

Applying Metadata Management Extraction, Mapping & Visualisation

NFDI-MatWerk Conference
| Siegburg, 27.-29.06.23

Workshop Team:

Ajay Kirar

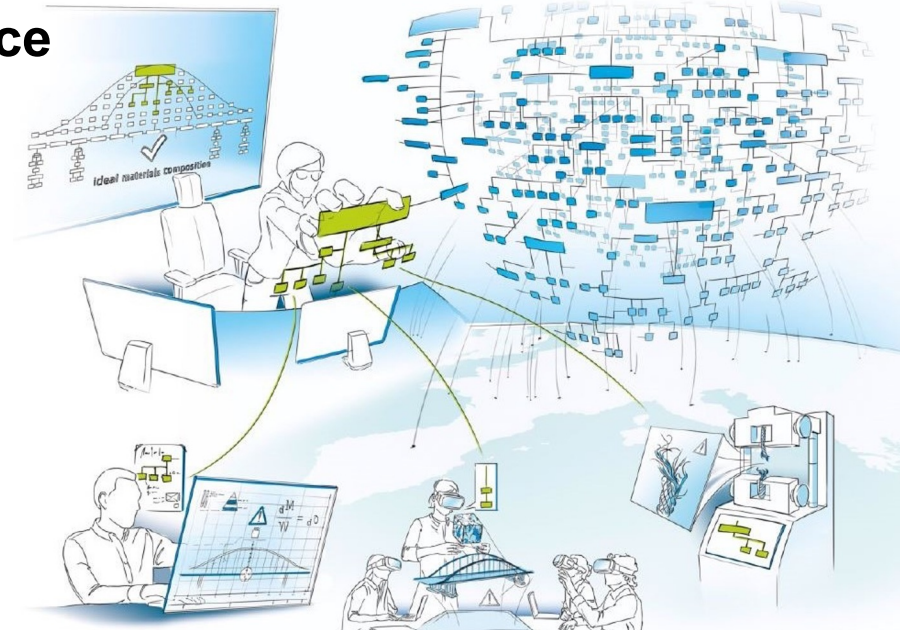
Benedikt Heinrichs

Elias Vitali

Gulzaure Abdildina

Reetu Joseph

Rossella Aversa



Agenda

- Introduction
- Demo: Semantic Metadata Extractor
 - Q/A session
- Introduction to FIB/SEM Tomography (PP13)
- Demo: Metadata Extraction & Mapping with the new interface
 - Q/A Session
- Demo: Metadata Visualisation
 - Q/A Session
- Wrap-up

Introduction

Aim of the workshop

To demonstrate how **Metadata Management** can be **applied** in practical scenarios by way of **extraction, mapping and visualisation**, which would ease the task for researchers by **decreasing time and the manual effort** needed.

Marktplatz

- Posters:
 - Metadata Extraction Tool and Schema Mapper for Scanning Electron Microscopy (SEM) images (Elias)
 - Semantic Metadata Extractor (Benedikt)
- Live demos
 - Demonstration of Automatic Metadata Extraction and Mapping for SEM Images (Elias & Ajay)

Demo: Semantic Metadata Extractor

Benedikt Heinrichs, Sirieam Hunke



Introduction

- There is an ongoing task to transform research data to FAIR Digital Objects (FDOs)
- These FAIR Digital Objects contain
 - The Digital Object (research data)
 - Metadata about the Digital Object
 - Some Service Interfaces
 - A Persistent Identifier
- The big point we focus on here today is metadata

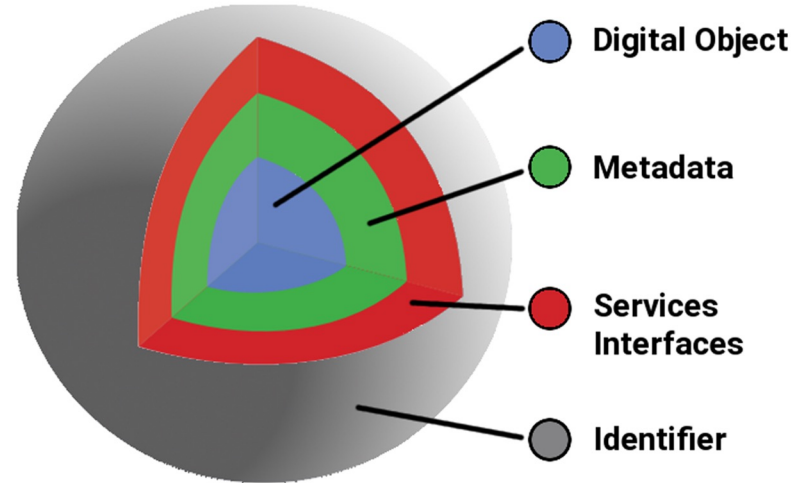


Image from “Digital Objects – FAIR Digital Objects: Which Services Are Required?”, located at:
<https://datascience.codata.org/articles/10.5334/dsj-2020-015/>

Metadata

- Why Metadata?
 - Describing the information surrounding the generation of a research item
 - Example: Describing a research experiment, the time it took place, etc.
- What Metadata?
 - Administrative: e.g. location or rights
 - Structural: provenance information
 - Descriptive: who, when or what
 - Semantic: Formulated in RDF using ontologies and validated by SHACL (W3C standard)
- How Metadata?
 - Manually input
 - Automatically generated during an experiment

Creator *	<input type="text" value="Benedikt Heinrichs"/>	✓	+
Title *	<input type="text" value="IC3K 2020 Poster"/>	✓	+
Production Date *	<input type="text" value="Wednesday, September 9, 2020"/>	✓	+
Subject Area	<input type="text" value="Informatik"/>	▼	+
Resource	<input type="text" value="Text"/>	▼	+
Rights	<input type="text"/>		+
Rightsholder	<input type="text"/>		+


Manual Metadata Input

- Administrative and Structural are usually fairly simple to automatically determine
 - e.g. a platform which manages metadata should be able to be aware of these types of metadata
- Descriptive metadata, however, currently mostly needs to be entered manually
 - This is usually a tedious and time-consuming task
 - A goal of RDM is to make the research process easier and not to create additional hurdles
 - Thankfully, the research data itself a lot of the time brings a subset of the necessary descriptive metadata with itself

Creator *	<input type="text" value="Benedikt Heinrichs"/>	✓	+
Title *	<input type="text" value="IC3K 2020 Poster"/>	✓	+
Production Date *	<input type="text" value="Wednesday, September 9, 2020"/>	✓	+
Subject Area	<input type="text" value="Informatik"/>	▼	+
Resource	<input type="text" value="Text"/>	▼	+
Rights	<input type="text"/>		+
Rightsholder	<input type="text"/>		+

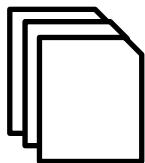
Manual Metadata Input

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Title *	IC3K 2020 Poster	✓	+
Production Date *	 Wednesday, September 9, 2020	✓	+
Subject Area	Informatik	▼	+
Resource	Text	▼	+
Rights			+
Rightsholder			+

Motivation for Semantic Metadata Extraction

- We want to know what our research data is about
- We want to provide the most detailed information about the content of our research data
- We want to spend only as much time as is necessary to input values into forms
- Proposition:



Research Data



Creator *	<input type="text" value="Benedikt Heinrichs"/>	✓	+
Title *	<input type="text" value="IC3K 2020 Poster"/>	✓	+
Production Date *	<input type="text" value="Wednesday, September 9, 2020"/>	✓	+
Subject Area	<input type="text" value="Informatik"/>	▼	+
Resource	<input type="text" value="Text"/>	▼	+
Rights	<input type="text"/>		+
Rightsholder	<input type="text"/>		+

Filled out Metadata



Result Motivation for Semantic Metadata Extraction



```
47 image:mode "RGB" ;
48 ebucore:hasFormat "JPEG" ;
49 ebucore:height "425" ;
50 ebucore:width "640" .
51
52 imageobject:apple rdfs:label "apple" ;
53 imageobject:count "6" .
54
55 imageobject:orange rdfs:label "orange" ;
56 imageobject:count "7" .
```

```
TextEditor - Editor
Datei Bearbeiten Ansicht

Benedikt and Amin work in the same office.
David is eavesdropping their conversation.
David can also speak chinese and knows the characters '性格'.
```



```
68 <http://pikes.fbk.eu/#Amin> a <http://www.newsreader-project.eu/ontologies/PERSON> .
69
70 <http://pikes.fbk.eu/#Benedikt> a <http://www.newsreader-project.eu/ontologies/PERSON> .
71
72 <http://pikes.fbk.eu/#eavesdropping> rdfs:seeAlso <http://dbpedia.org/resource/Eavesdropping> .
```

Prepare the deployment for production server

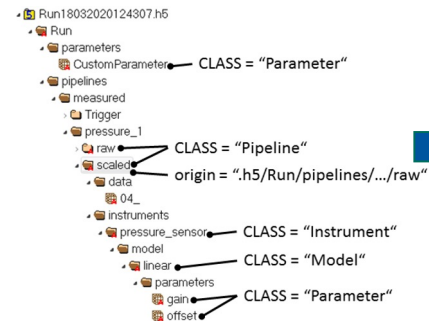
Refer to the product ticket for the description of the ticket.

