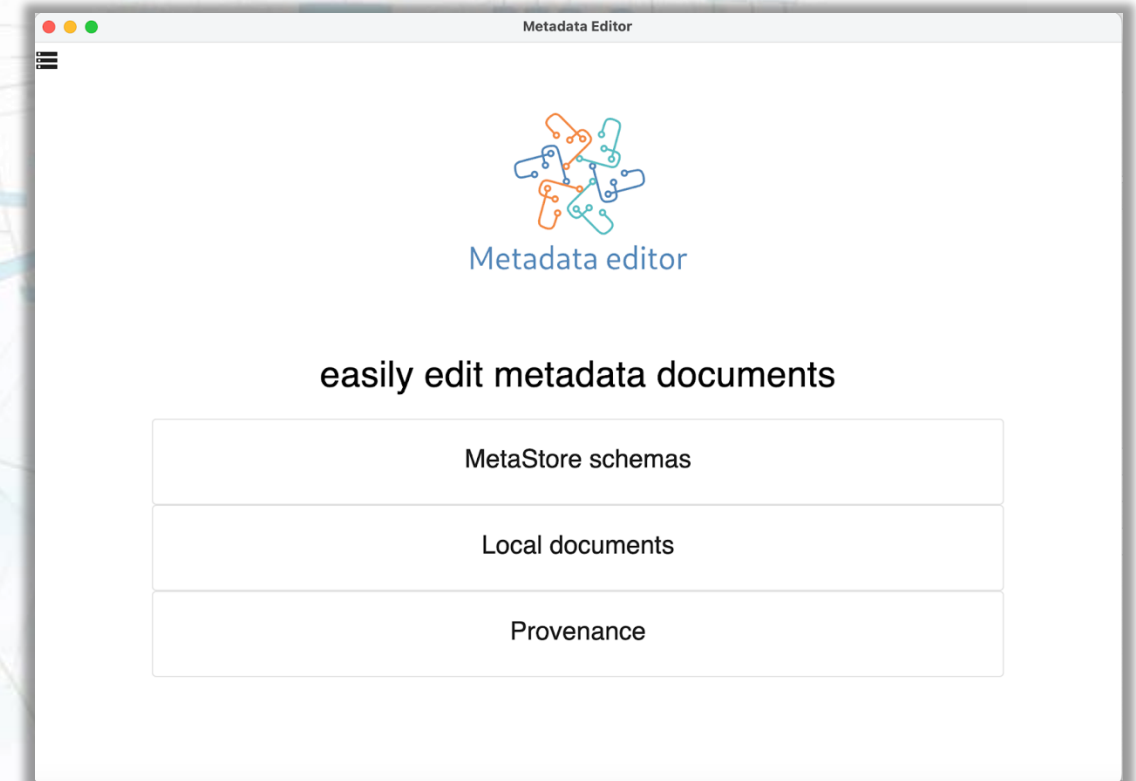
- Introduction to the Metadata Editor (45 Min)
  - Search Component (30 Min)
  - Introduction to the NFDI-MatWerk Metadata Repository (30 Min)
  - Survey (15 Min)
- 

# Objectives

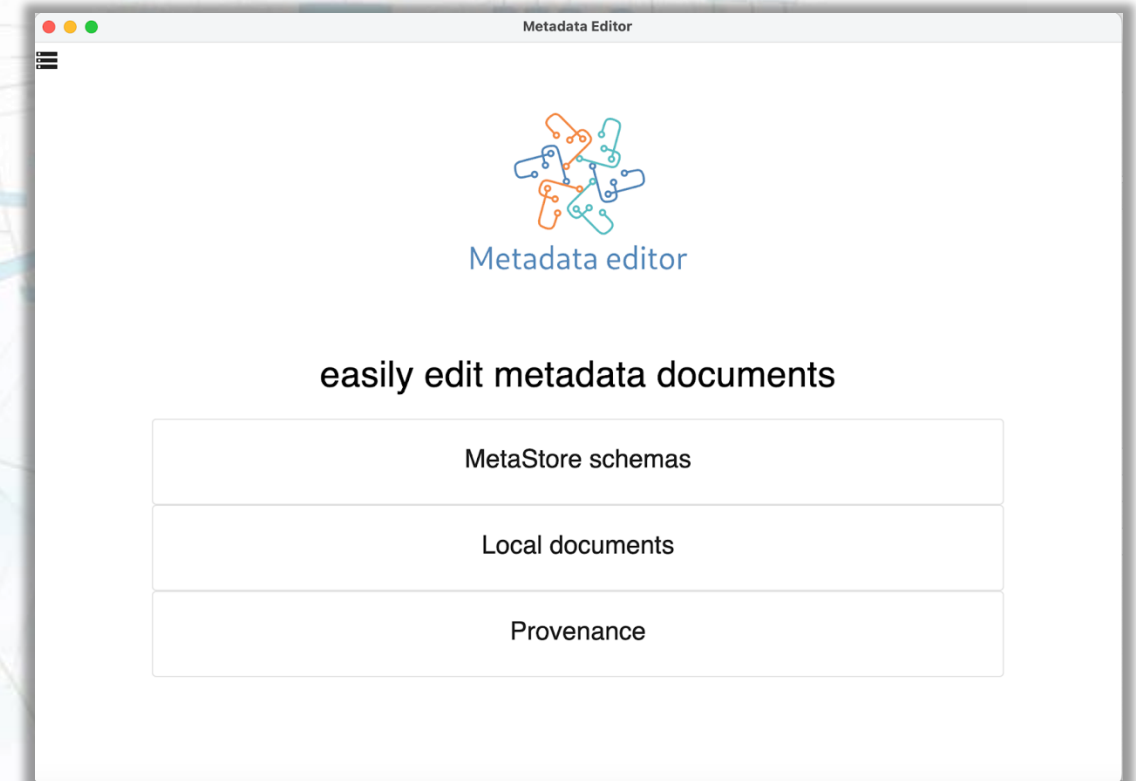
- Retrieve an already registered JSON schema using the Metadata Editor.
- Load a metadata document based on a JSON schema using the Metadata Editor.
- Search for a metadata document using the Search component.
- Edit and manage a metadata document using the NFDI-MatWerk Metadata Repository.
- Look for existing metadata schemas and documents in the NFDI-MatWerk Metadata Repository.

- Desktop application developed and maintained by eXact lab as part of the NFFA-Europe Pilot project
- User interface to support users while ingesting and editing their metadata documents
- Two different metadata repository instances:
  - MetaRepo
  - NFDI-MatWerk

