Data preparation for SEM/FIB Tomography (FEI Strata)

To reflect the nested nature of the schema, the map is divided into three sections, namely “acquisition”, “dataset” and “image”, each corresponding to the three different schemas which are nested in the order they appear.

The map is in the form “destination path”:”origin path”, to adapt to the nested structure of the schema.

The data are contained in multiple files. Everything must be combined into one single JSON file.

## Acquisition Main and Dataset

In the folder of SEM/FIB Tomography acquisition data from FEI Strata, there will be a file called “**ProjectData.xml”**. This file contains general project information. And is needed for the acquisition\_main schema and acquisition\_dataset sub-schema. “**ProjectData.xml”** has sequences (arrays of ordered struct-datatypes) of names Job, Parameter, Result, Image, Acquisition, Project and ResultType. Out of which the “**Parameter**”s and “**Project**” are of importance. Each parameter has elements called “**Name**” and “**Value**”. Each line of the map needs to be identified from the element “**Name**” of the Parameter and the value need to be extracted from the “**Value**” element with the corresponding name.

Then there is a folder called **TiffImages** which contain images in the TIFF format.

To read such metadata which belong to the dataset sub-schema, it is enough to just read out from one “**SemImagexxx.tif**” and one “**Driftcorrectionxxx.tif”** out of the “**TiffImages**” folder.

In the case of **"acquisition.dataset.instrument.eBeam.accelerationVoltage.value":"Images.SemImage.EBeam.HV",** the data needs to be read from one of the **“SemImagexxx.tif“** (e.g. SemImage125.tif) The FEI data saved with the name “**HV”** under the block “**EBeam”** is the value of the acceleration voltage of the e-beam.

Or in the case of **"acquisition.dataset.instrument.iBeam.accelerationVoltage.value":"** **Images.Driftcorrection.IBeam.HV",** the data needs to be read from one of the **“Driftcorrectionxxx.tif“** (e.g. Driftcorrection341.tif) The FEI data saved with the name “**HV”** under the block “**IBeam”** is the value of the acceleration voltage of the i-beam.

## Image

The images which are named in the form “**SemImagexxx.tif**” form one dataset. So, each of these images need to be read according to the image sub-schema and then compiled into an array.

## Data Preparation/ Manual additions

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| --- | --- |
| **“acquisition.dataset.definition“** | To be assigned the value “acquisition\_dataset” |
| **“acquisition.dataset.instrument.spot”** | Need to be deleted from the metadata if “**acquisition.dataset.instrument.eBeam.beamCurrent.value”** is present |
| **“acquisition.dataset.images.definition”** | To be assigned the value “acquisition\_image” |
| **"acquisition.dataset.images.fileName"** | Name of the image, to be read from each file name. |
| **"acquisition.genericMetadata.zCutSpacing.value"** | This value is not directly available from the metadata but can be calculated. To calculate the zCutSpacing, divide SliceAndViewMilling.Height **("acquisition.genericMetadata.millingLocationHeight.value”**) with the number of cuts(**"acquisition.genericMetadata.numberOfCuts"**).  acquisition.genericMetadata.zCutSpacing.value = SliceAndViewMilling.Height/ SliceAndViewMilling.numberOfCuts = **acquisition.genericMetadata.millingLocationHeight.value/ acquisition.genericMetadata.numberOfCuts** |

## Extracting the detector settings:

The number of detectors in use can be read from the parameter:

**"acquisition.dataset.instrument.numberOfDetectors":"Images.SemImage.Detectors.Number"**. This number is important as based on this number we know if multiple detectors are used. If multiple detectors are used, we have an array of detectors.

The parameter **"acquisition.dataset.instrument.detector.detectorType":"Images.SemImage.Detectors.Name"** gives the name of the individual detector types.

For the parameters which contain “**Detectors.<Name>**” in the key value pairs in the box below, the part **“<Name>”** needs to be replaced with the value of **"acquisition.dataset.instrument.detector.detectorType" ("Images.SemImage.Detectors.Name")**

**"acquisition.dataset.instrument.detector.detectorSettings.contrast":"Images.SemImage.Detectors.<Name>.Contrast", "acquisition.dataset.instrument.detector.detectorSettings.brightness":"Images.SemImage.Detectors.<Name>.Brightness", "acquisition.dataset.instrument.detector.detectorSettings.mix":"Images.SemImage.Detectors.<Name>.Mix", "acquisition.dataset.instrument.detector.detectorSettings.signal":"Images.SemImage.Detectors.<Name>.Signal", "acquisition.dataset.instrument.detector.detectorSettings.grid":"Images.SemImage.Detectors.<Name>.Grid", "acquisition.dataset.instrument.detector.detectorSettings.contrastdB":"Images.SemImage.Detectors.<Name>.ContrastDB", "acquisition.dataset.instrument.detector.detectorSettings.brightnessdB":"Images.SemImage.Detectors.<Name>.BrightnessDB", "acquisition.dataset.instrument.detector.detectorSettings.setting":"Images.SemImage.Detectors.<Name>.Setting",**

**"acquisition.dataset.instrument.detector.detectorSettings.minimumDwellTime":"Images.SemImage.Detectors.<Name>.MinimumDwellTime"**

For e.g., the mapping **"acquisition.dataset.instrument.detector.detectorSettings.contrast":"Images.SemImage.Detectors.<Name>.Contrast**", should be modified to **"acquisition.dataset.instrument.detector.detectorSettings.contrast":"Images.SemImage.Detectors.CDEM.Contrast**" if the value of **("Images.SemImage.Detectors.Name")** is **CDEM** and to **"acquisition.dataset.instrument.detector.detectorSettings.contrast":"Images.SemImage.Detectors.ETD.Contrast**" if the value of **("Images.SemImage.Detectors.Name")** is **ETD.**

When more than one detector is used, as indicated from the **"acquisition.dataset.instrument.numberOfDetectors"** i.e, **("Images.SemImage.Detectors.Number"**), the detectors should be made into an array.

## Further Important Points:

* Check if all Booleans are marked properly. Instead of True and False, some values will be On, Off, yes or no. These need to be mapped to True or False accordingly.
* The SEM/FIB Tomography metadata uses SI units, so there are no unit mappings for values.
* Read only values which are not empty, else no need to save those parameters in the metadata.