- Update AutoSPInstaller.xml for installation
 - Check if there need to be separate SP Installer.xmls for the Farm join since there is only one farm.
 - Check if we need a separate file. Set the secret keys and replace it with Consul values into the deployment script.
- Detect why the error during installation "Previously installed Office 2019" (PreReqCheck) occurred
- Parameter for the Installation => For Produktiv vs Dev
 - o Create a parameter to filter (blacklist) steps
 - o Add a json file with default values for config params. also secrets. check if this solves #322
- Make sure the production deployment is working
- Put CoSclnE DB creation into its own step and otherwise throw 3.02 out

Topic/600-productionDeployment

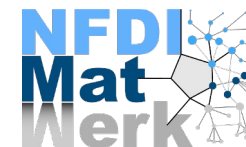


```
87
88 <http://pikes.fbk.eu/#installation> a <http://dbpedia.org/class/yago/Initiation107453195> ;
89 rdfs:seeAlso <http://dbpedia.org/resource/Installation_(computer_programs)> .
90
91 <http://pikes.fbk.eu/#json> rdfs:seeAlso <http://dbpedia.org/resource/JSON> .
92
```



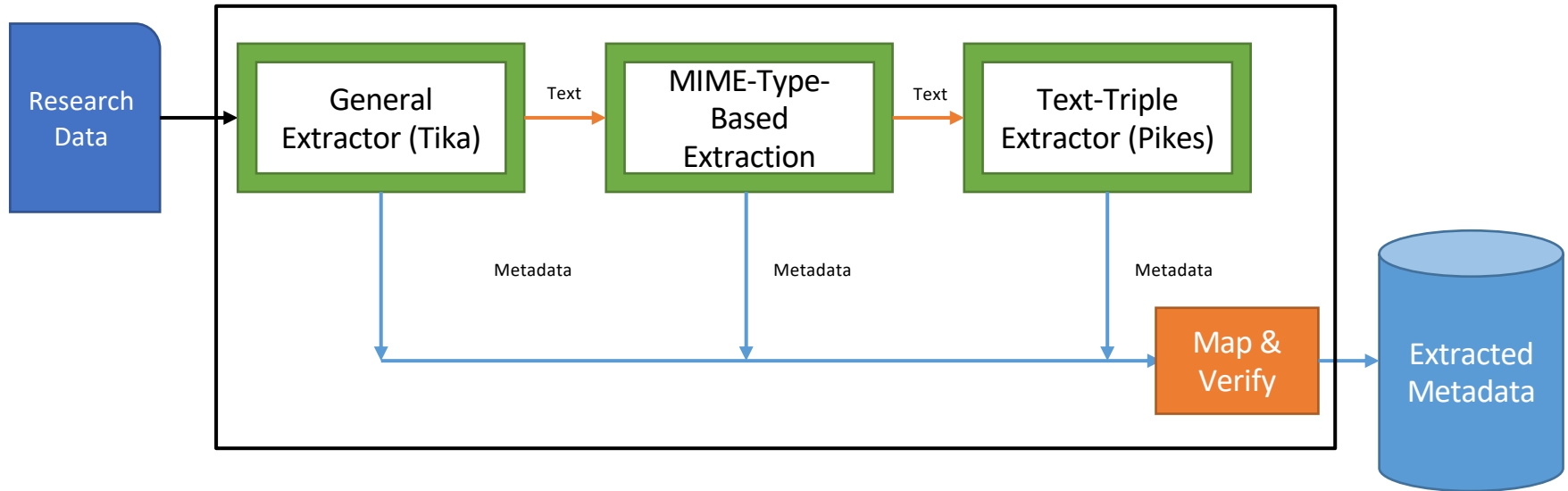
```
<https://hdl.handle.net/21.11102/
a ns3:Pipeline,
  dcat:Catalog ;
ns5:pipelineVersion "1.0" ;
ns3:origin "this" ;
ns3:units "volts" ;
ns3:variable "voltage" ;
dct:identifier "Run1803202012
dcat:catalog <https://hdl.han
<https://hdl.handle.net/2
```

HDF5 File Structure



Metadata Extraction Pipeline

Metadata Extraction



[Heinrichs, B.](#) ; [Politze, M.](#)

[Moving Towards a General Metadata Extraction Solution for Research Data with State-of-the-Art Methods](#)

12th International Conference on Knowledge Discovery and Information Retrieval, KDIR 2020, online,

2 Nov 2020 - 4 Nov 2020

Metadata Extraction Application – Features

- Dynamic Configuration
 - You can configure every extractor which shall be called and specify certain environment variables
- Registration of custom extractors
 - Once implemented, an extractor will listen to its registration method which can e.g. listen to certain MIME-Types like “image/png”
 - Custom extractors can be excluded from the default configuration, so that specific use cases can be proposed without impacting everything else
- Highly extendable
 - By being open source, this application is easily extendable to different areas
 - <https://git.rwth-aachen.de/coscine/research/metadataextractor>

Metadata Extraction Service

<https://metadataextractor.otc.coscine.dev/>



Metadata Extractor API 0.1.1
[Base URL: /]
[/swagger.json](#)

This API extracts RDF triples from files

default Default namespace ^

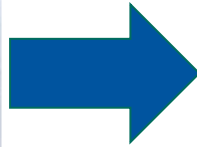
POST / ^

Parameters Try it out

Name	Description
identifier string (formData)	File Identifier
<input type="text" value="identifier"/>	
config string (formData)	Object defining the utilized configuration (try "/defaultConfig" to get the structure)
<input type="text" value="config"/>	
creation_date string (formData)	Creation Date (Time) (e.g. "2022-09-15T09:27:17.3550000+02:00")
<input type="text" value="creation_date"/>	
modification_date string (formData)	Modification Date (Time) (e.g. "2022-09-15T09:27:17.3550000+02:00")
<input type="text" value="modification_date"/>	
file <small>required</small> file (formData)	
<input type="button" value="Datei auswählen"/> Keine ausgewählt	



Example Results – Object Detection



```
47 image:mode "RGB" ;
48 ebucore:hasFormat "JPEG" ;
49 ebucore:height "425" ;
50 ebucore:width "640" .
51
52 imageobject:apple rdfs:label "apple" ;
53 imageobject:count "6" .
54
55 imageobject:orange rdfs:label "orange" ;
56 imageobject:count "7" .
```

Example Results – Text

```
TestText.txt - Editor
Datei  Bearbeiten  Ansicht

Benedikt and Amin work in the same office.
David is eavesdropping their conversation.
David can also speak chinese and knows the characters '性格'.
```



```
68 <http://pikes.fbk.eu/#Amin> a <http://www.newsreader-project.eu/ontologies/PERSON> .
69
70 <http://pikes.fbk.eu/#Benedikt> a <http://www.newsreader-project.eu/ontologies/PERSON> .
71
72 <http://pikes.fbk.eu/#eavesdropping> rdfs:seeAlso <http://dbpedia.org/resource/Eavesdropping> .
```


Example Results – Image to Text

Prepare the deployment for production server

Refer to the product ticket for the description of the ticket.