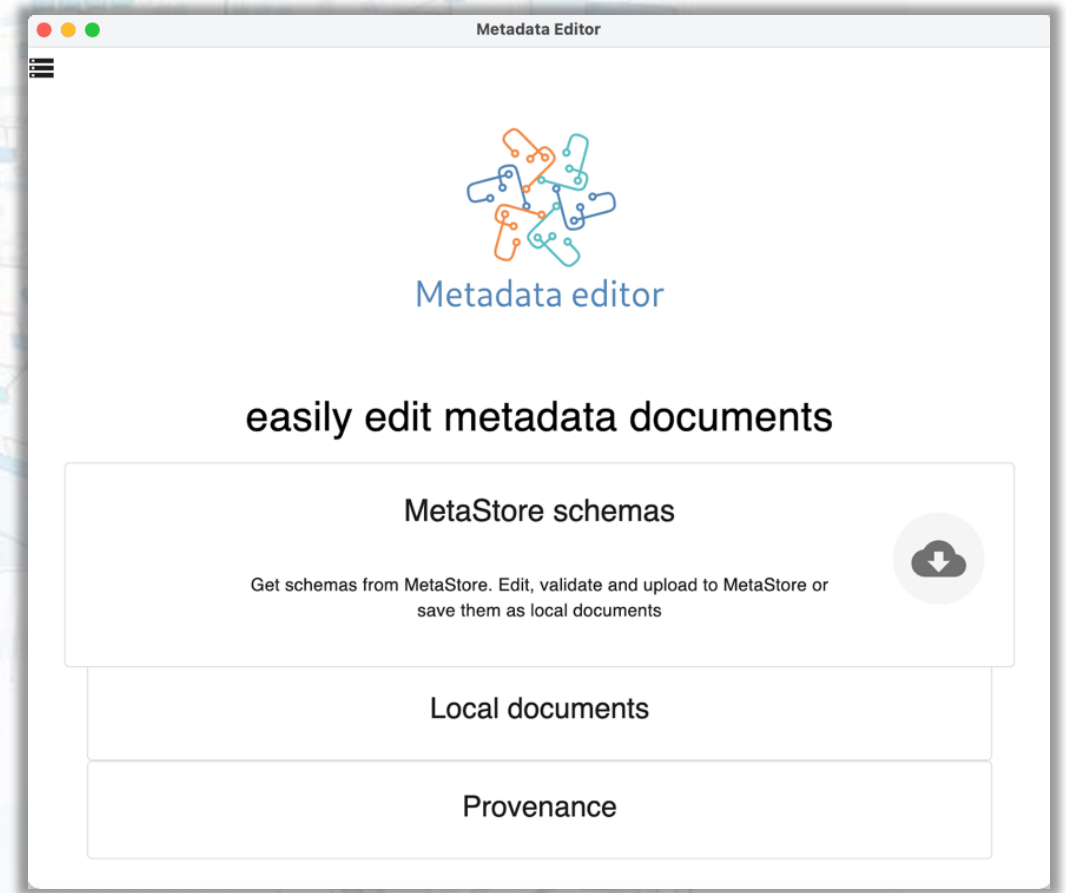
Metadata  
Repository



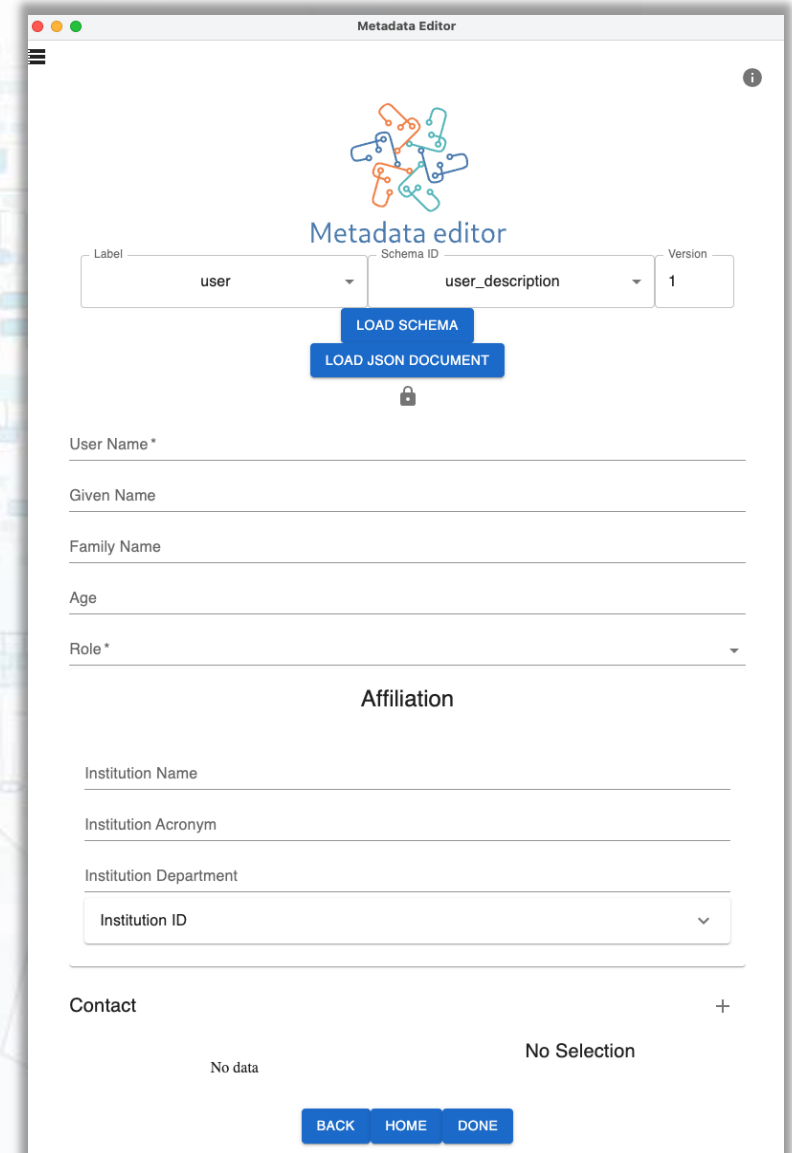
- Main functionalities
  - Get Schema Templates, Manage Metadata Documents
  - Load and manage Metadata Documents
  - Get document provenance



- Retrieve registered schemas from the MetaStore instance using the first box “MetaStore schemas”

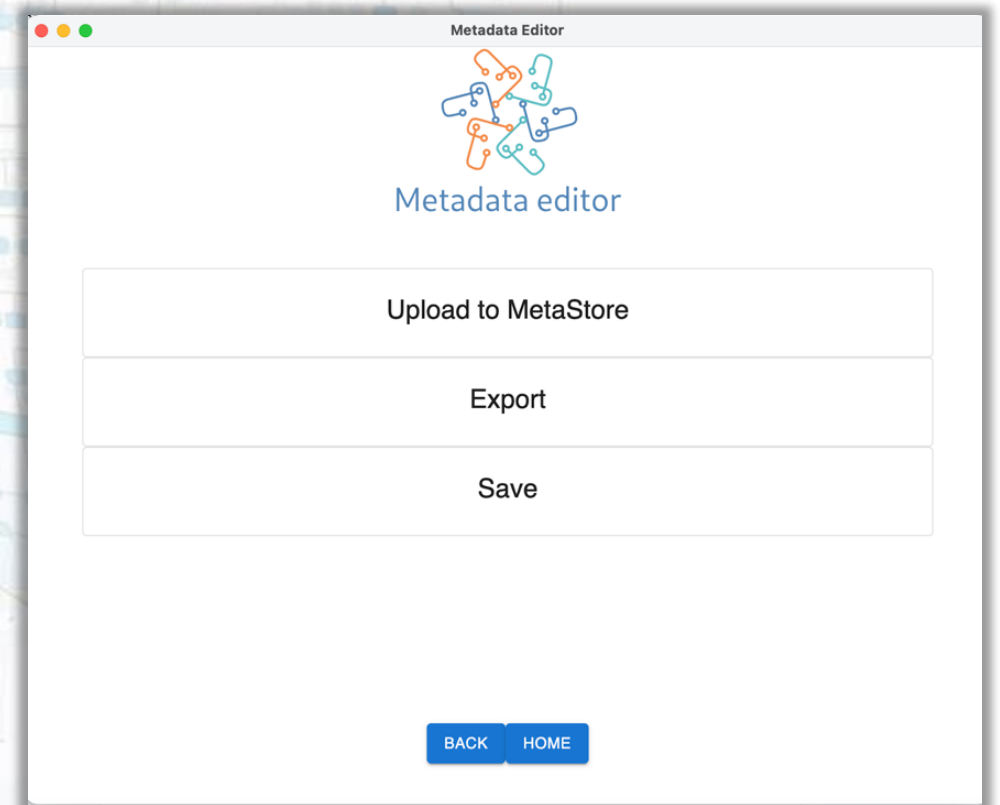


- Registered schemas are grouped using:
  - thematic “label” tags: group schemas which have common characteristics because they belong to the same part of the workflow.
  - Schema identifier
  - Optionally version number
- Fill out the form manually or load an existing filled-in metadata document.



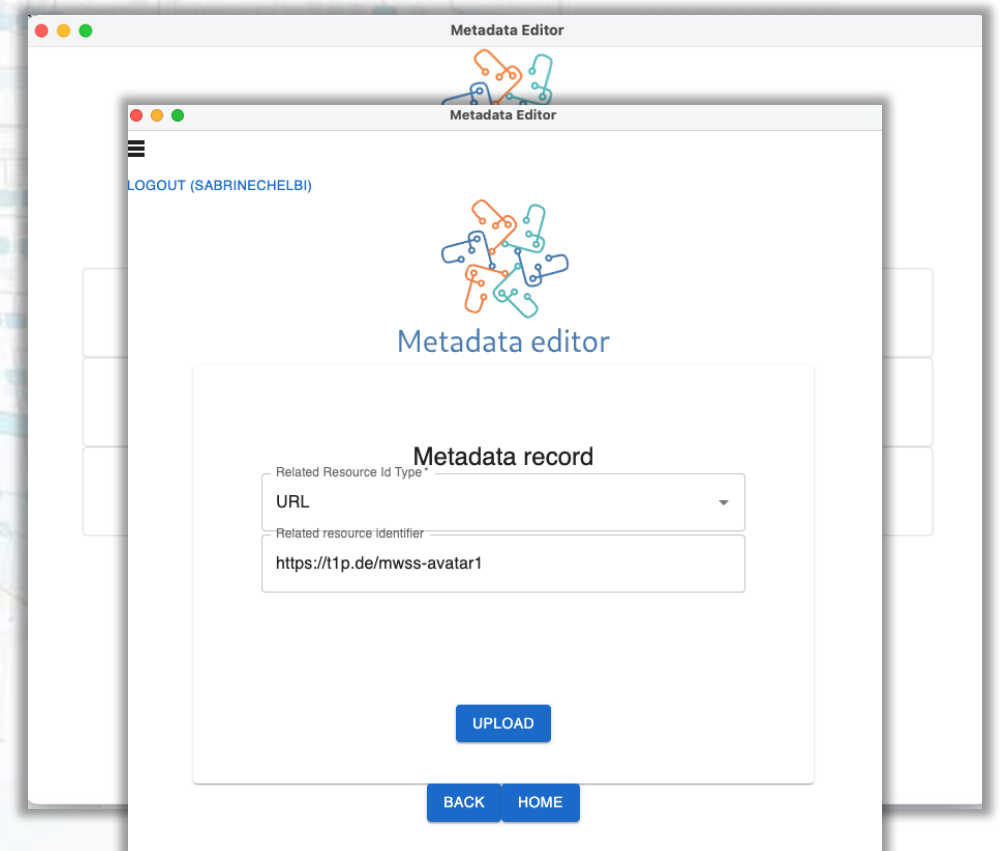
The screenshot shows the Metadata Editor web application interface. At the top, there is a logo for 'Metadata editor' and a navigation menu. Below the logo, there are three dropdown menus: 'Label' (set to 'user'), 'Schema ID' (set to 'user\_description'), and 'Version' (set to '1'). There are two blue buttons: 'LOAD SCHEMA' and 'LOAD JSON DOCUMENT'. Below these buttons is a lock icon. The form contains several input fields: 'User Name \*', 'Given Name', 'Family Name', 'Age', and 'Role \*'. Below these is a section titled 'Affiliation' with fields for 'Institution Name', 'Institution Acronym', 'Institution Department', and 'Institution ID' (a dropdown menu). At the bottom, there is a 'Contact' section with a plus sign and a 'No Selection' message. At the very bottom, there are three blue buttons: 'BACK', 'HOME', and 'DONE'.

- As a next step, the user has 3 options:
  - Upload the document to the MetaStore instance
  - Export the document as a JSON file
  - Save it locally as a JME file



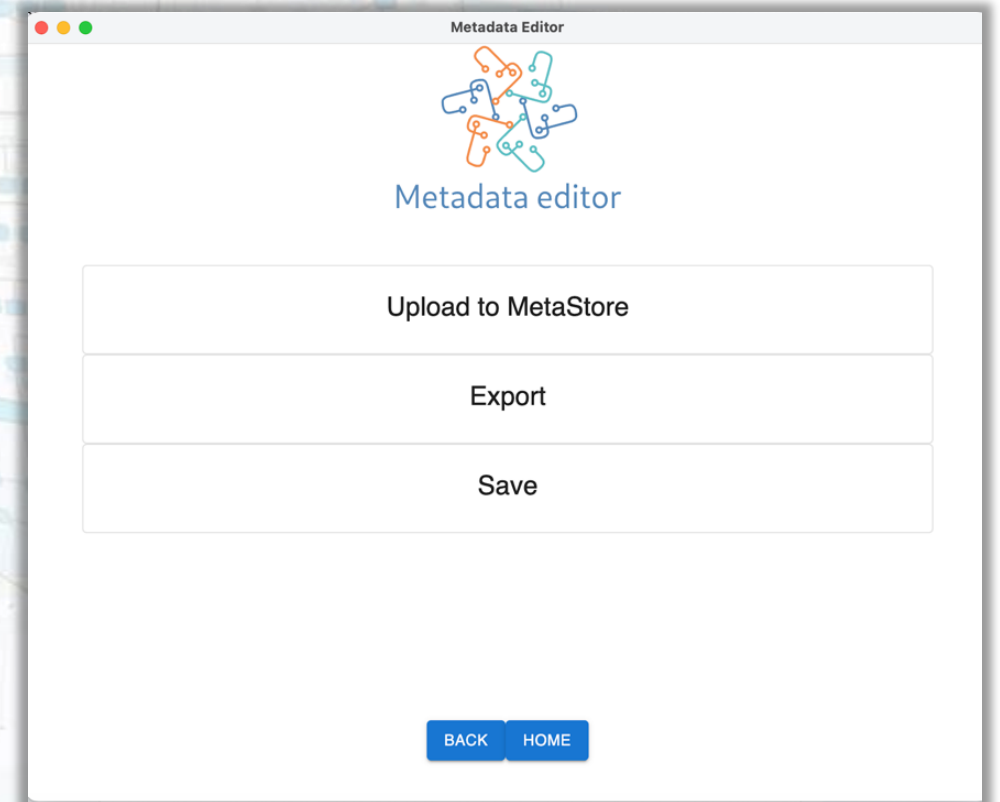


- As a next step, the user has 3 options:
  - **Upload the document to the MetaStore instance**
  - Export the document as a JSON file
  - Save it locally as a JME file



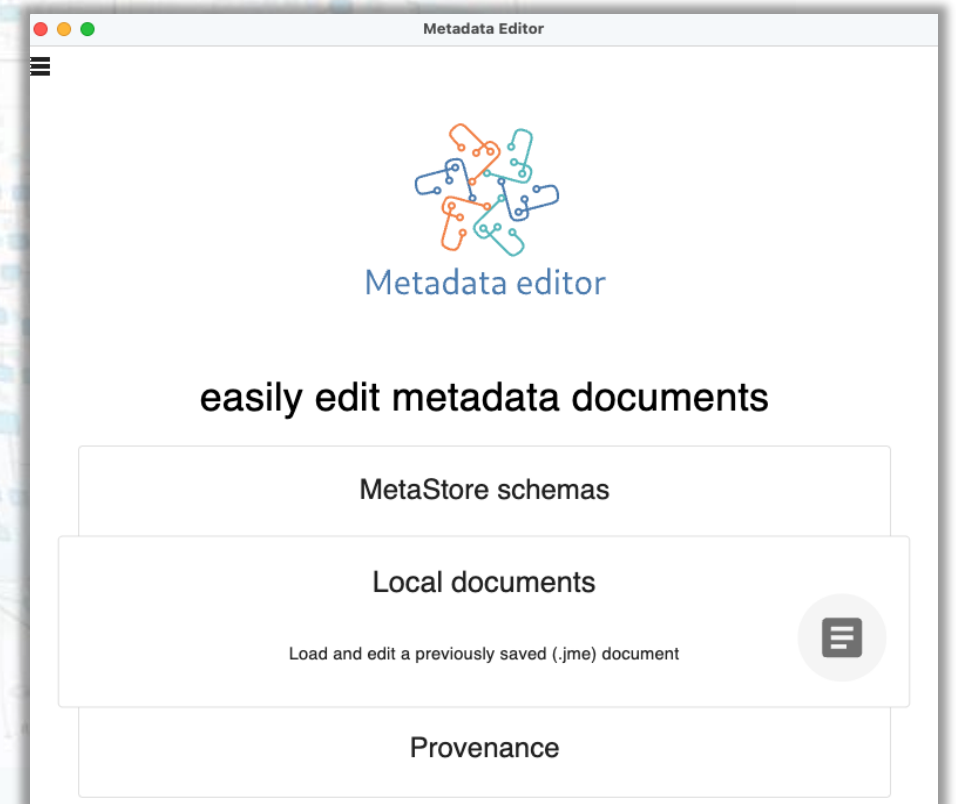
The screenshot displays the Metadata Editor web interface. At the top, there is a navigation bar with the text "Logout (SABRINECHELBI)". Below this is the "Metadata editor" logo, which consists of a stylized network of nodes and lines. The main content area features a form titled "Metadata record". This form includes a dropdown menu for "Related Resource Id Type" with "URL" selected, and a text input field for "Related resource identifier" containing the URL "https://t1p.de/mwss-avatar1". Below the form is a blue "UPLOAD" button. At the bottom of the interface, there are two blue buttons labeled "BACK" and "HOME".