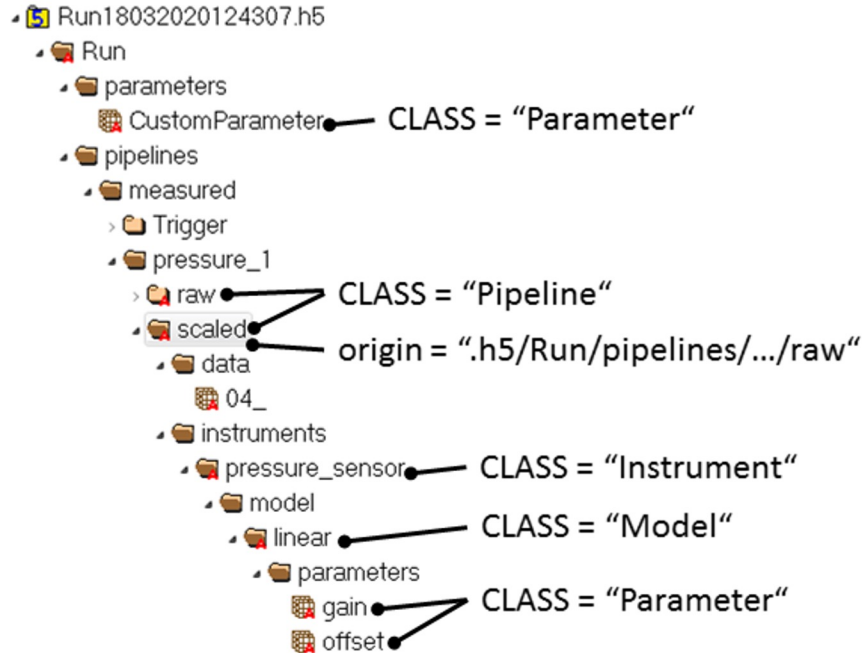
- Update AutoSPInstaller.xml for installation
 - Check if there need to be separate SP Installer xmls for the Farm join since there is only one farm.
 - Check if we need a separate file. Set the secret keys and replace it with Consul values into the deployment script.
- Detect why the error during installation "Previously installed Office 2019" (PreReqCheck) occurred
- Parameter for the Installation => For Produktiv vs Dev
 - Create a parameter to filter (blacklist) steps
 - Add a json file with default values for config params, also secrets, check if this solves #322
- Make sure the production deployment is working
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Topic/600-productionDeployment



```
87
88 <http://pikes.fbk.eu/#installation> a <http://dbpedia.org/class/yago/Initiation107453195> ;
89   rdfs:seeAlso <http://dbpedia.org/resource/Installation\_\(computer\_programs\)> .
90
91 <http://pikes.fbk.eu/#json> rdfs:seeAlso <http://dbpedia.org/resource/JSON> .
92
```

Example Results – Real Example with HDF5



```
<https://hdl.handle.net/21.11102/1
  a ns3:Pipeline,
    dcat:Catalog ;
  ns5:pipelineVersion "1.0" ;
  ns3:origin "this" ;
  ns3:units "volts" ;
  ns3:variable "voltage" ;
  dct:identifier "Run18032020124
  dcat:catalog <https://hdl.han
  <https://hdl.handle.net/21
```

HDF5 File Structure

[Heinrichs, B. P. A.](#) ; [Preuß, N.](#) ; [Politze, M.](#) ; [Müller, M. S.](#) ; et al
[Automatic General Metadata Extraction and Mapping in an HDF5 Use-case](#)
Proceedings of the 13th International Joint Conference on Knowledge Discovery,
Knowledge Engineering and Knowledge Management



Metadata Extraction Service – Usage

Open Source

- Git Repo (Python Code):

<https://git.rwth-aachen.de/coscine/research/metadataextractor>

- Docker Image:

registry.git.rwth-aachen.de/coscine/research/metadataextractor:latest

- Demo:

<https://metadataextractor.otc.coscine.dev/>

- Start adding your own extractor now by using Gitpod:

<https://gitpod.io/#https://git.rwth-aachen.de/coscine/research/metadataextractor>

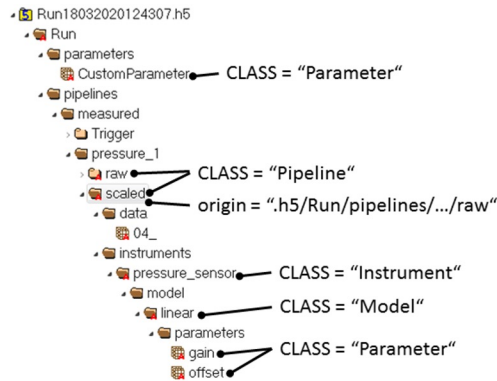
Metadata Extraction Service – Future Work

- Inclusion in research data management systems like Coscine
 - Automatically extract the metadata for research data based on a given configuration
 - Fill the metadata form automatically based on a templating engine
 - Make use of the extracted metadata in applications like “search”
- Utilize the extracted metadata to determine the similarity between research data when the MIME-Type is different (e.g. image with text vs. text file)
 - Making use of <https://git.rwth-aachen.de/coscine/research/semanticsimilarity>
- Improve the performance and make it better scale against big research data

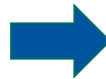


Conclusion

- Today, I showed a look into our proposed solution of semantic metadata extraction
- It is a pipeline which takes research data and tries to describe the content as semantic metadata
- The usage has been demonstrated on different examples with a real-life use case as well



HDF5 File Structure



```
<https://hdl.handle.net/21.11102/1
a ns3:Pipeline,
  dcat:Catalog ;
ns5:pipelineVersion "1.0" ;
ns3:origin "this" ;
ns3:units "volts" ;
ns3:variable "voltage" ;
dct:identifier "Run18032020124
dcat:catalog <https://hdl.han
<https://hdl.handle.net/21
```

- Future work is being done to utilize this in real life applications

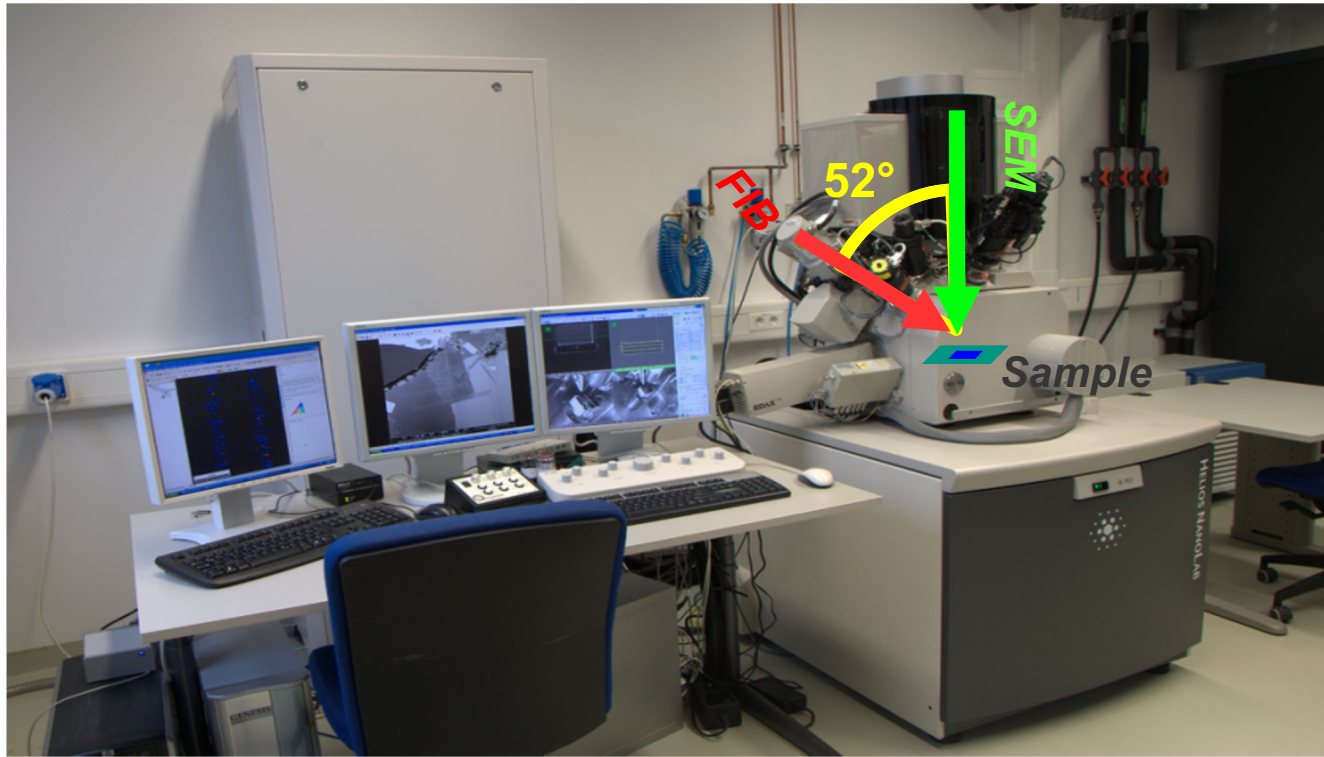
Q & A

Introduction to FIB/SEM Serial Sectioning Tomography (PP13)