- As a next step, the user has 3 options:
  - Upload the document to the MetaStore instance
  - Export the document as a JSON file
  - Save it locally as a JME file



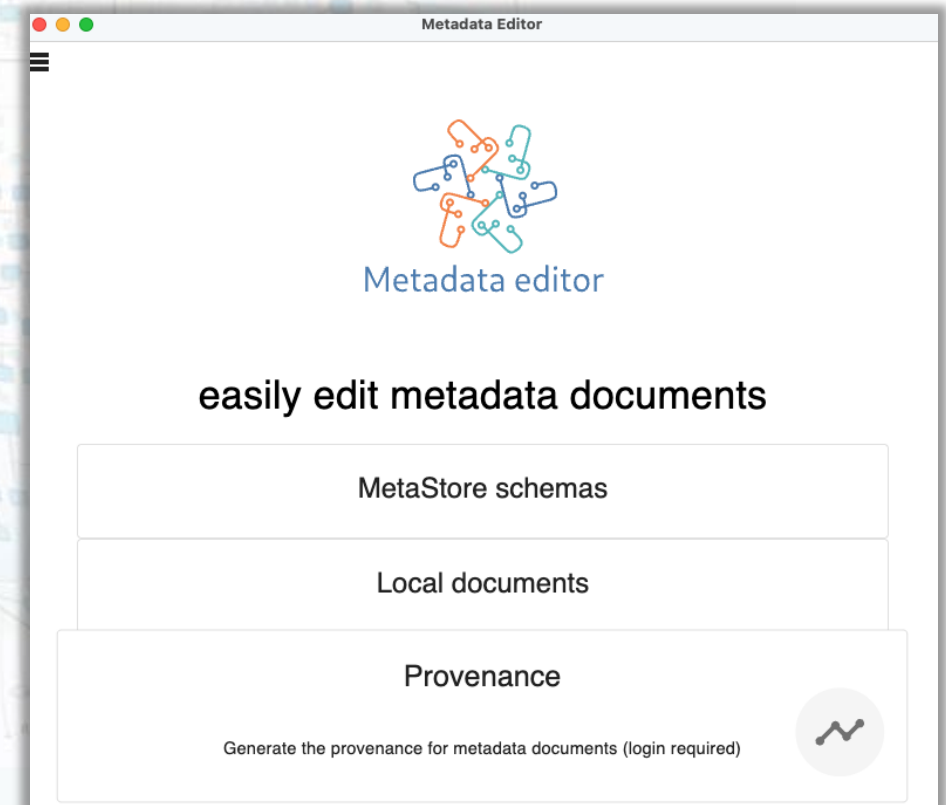
# Metadata Editor: Load and Manage Metadata Documents

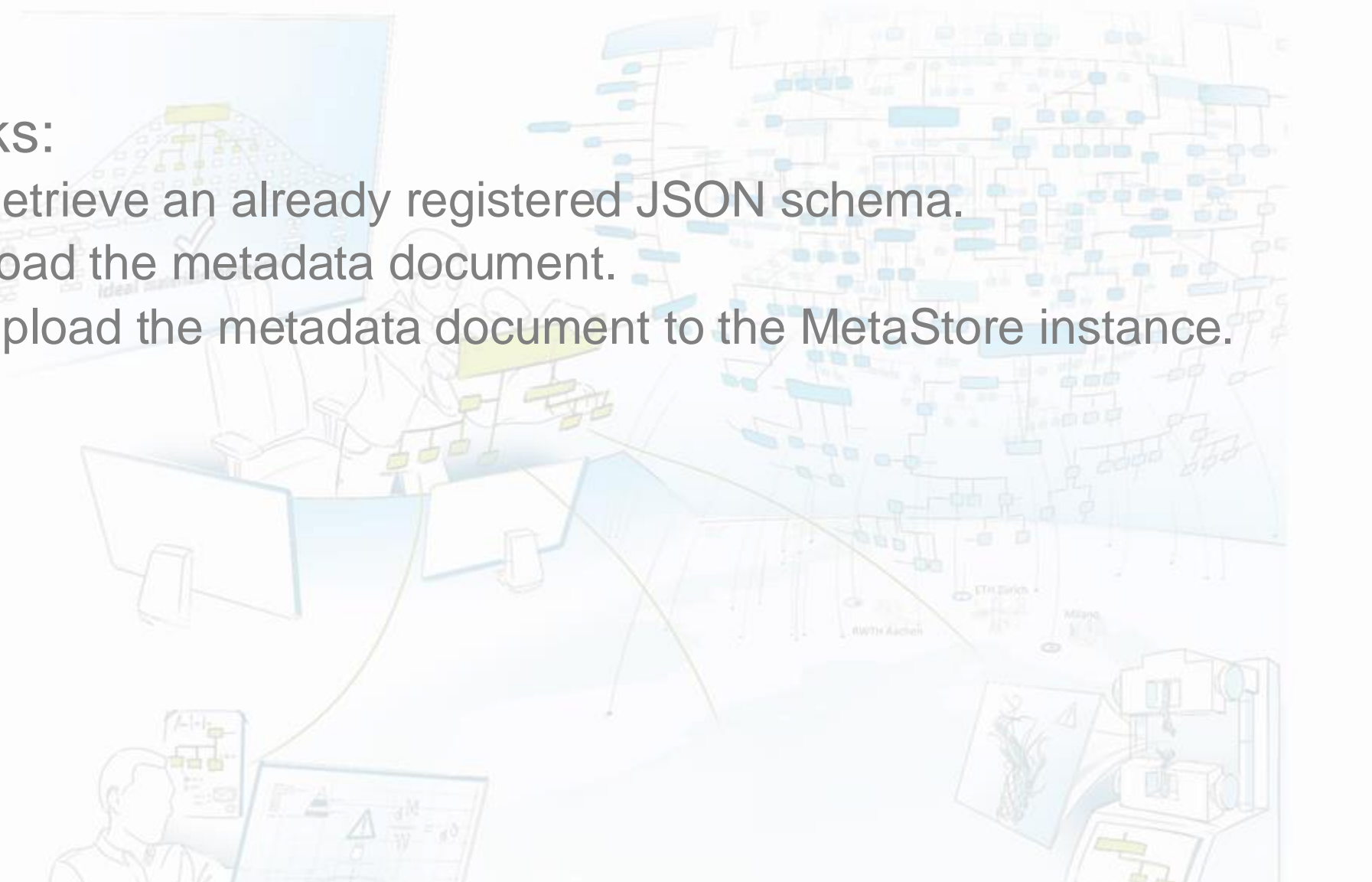
- Further editing of the previously saved JME document.
- The editing and saving of the document follows the same process.



# Metadata Editor: Get document provenance

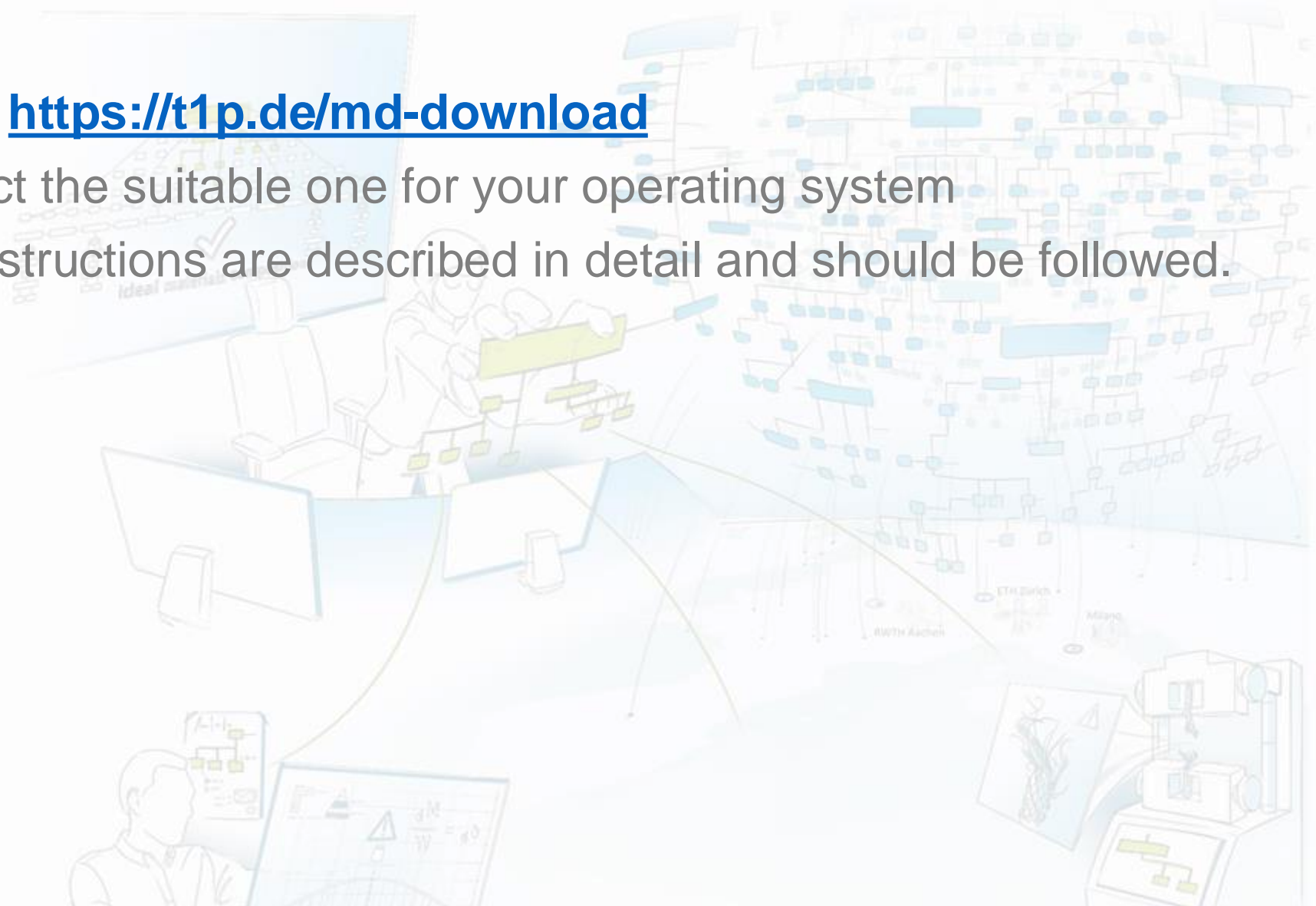
- The provenance is tracked backwards and is retrieved by iteratively keeping track of the “Parent” field inside the other registered metadata documents, if available.
- Required information: schema identifier, the corresponding metadata document.
- The provenance JSON file will be automatically generated and can be saved locally.
- In case the metadata document does not include a “Parent” field, an error will be displayed.



- Tasks:
    - Retrieve an already registered JSON schema.
    - Load the metadata document.
    - Upload the metadata document to the MetaStore instance.
- 
- The background of the slide is a light blue, semi-transparent illustration of a laboratory or office environment. It shows several computer monitors, desks, and people working. In the foreground, a person is looking at a monitor displaying a complex diagram. In the background, another person is working at a desk with a computer. The overall scene is a busy, modern workspace.

# Metadata Editor: Installation

- Link: <https://t1p.de/md-download>
- Select the suitable one for your operating system
- All instructions are described in detail and should be followed.



- Task: upload your created metadata document to the NFDI-MatWerk instance.
- Steps:
  1. Open the Metadata Editor application and select the NFDI-MatWerk instance.
  2. Select the “MetaStore schemas” button.
  3. Load the appropriate schema: the “user” label, “user\_description” schema identifier.
  4. Load your created metadata document: click on the button “load JSON document” and check if the form is filled out correctly. Manually add metadata if something is missing.
  5. Select the “DONE” button in order to go to the next page.
  6. Select the “Upload to MetaStore” option.
  7. Register in the AAI of keycloak.
  8. Fill out the Metadata Record document: select “URL” as a related resource identifier type and as related resource identifier value, we provided for you 20 avatars, from which you can select one. Here the link for the avatar pictures: [https://t1p.de/mwss-avatar\[1-20\]](https://t1p.de/mwss-avatar[1-20]).

# Search Component

- Aim: find relevant data by performing a search based on metadata.
- Only publicly available metadata documents are listed.
- Filtering is available.
- After the login, users can see their documents.
- <https://t1p.de/search-component>

NFDI4MatWerk Metadata Search

Search [Search]

Clear 0 Filters

Showing 1 - 5 out of 5

Sort By: Relevance

INDEX

- metastore-user\_description 5
- metastore-scanning-electron-microscopy 4

PROGRAM VERSION

- V05.07.00.00 : 08-Jul-14 2
- 14.5.1.432 1
- 3.8.9.1943 1

USERNAME

- SABINE 2
- user 2

STAGE ALIGNMENT DONE

- 1 2

ACCELERATION VOLTAGE

- 0-5 0
- 6-10 2
- 11-15 0
- 16-20 0
- >20 2

END TIME

- This Year 0
- Last Year 0
- 2 years ago 1
- Older 3

ROLE

- Team Member 3
- Data Curator 1
- Team Leader 1

AFFILIATION

- KIT 2

Results:

- sample SEM image Thermo Fisher Helios** (SEM 20000 kV) - HeliosPFIB - feasibility (quick check, rough estimate) - User: user
- sample SEM image FEI Helios Nanolab600** (SEM 10000 kV) - Unspecified Title - feasibility (quick check, rough estimate) - User: user
- 1-as-cast\_16\_Sch\_10k\_InLens.tif** (SEM 10 kV, StageAligned) - Auriga 60 (Auriga 60-46-18) - No purpose provided. - User: SABINE
- Jejkal, Thomas** (Team Leader, CC-BY) - Karlsruhe Institute of Technology - Contact me via: ORCID or Email - User: Thomas