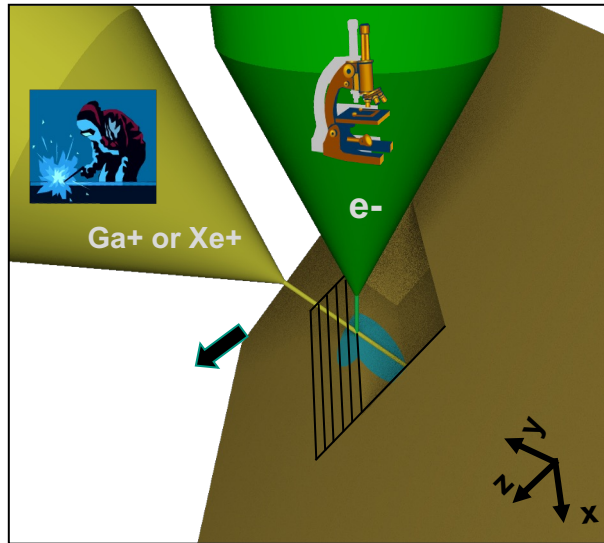
Reetu Joseph, Rossella Aversa, Christoph Pauly



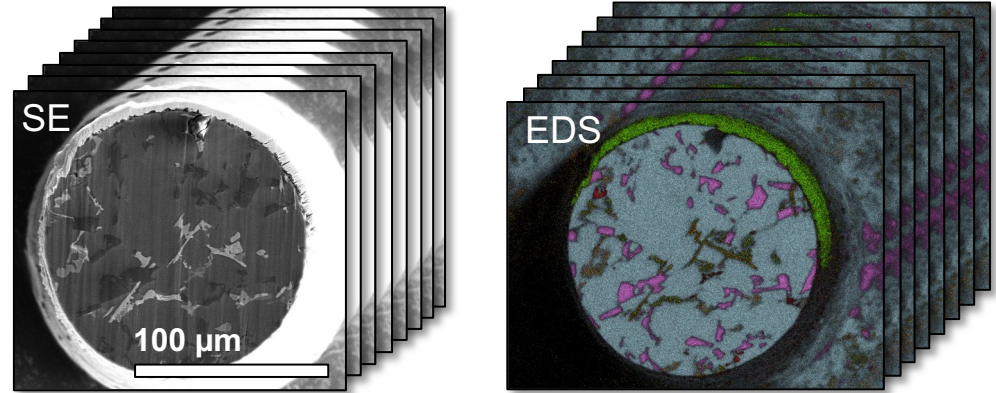
FIB/SEM Serial Sectioning Tomography Apparatus



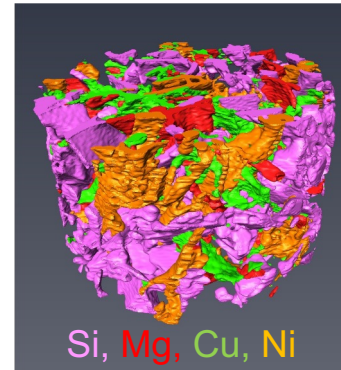
I. Serial sectioning and multimodal imaging



II. Image Processing and 3D reconstruction

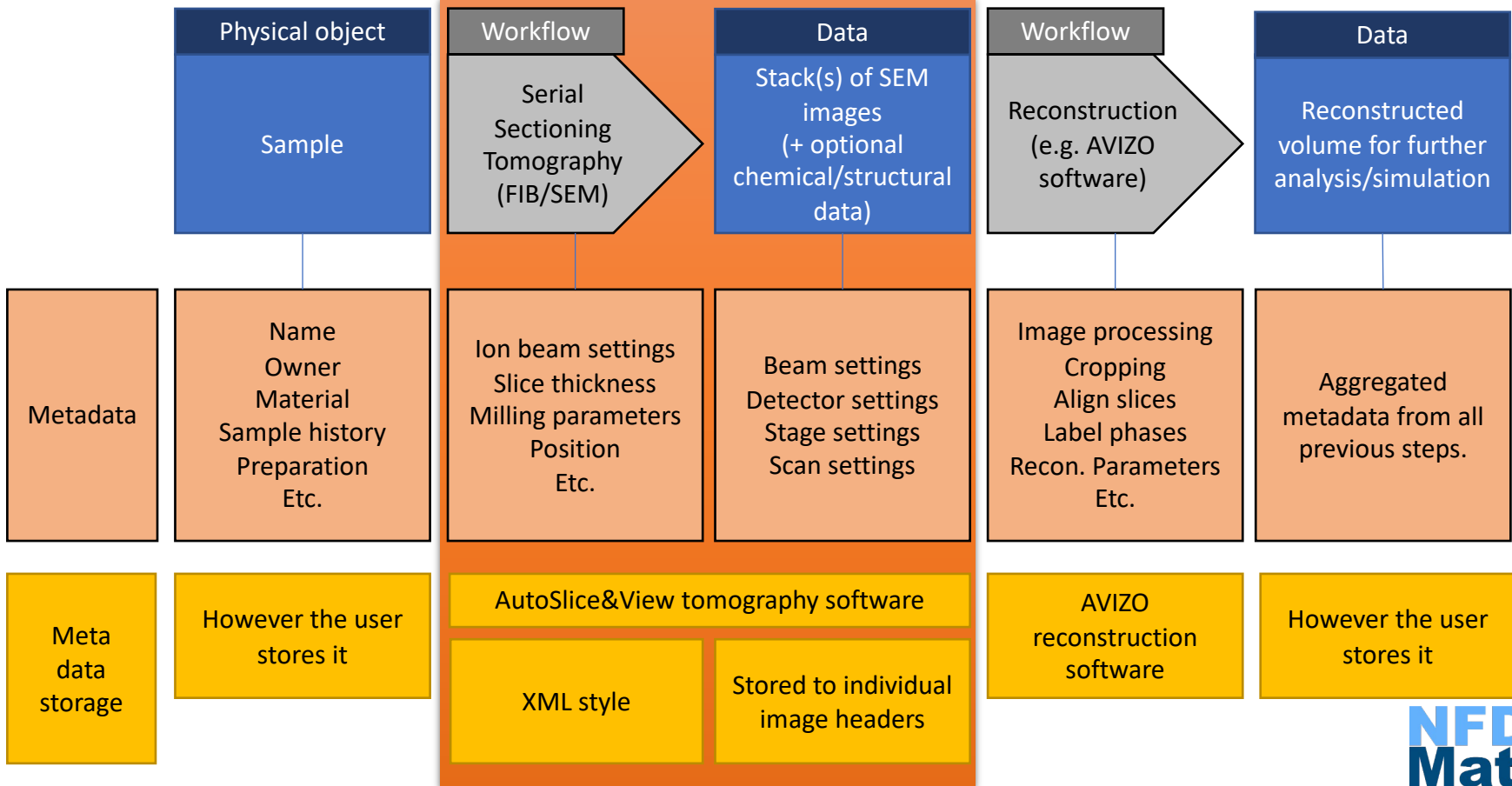


2D image stack
(x-y-plane)



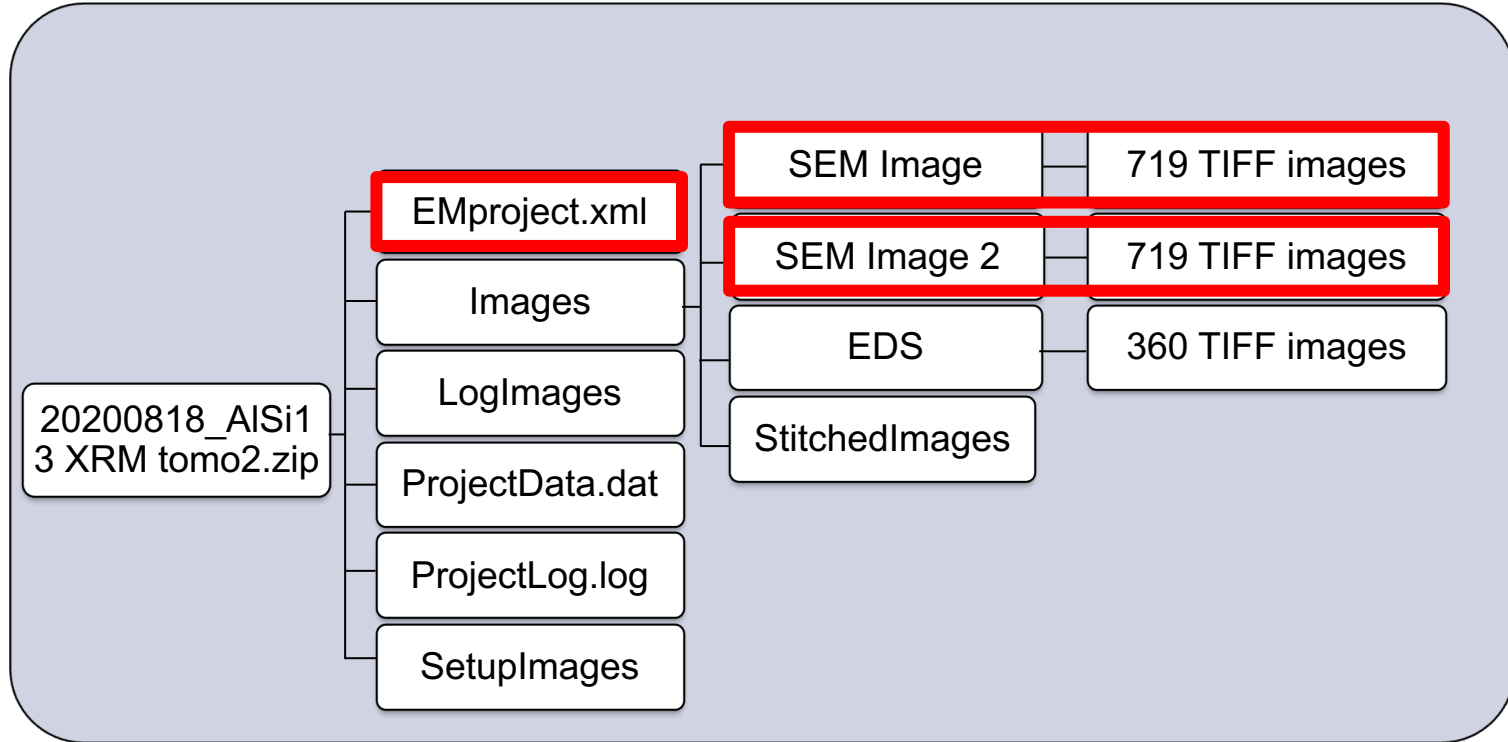
3D volume based
on EDS data (x-y-z)





Metadata Handling

Acquisition Data



Demo + Presentation: Metadata Extraction & Mapping – SEM/FIB Serial Sectioning Tomography

Elias Vitali, Ajay Kirar, Reetu Joseph, Rossella Aversa

Acquisition Data

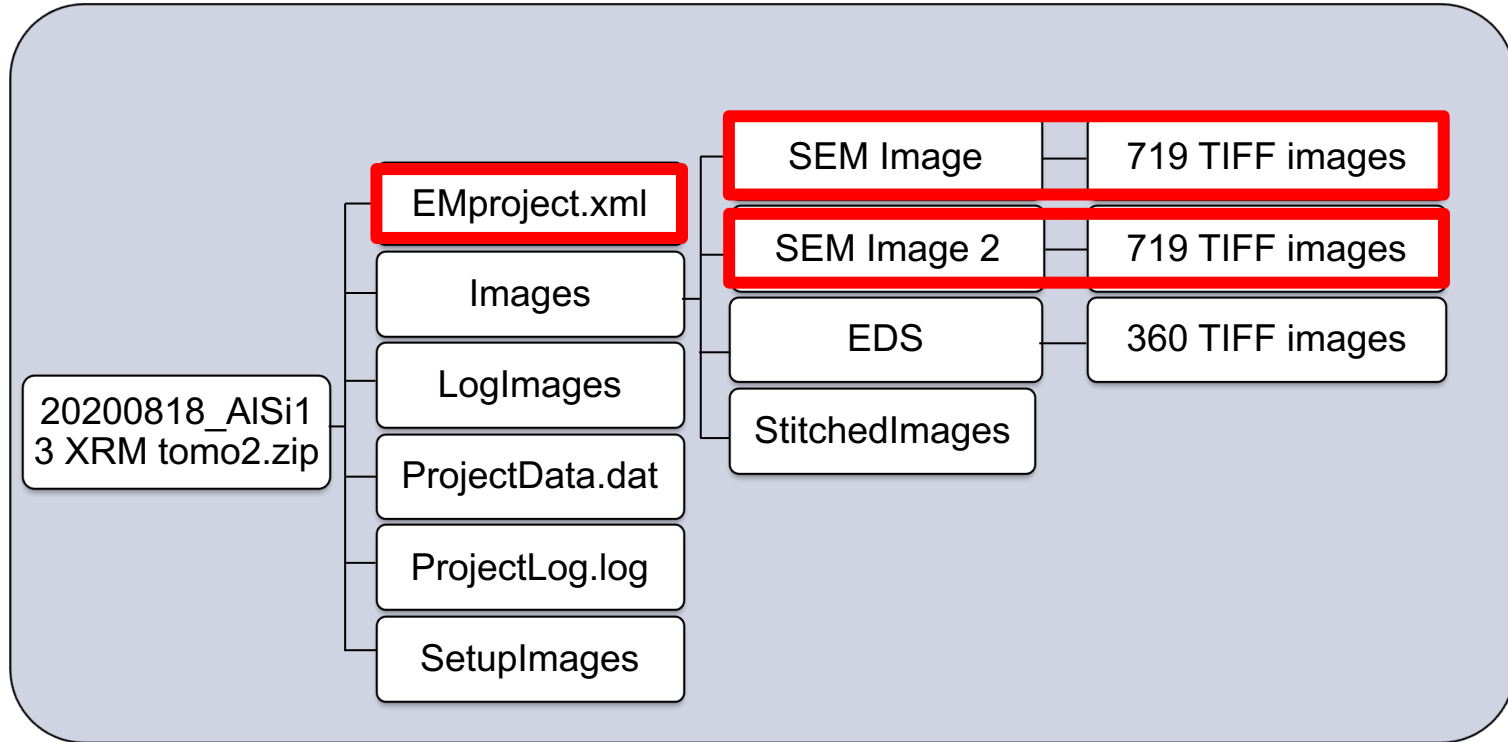


Image Metadata



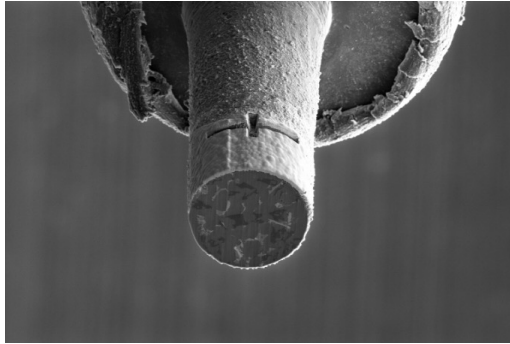
- Hidden in this image is a ton of metadata
- Need an efficient method to extract this metadata

Desired Result

- We want a metadata document that describes:
 - the acquisition;
 - each dataset;
 - each image.
- A [schema](#) dictates the format which this metadata document should take
 - This lets us "map" the metadata

Process at a glance

1. Original TIFF image with all metadata



HV=15000
HFW=0.000592
VFW=0.000394667
WD=0.00402349
BeamCurrent=1.6e-009

"acquisition.dataset.instrument.eBeam.accelerationVoltage.value":"Images.SEM Image.SliceImage.EBeam.hv",
"acquisition.dataset.instrument.eBeam.beamCurrent.value":"Images.SEM Image.SliceImage.EBeam.beamcurrent",
"acquisition.dataset.instrument.eBeam.scanRotation.value":"Images.SEM Image.SliceImage.EBeam.scanrotation",

2. Map file which translates original keys to schema keys

3. Formatted metadata document

```
{  
  "acquisition": {  
    "genericMetadata": {--  
  },  
  "dataset": [  
    {  
      "rows": "1",  
      "columns": "1",  
      "tileColumn": "0",  
      "user": {--  
    },  
    "program": {--  
  },  
  "instrument": {  
    "beamType": "EBeam",  
    "spot": "1",  
    "eBeam": {  
      "accelerationVoltage": {  
        "value": "15000"  
      },  
      "beamCurrent": {  
        "value": "1.6e-009"  
      }  
    }  
  }  
}
```


The Mapping Service



NFDI-MatWerk Metadata Mapping Service

Extract metadata and map it to json.

Choose a Mapping

Select or search your mapping here.

Drag & Drop your files or [Browse](#)

Map document



1. Choose the mapping scheme

NFDI-MatWerk Metadata Mapping Service
Extract metadata and map it to json.

Choose a Mapping

Select or search your mapping here.