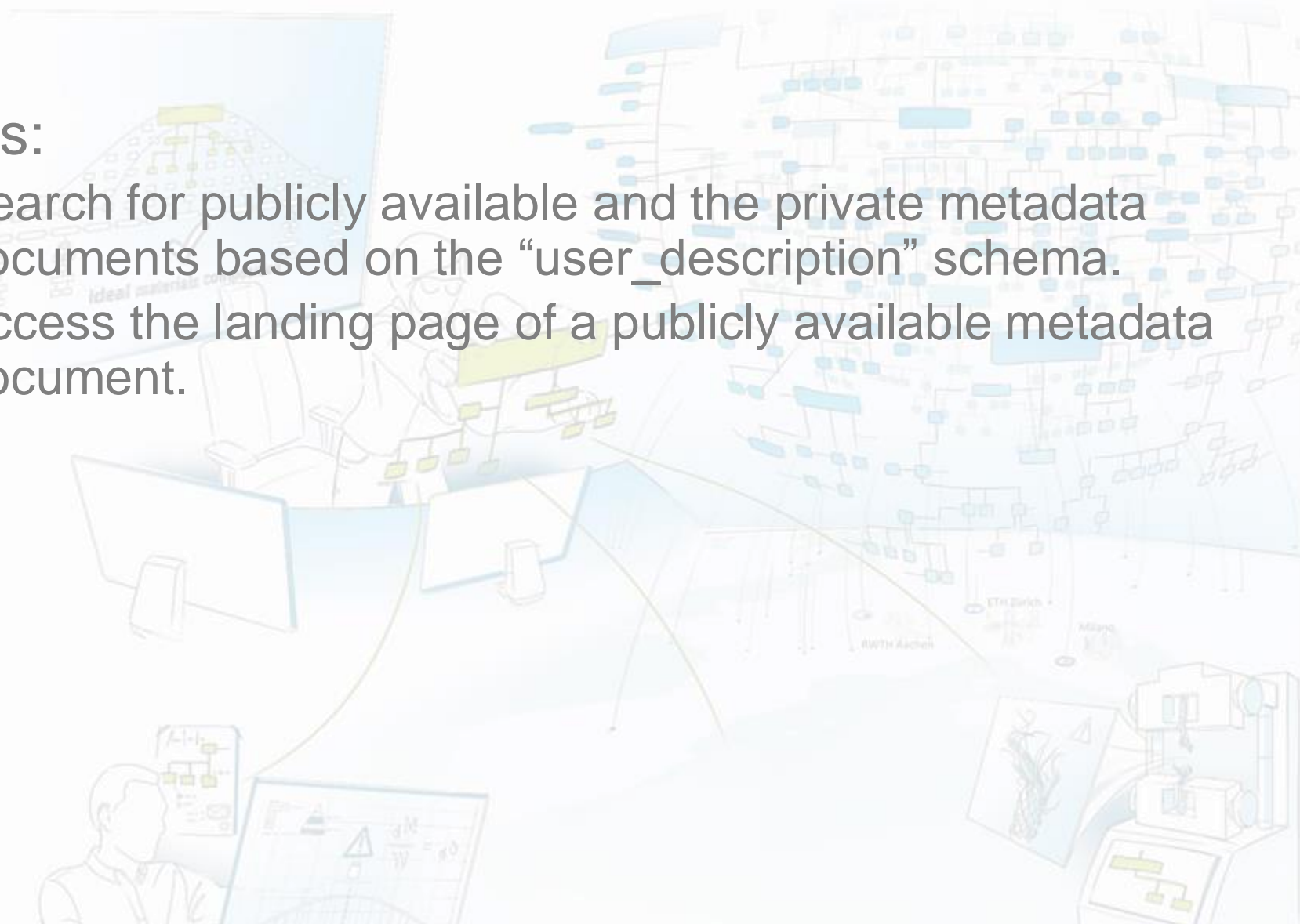
# Search Component: Landing Page

- Different information are provided: schema identifier, label, type of the document,...
- Landing pages only for publicly available documents are available.
  - The user won't benefit from the advantages of the FAIR principles (not findable, not reusable)
  - The right permissions should be changed and a license should be added.

The screenshot shows a landing page for a schema. At the top left, the word "user" is displayed. To its right, a blue button contains the text "SchemaId: user\_description" and "Version: 1". Below this, an information icon is followed by the text "Basic schema for user description." and a comment icon with "No comment available". A link icon is followed by a URL: "https://media.istockphoto.com/id/519078727/photo/male-silhouette-as-avatar-profile-picture.jpg?s=612x612&w=0&k=20&c=AJzMyHfkVKhLnBWOD5aagY--kDBV1g9II0zH9uELE9g=". Below the link is a "Downloads" section with a download icon. It contains two items: "Metadata Document" with a download icon and the SHA1 hash "sha1:83c63407ab2dda8767a3dfd600758816e4f6e837", and "Schema Document" with a download icon and the SHA1 hash "sha1:bb7f2cc5aa56c6ffe2b55b1415d3b27873e5f4fc". On the right side, a "Metadata" section lists: "Type: JSON", "MimeType: application/json", "Created at: 2024-07-31 14:01:04", and "Last Modified: 2024-07-31 14:07:48".

- Tasks:

- Search for publicly available and the private metadata documents based on the “user\_description” schema.
- Access the landing page of a publicly available metadata document.



- Task: search for your created metadata document.
- Steps:
  1. Open the search component by accessing the following link: <https://t1p.de/search-component>. Be sure that you are not logged in!
  1. Have a look to the list of the metadata documents.
  2. Filter the metadata documents based on the “user\_description” schema.
  3. Check the landing page of the available metadata document.
  4. Log in into the search component.
  5. Check if your metadata document is available.

## ■ Metadata Editor

- Load the metadata documents automatically.
- Limitations
  - the loaded metadata documents are not publicly available.
  - License cannot be added.

## ■ Search Component

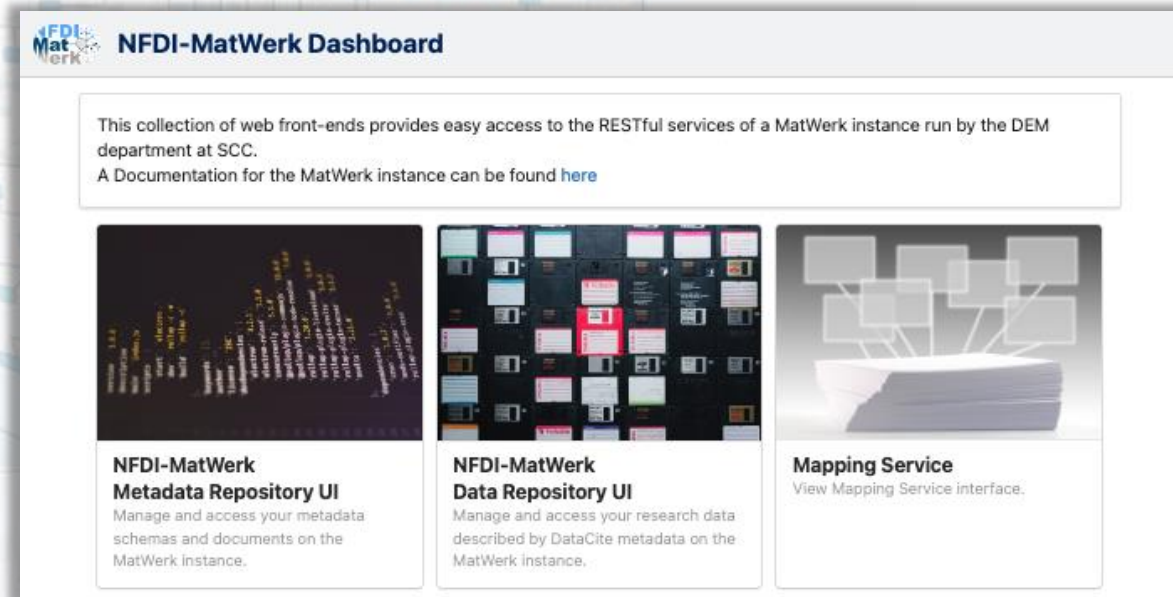
- Search for publicly available metadata documents.
- Search for the own created metadata documents, but not the ones loaded by the collaborators.

➔ Solution: Customize the settings and interact with the metadata repository.

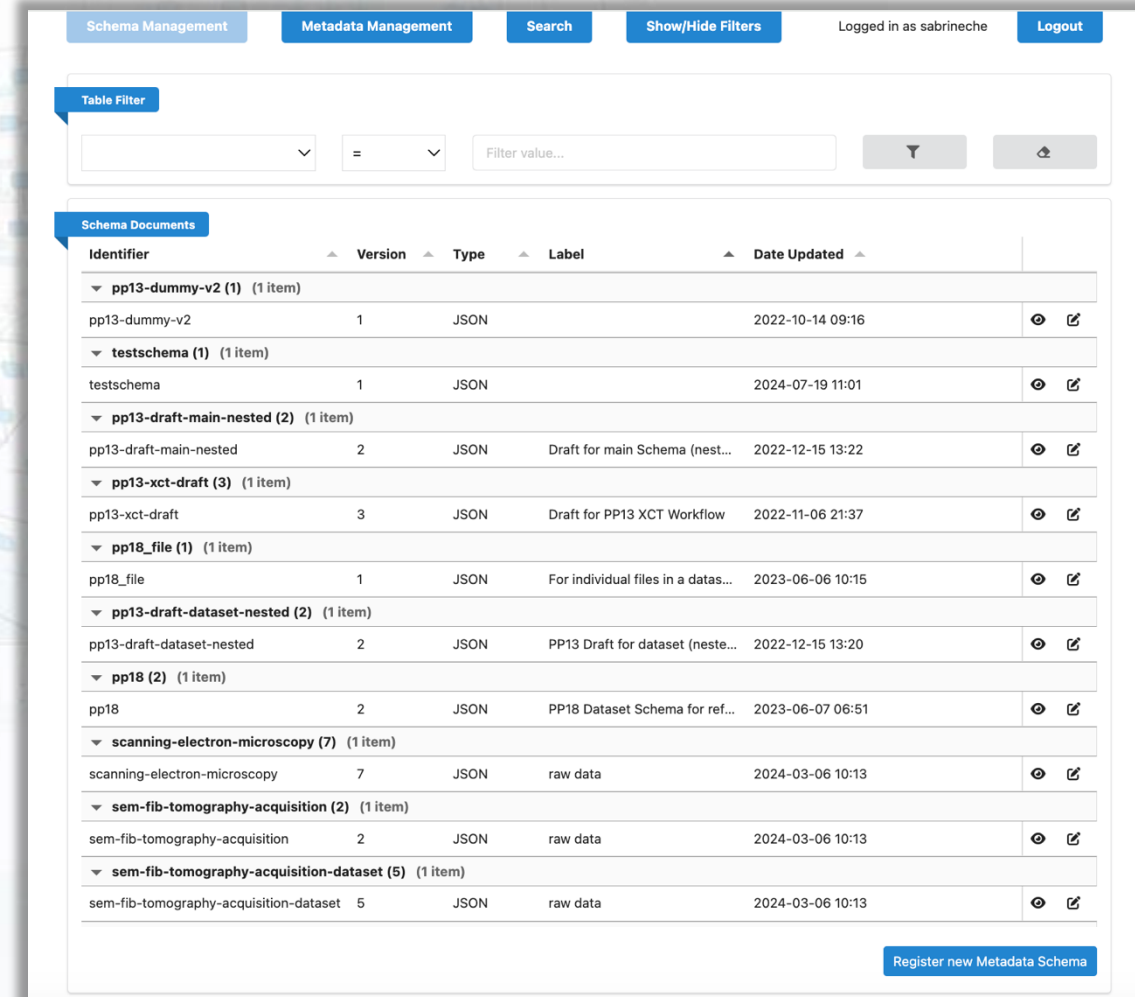
- Developed within DEM at SCC-KIT.
- Metadata repository framework for storing schemas and metadata documents and supports both formats XML and JSON.
- It allows to:
  - register and later update XML/JSON schemas
  - add metadata documents written according to a registered schema and later update them
  - validate metadata against a registered schema
- All functionalities are described with the help of a clear and intuitive REST-API Structure.
- NFDI-MatWerk Metadata Repository is a MetaStore instance for the NFDI-MatWerk project.

GET	/api/v1/schemas/{schemaId}	Get schema record by schema id (and version).
GET	/api/v1/schemas	Get all schema records.
PUT	/api/v1/schemas/{schemaId}	Update a schema record.
POST	/api/v1/schemas	Register a schema document and its record.
POST	/api/v1/schemas/{schemaId}/validate	Validate a metadata document.
DELETE	/api/v1/schemas/{schemaId}	Delete a schema record.
GET	/api/v1/metadata/{id}	Get a metadata record by id.
GET	/api/v1/metadata	Get all records.
PUT	/api/v1/metadata/{id}	Update a metadata record and/or metadata document.

- DEM provides a collection of web front-end services for the MatWerk Project available under this link <https://t1p.de/frontend-dashboard>
- It includes:
  - Metadata Repository UI: enables the management and access of metadata schemas and documents.
  - Data Repository UI: enables the management and access of research data.
  - Mapping service: enables the extraction of metadata from different data files and maps them to appropriate published metadata schemas.

A screenshot of the NFDI-MatWerk Dashboard. The dashboard has a light blue header with the NFDI MatWerk logo and the title 'NFDI-MatWerk Dashboard'. Below the header is a text box explaining that the collection of web front-ends provides easy access to the RESTful services of a MatWerk instance run by the DEM department at SCC, and that documentation can be found [here](#). Below this are three main service tiles: 1. 'NFDI-MatWerk Metadata Repository UI' with a dark background and yellow text, described as a tool to manage and access metadata schemas and documents. 2. 'NFDI-MatWerk Data Repository UI' with a grid of colorful icons, described as a tool to manage and access research data described by DataCite metadata. 3. 'Mapping Service' with a white background and a network diagram, described as a tool to view the Mapping Service interface.

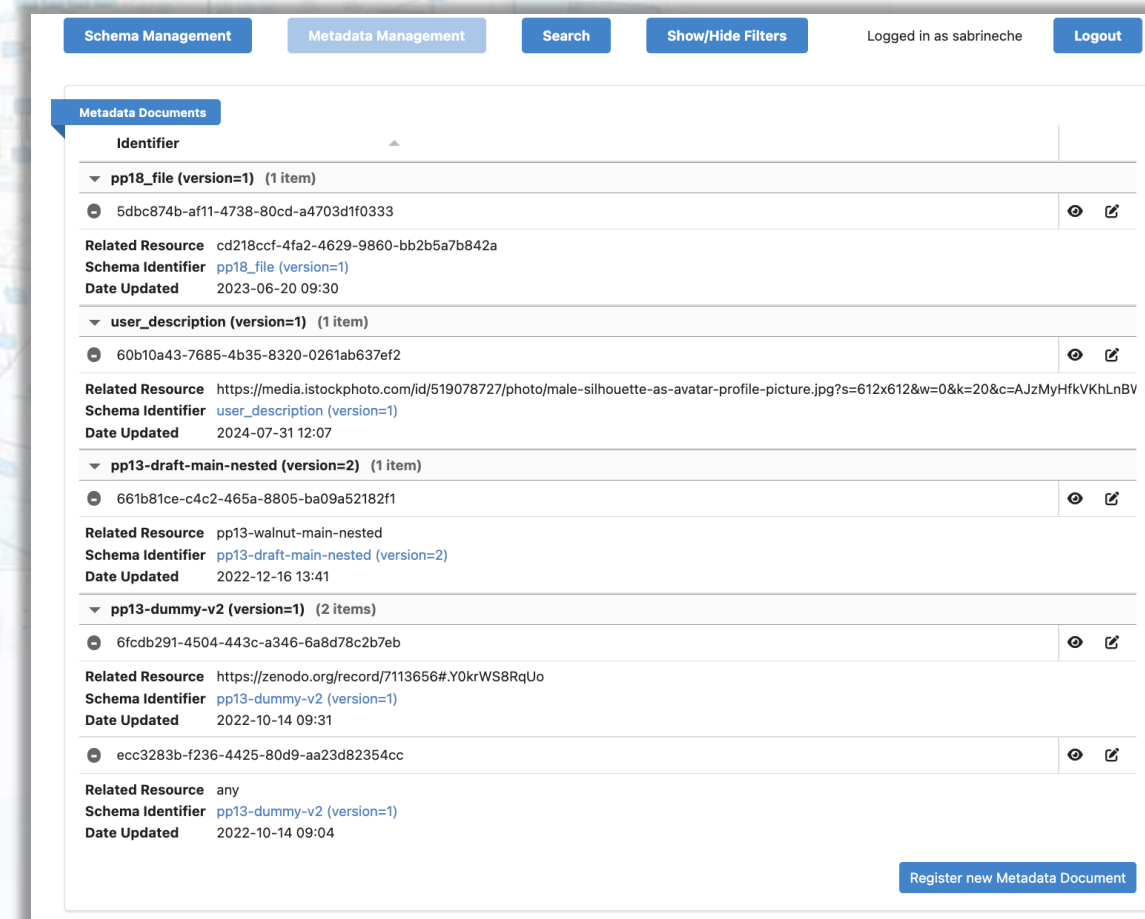
- Registered schemas are publicly available in read-only mode.
- Schemas are listed in a table with different column headers: “identifier”, “Version”, “Type”, “Label” and “Date Updated”.
- Filtering is also available based on “schema identifier”, “Type” or “label”.
- Schema records:
  - include the metadata information of a schema
  - They can be read and updated using the icons on the right side.
  - Schema itself can be also read and updated.