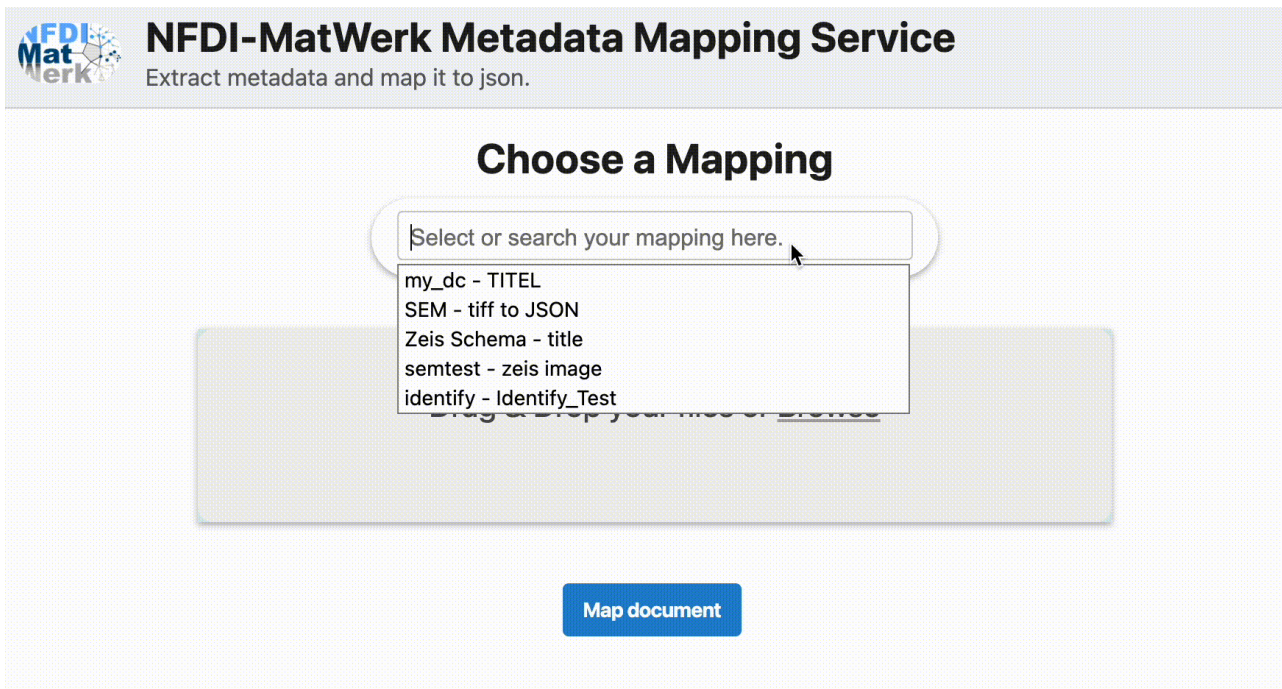
Drag & Drop your files or [Browse](#)

Map document

Select your mapping scheme by clicking here

NFDI-MatWerk

1. Choose the mapping scheme



NFDI-MatWerk Metadata Mapping Service
Extract metadata and map it to json.

Choose a Mapping

Select or search your mapping here.

- my_dc - TITEL
- SEM - tiff to JSON
- Zeis Schema - title
- semtest - zeis image
- identify - Identify_Test

Map document

2. Uploading the dataset

The screenshot shows the NFDI-MatWerk Metadata Mapping Service interface. At the top left is the logo for NFDI MatWerk. The main heading is "NFDI-MatWerk Metadata Mapping Service" with the subtitle "Extract metadata and map it to json." Below this is a section titled "Choose a Mapping" containing a dropdown menu with the selected option "SEM - tiff to JSON". A large grey box with a red border contains the text "Drag & Drop your files or Browse". Below this is a blue button labeled "Map document". To the right, a red arrow points from the "Browse" link to a file selection dialog. The dialog shows a sidebar with navigation options like Documents, My Drive, Recents, etc. The main area displays several files and folders, with "20200818_AISI13 XRM tomo2.zip" highlighted. At the bottom of the dialog are "Cancel" and "Open" buttons.

NFDI MatWerk Metadata Mapping Service
Extract metadata and map it to json.

Choose a Mapping

SEM - tiff to JSON

Drag & Drop your files or Browse

Map document

Click on "Choose File" and upload the desired dataset

Documents
My Drive
Recents
Applications
Desktop
PP13_Map...
NEP
Downloads
kit
DEM
iCloud
iCloud Drive
Shared
Locations
Network

20200818_AISI13 XRM tomo2 8 items
20200818_AISI13 XRM tomo2.zip 4.25 GB
AIS13 XRM tomo_3...EDS.zip 1.29 GB
EDS - SliceImage - 001_0.spd

Cancel Open

3. Map and download

NFDI-MatWerk Metadata Mapping Service
Extract metadata and map it to json.

Choose a Mapping

SEM - tiff to JSON

Drag & Drop your files or [Browse](#)

Map document

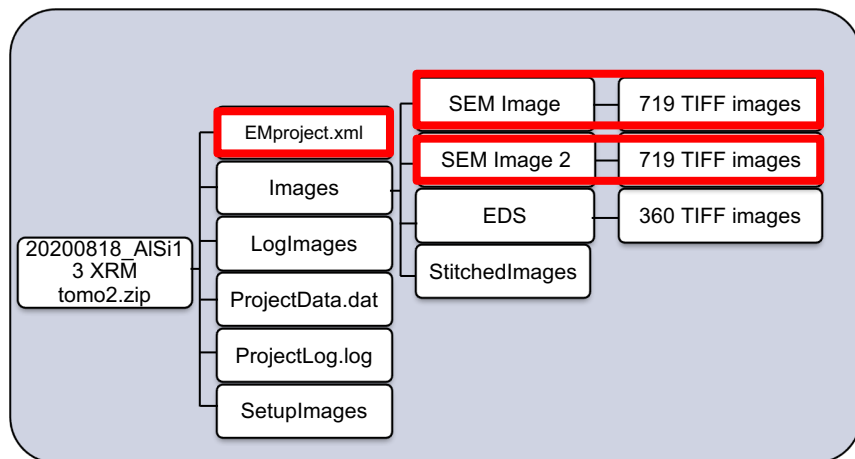
Click "Map document". A download of the results file should automatically start, if it doesn't, you can also click on the "Download result" button which will appear after mapping.

4. Examine the results

```
1  {
2    "acquisition": {
3      "genericMetadata": {
4        "program": {
5          "programName": "Auto Slice & View 4",
6          "programVersion": "4.2.1.1982"
7        },
8        "applicationId": {
9          "identifierValue": "ASV"
10       },
11       "fileVersion": "1.2",
12       "projectName": "20200818_AlSi13 XRM tomo2",
13       "zCutSpacing": {
14         "value": "2.0000000000000002E-07"
15       },
16       "numberOfCuts": "719",
17       "pump": "TMP",
18       "column": "Elstar",
19       "source": "FEG",
20       "eucentricWorkingDistance": {
21         "value": "0.004"
22       }
23     }
24   }
```

Summary

- Automatically extract data from hundreds of images in one swift process
- Reorganized metadata in a structured format according to a published schema



```
{
  "acquisition": {
    "genericMetadata": {
      "program": {
        "programName": "Auto Slice & View 4",
        "programVersion": "4.2.1.1982"
      },
      "applicationId": {
        "identifierValue": "ASV"
      },
      "fileVersion": "1.2",
      "projectName": "20200818_AISi13 XRM tomo2",
      "zCutSpacing": {
        "value": "2.0000000000000002E-07"
      },
      "numberOfCuts": "719",
      "pump": "TMP",
      "column": "Elstar",

```

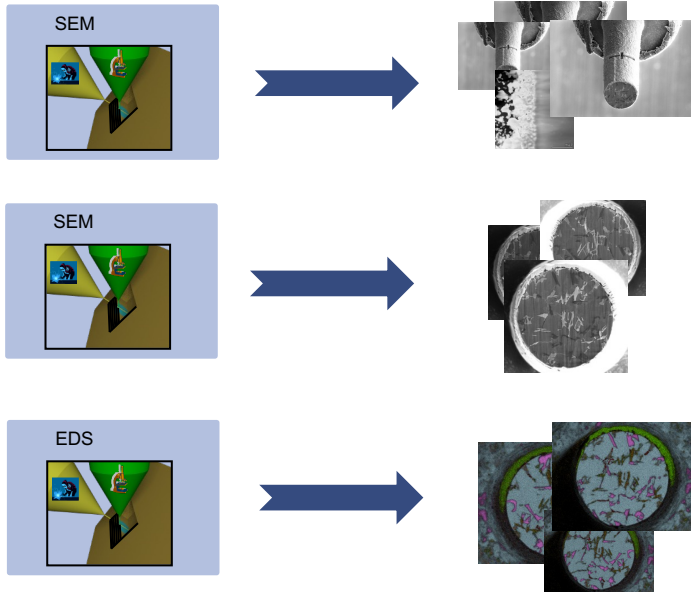
Q & A

Visual Analysis of complex metadata of SEM/FIB Tomography TIFF images

Gulzaure Abdildina, Rossella Aversa

Problem

Each experiment produces a large amount of data



Scientists need to:

- Analyze a large amount of experimental results.
- Monitor the experiment's progress for expected outcomes.
- Compare results from multiple experiments.

How can these processes be automated to facilitate the decision-making process?

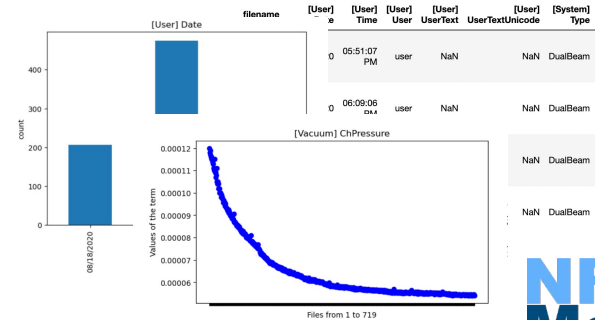
Visual Analyzer

Python-based Jupyter Notebook which allows to:

- quickly overview metadata of SEM/FIB Tomography TIFF images
- visualize metadata for the analysis of experiment results -> makes complex data more accessible and understandable
- support scientists in accelerating decision-making processes



→ applying Visual Analyzer



Quick overview of the metadata

- Overall view of the metadata: statistics and common trends

	filename	user Date	user userName	program programName	spot	beamType	scan scanType	eBeam apertureSetting Size	accelerati
count	719	719	719	719	719	719	719	719	
unique	719	3	1	1	1	1	1	1	
top	SEM Image - SlicedImage - 085.tif	08/19/2020	user	14.5.1.432	1	EBeam	EScan	4.53e-005	
freq	1	474	719	719	719	719	719	719	

4 rows x 75 columns

Quick overview of the metadata

Analysis of the metadata:

- Total number of metadata terms - 73
- Terms with constant values - 65
- Terms with changing values - 8 :
 - according to schema changing values can be 16

Quick overview of the metadata with changing values

Metadata with changing values

Data columns (total 9 columns):

#	Column	Non-Null Count	Dtype
0	filename	719 non-null	object
1	stage StageX	719 non-null	float64
2	stage StageY	719 non-null	float64
3	stage StageTa	719 non-null	float64
4	stage workingDistance	719 non-null	float64
5	imaging driftcorrected	719 non-null	object
6	vacuum chamberPressure	719 non-null	float64
7	image specimenCurrent	719 non-null	float64
8	images creationTime	719 non-null	object

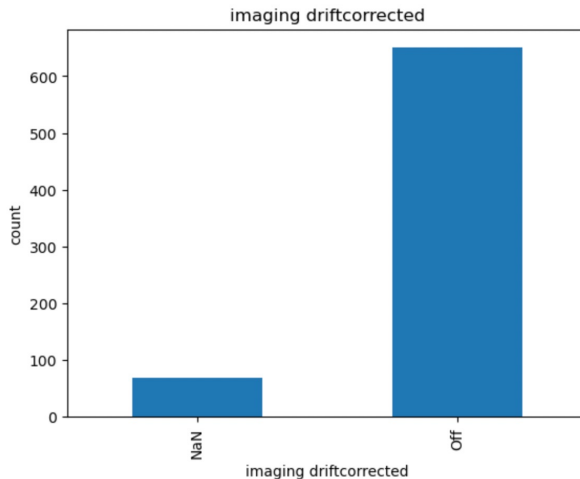
Overview of the values

filename	user Date	stage StageX	stage StageY	stage StageTa	stage workingDistance	driftc
SEM Image - SlicelImage - 001.tif	08/18/2020	0.000225271	-0.00467317	0.336851	0.00402349	
SEM Image - SlicelImage - 002.tif	08/18/2020	0.000225271	-0.00467317	0.336851	0.00402365	
SEM Image - SlicelImage - 003.tif	08/18/2020	0.000225271	-0.00467317	0.33685	0.00402381	
SEM Image - SlicelImage - 004.tif	08/18/2020	0.000225271	-0.00467317	0.336851	0.00402396	

Visualizing Metadata

Grouping images by *driftcorrected*:

- Metadata *driftcorrected* has two values
- We can also investigate how many and which images has missing values

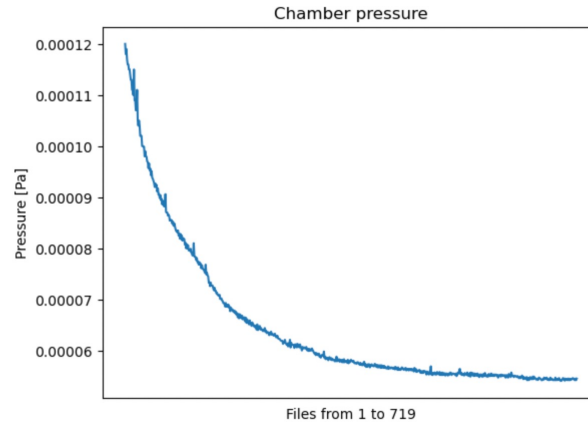


Images with missing *driftcorrected* values

	filename	imaging driftcorrected
673	SEM Image - SlicelImage - 048.tif	NaN
101	SEM Image - SlicelImage - 050.tif	NaN
5	SEM Image - SlicelImage - 052.tif	NaN
107	SEM Image - SlicelImage - 054.tif	NaN
205	SEM Image - SlicelImage - 056.tif	NaN
717	SEM Image - SlicelImage - 063.tif	NaN
629	SEM Image - SlicelImage - 065.tif	NaN
551	SEM Image - SlicelImage - 073.tif	NaN
701	SEM Image - SlicelImage - 103.tif	NaN

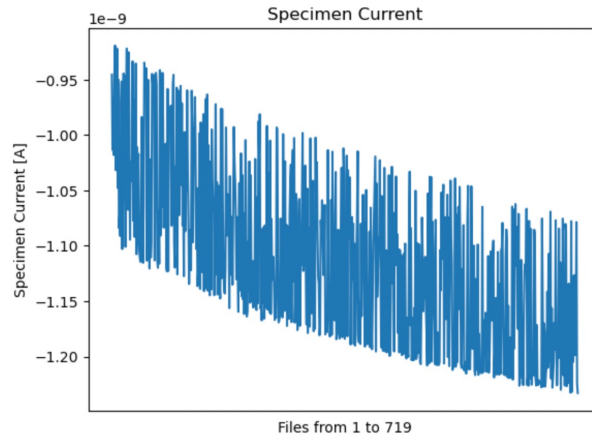
Visualizing Metadata

- Visualizing the evolution of chamber pressure values during the experiment
- Chamber pressure affects milling accuracy
- Expected to decrease over the course of the experiment



Visualizing Metadata

- Visualizing the changes of specimen current values during the experiment
- Specimen current affects the brightness of the SEM image and Energy-Dispersive X-ray Spectroscopy (EDS) signal

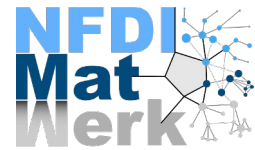


Conclusions

- The Visual Analyzer:
 - allows for a quick overview of the experiment as a whole
 - facilitates the comparison of experiment results
 - automates and optimizes the analysis of metadata, expediting the decision-making process
- It can be expanded and adapted according to the needs of the scientists
- Open source:
 - <https://bwsyncandshare.kit.edu/s/nemrjdMGKnLfmt2>