The screenshot shows the 'Schema Management' interface. At the top, there are navigation tabs for 'Schema Management', 'Metadata Management', 'Search', and 'Show/Hide Filters'. The user is logged in as 'sabrineche' and there is a 'Logout' button. Below the navigation is a 'Table Filter' section with a dropdown menu, an equals sign, another dropdown, and a text input field for 'Filter value...'. The main content area is titled 'Schema Documents' and contains a table with the following columns: Identifier, Version, Type, Label, and Date Updated. The table lists several schemas, each with a dropdown arrow on the left and a magnifying glass and edit icon on the right. A 'Register new Metadata Schema' button is located at the bottom right of the interface.

Identifier	Version	Type	Label	Date Updated
▼ pp13-dummy-v2 (1) (1 item)				
pp13-dummy-v2	1	JSON		2022-10-14 09:16
▼ testschema (1) (1 item)				
testschema	1	JSON		2024-07-19 11:01
▼ pp13-draft-main-nested (2) (1 item)				
pp13-draft-main-nested	2	JSON	Draft for main Schema (nest...	2022-12-15 13:22
▼ pp13-xct-draft (3) (1 item)				
pp13-xct-draft	3	JSON	Draft for PP13 XCT Workflow	2022-11-06 21:37
▼ pp18_file (1) (1 item)				
pp18_file	1	JSON	For individual files in a datas...	2023-06-06 10:15
▼ pp13-draft-dataset-nested (2) (1 item)				
pp13-draft-dataset-nested	2	JSON	PP13 Draft for dataset (neste...	2022-12-15 13:20
▼ pp18 (2) (1 item)				
pp18	2	JSON	PP18 Dataset Schema for ref...	2023-06-07 06:51
▼ scanning-electron-microscopy (7) (1 item)				
scanning-electron-microscopy	7	JSON	raw data	2024-03-06 10:13
▼ sem-fib-tomography-acquisition (2) (1 item)				
sem-fib-tomography-acquisition	2	JSON	raw data	2024-03-06 10:13
▼ sem-fib-tomography-acquisition-dataset (5) (1 item)				
sem-fib-tomography-acquisition-dataset	5	JSON	raw data	2024-03-06 10:13

- Metadata documents are listed in a table with a column header: “identifier”.
- Filtering is also available based on “identifier”, “related resource” or “schema identifier”.
- Same functionalities, mentioned for the schema management, are also provided.
- Only metadata documents publicly available are shown if you are logged out.
- The ones created by you or shared to you are visible only after the login.



The screenshot displays the 'Metadata Management' section of the NFDI-MatWerk interface. The user is logged in as 'sabrineche'. The main content area is titled 'Metadata Documents' and lists several documents with their identifiers, related resources, schema identifiers, and update dates. Each document entry includes a toggle for visibility and a share icon.

Identifier	Related Resource	Schema Identifier	Date Updated
<b>pp18_file (version=1) (1 item)</b>			
5dbc874b-af11-4738-80cd-a4703d1f0333	cd218ccf-4fa2-4629-9860-bb2b5a7b842a	pp18_file (version=1)	2023-06-20 09:30
<b>user_description (version=1) (1 item)</b>			
60b10a43-7685-4b35-8320-0261ab637ef2	https://media.istockphoto.com/id/519078727/photo/male-silhouette-as-avatar-profile-picture.jpg?s=612x612&w=0&k=20&c=AJzMyHfkVKhLnB	user_description (version=1)	2024-07-31 12:07
<b>pp13-draft-main-nested (version=2) (1 item)</b>			
661b81ce-c4c2-465a-8805-ba09a52182f1	pp13-walnut-main-nested	pp13-draft-main-nested (version=2)	2022-12-16 13:41
<b>pp13-dummy-v2 (version=1) (2 items)</b>			
6fcdb291-4504-443c-a346-6a8d78c2b7eb	https://zenodo.org/record/7113656#.Y0krWS8RqUo	pp13-dummy-v2 (version=1)	2022-10-14 09:31
ecc3283b-f236-4425-80d9-aa23d82354cc	any	pp13-dummy-v2 (version=1)	2022-10-14 09:04

Register new Metadata Document

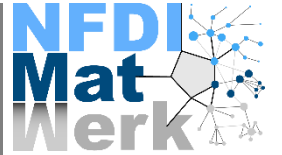


- Tasks:
  - Check the schema “user\_description”.
  - List all metadata documents related to the “user\_description” schema using the filter.
  - Login and check your own loaded metadata document.
  - Update the metadata document by adding an ACL permission and a License.
  - Check the metadata document in the search component.
  - Check the Landing page of the metadata document.

- Task: play around with the NFDI-MatWerk Metadata Repository, change the ACL permission of your metadata document and add a license.
- Steps:
  1. Access the NFDI-MatWerk Dashboard via this link: <https://t1p.de/frontend-dashboard>.
  2. Open the NFDI-MatWerk Metadata Repository UI. Be sure that you are not logged in!
  3. Use the filter to find the “user\_description” schema.
  4. Read the schema record and the JSON schema using the eye icon.
  5. Access the Metadata Management page.
  6. Use the filter to find all metadata documents related to the “user\_description” schema.
  7. Login in order to be able to see your metadata document.
  8. Check the list again if it includes your metadata document.
  9. Update your metadata document record by adding the following ACL permission and also the license.
  10. Validate your metadata record. The fields should be marked green.
  11. Submit your metadata document.
  12. Access the search component by clicking on the “search” button.
  13. Use the filter in order to list the metadata documents related to the “user\_description” schema.
  14. Choose one metadata document and go to the landing page by clicking on the “Show Metadata Record”.
  15. Check the metadata document and see the data.

- **Metadata Editor**
  - Retrieve a specific schema.
  - Load metadata documents automatically.
  - Upload metadata documents to the NFDI-MatWerk Metadata Repository.
- **Search Component**
  - Search for publicly available metadata documents.
  - Search for the own created metadata documents
- **NFDI-MatWerk Metadata Repository**
  - List all available schemas
  - List all available metadata documents
  - Update a metadata document by changing the ACL permission and adding a license

# Acknowledgements



## Contributions:

Thomas Jejkal, Andrea Recchia

## Used material:

<https://metadata-editor.gitlab.io/documentation/>

<https://kit-data-manager.github.io/webpage/metastore/index.html>

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**DFG** Deutsche  
Forschungsgemeinschaft

German Research Foundation

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