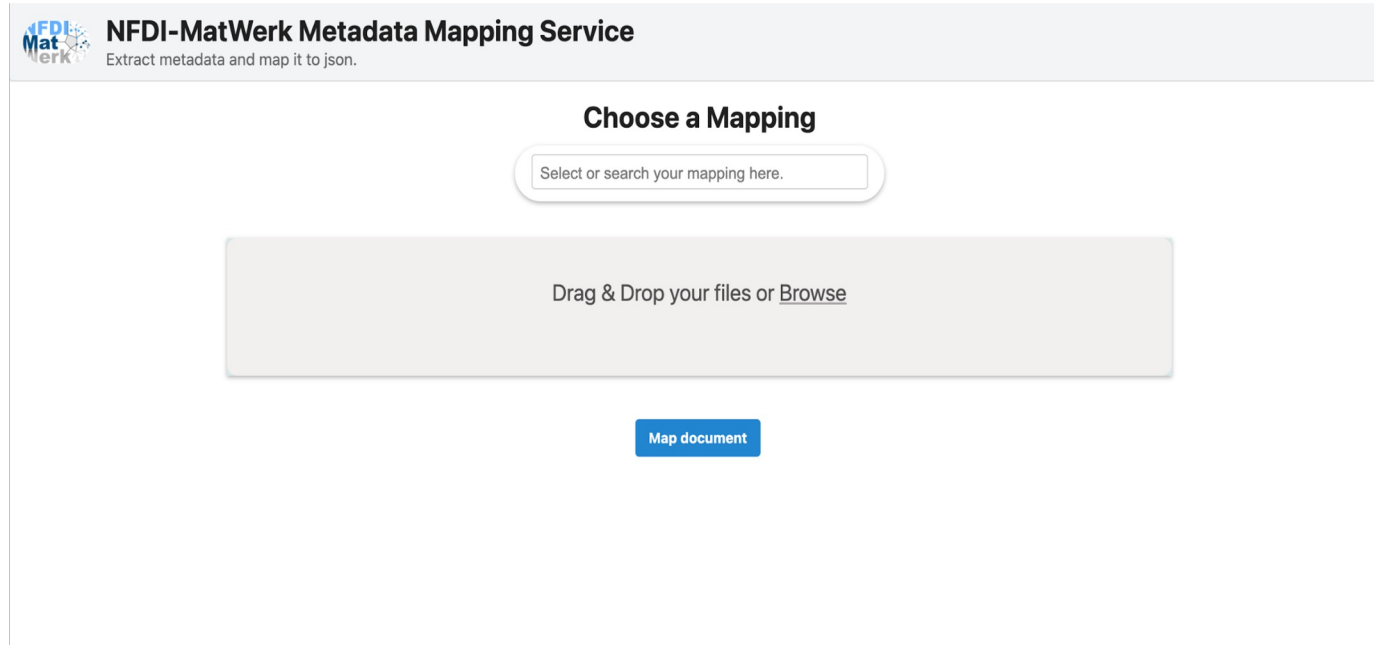
Q & A

Thank You



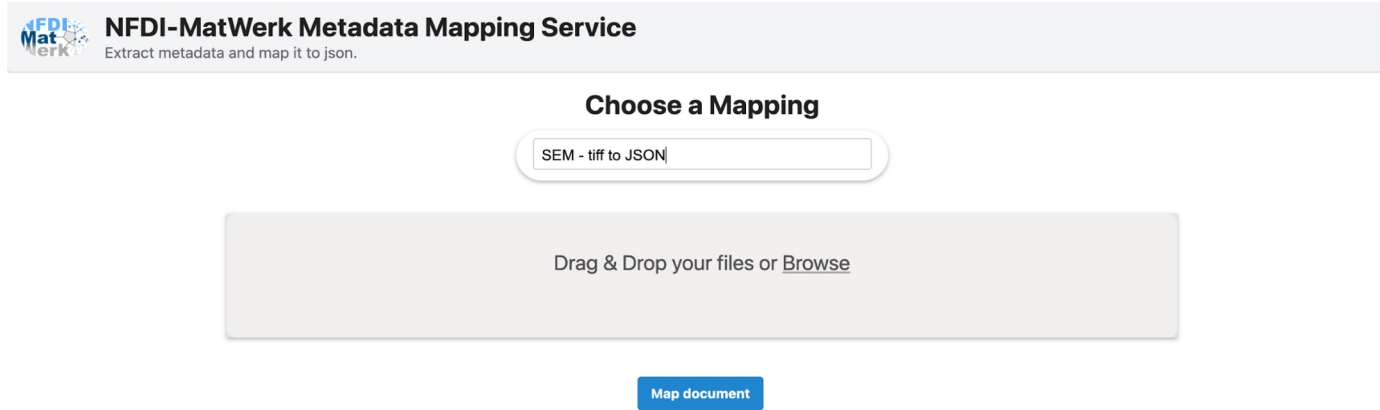
Back-up

Interface for Mapping Service



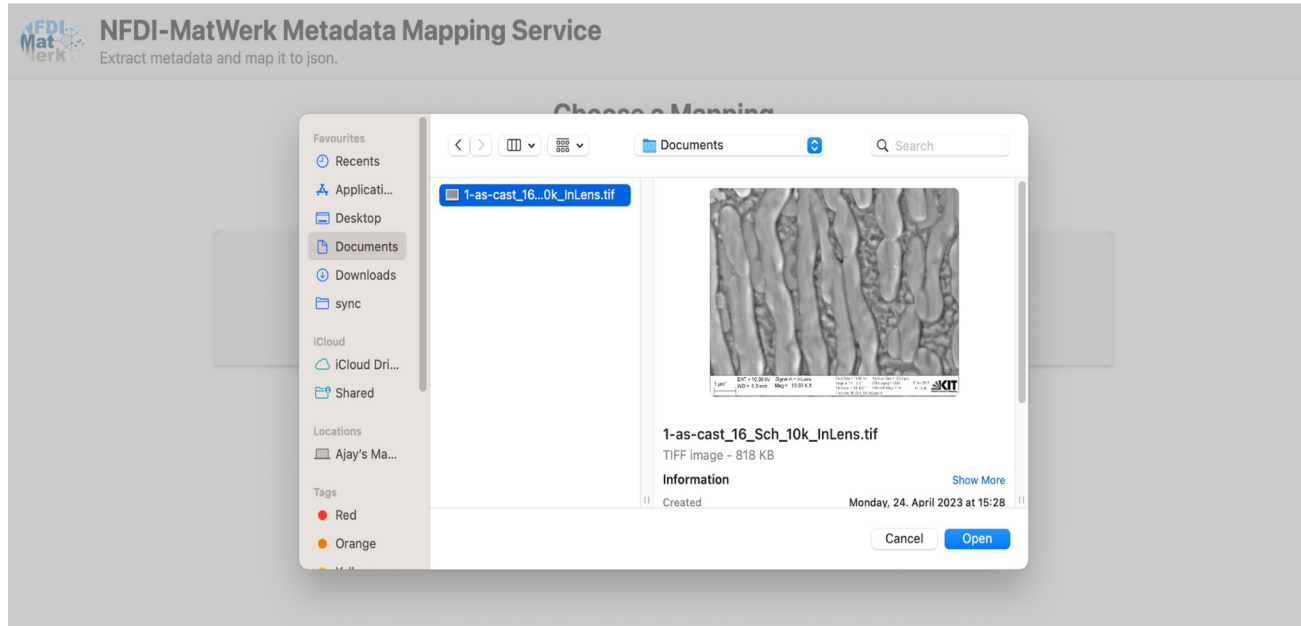
The screenshot shows the user interface for the NFDI-MatWerk Metadata Mapping Service. At the top left is the logo for NFDI MatWerk, consisting of the text 'NFDI MatWerk' and a stylized network diagram. To the right of the logo, the title 'NFDI-MatWerk Metadata Mapping Service' is displayed in a bold font, with the subtitle 'Extract metadata and map it to json.' below it. The main content area is titled 'Choose a Mapping' and contains a search input field with the placeholder text 'Select or search your mapping here.'. Below the search field is a large, light gray rectangular area with the text 'Drag & Drop your files or [Browse](#)'. At the bottom center of this area is a blue button labeled 'Map document'.

Interface for Mapping Service



The screenshot shows the user interface for the NFDI-MatWerk Metadata Mapping Service. At the top left is the logo for NFDI MatWerk, which consists of the text 'NFDI MatWerk' next to a stylized network diagram. To the right of the logo, the text reads 'NFDI-MatWerk Metadata Mapping Service' followed by the subtitle 'Extract metadata and map it to json.' Below this header is a section titled 'Choose a Mapping' containing a dropdown menu with the selected option 'SEM - tiff to JSON'. Underneath the dropdown is a large, light gray rectangular area with the text 'Drag & Drop your files or [Browse](#)'. At the bottom center of the interface is a blue button with the text 'Map document'.

Interface for Mapping Service



Interface for Mapping Service



NFDI-MatWerk Metadata Mapping Service

Extract metadata and map it to json.

Choose a Mapping

SEM - tiff to JSON



818 KB

1-as-cast_16_Sch_10k_InLens.tif

Map document

