

LEAPS Plenary Meeting Soleil

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LEAPS-INNOV WP3:

Metrology file format proposal

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LEAPS League of European
Accelerator-based
Photon Sources

Metrology Data Format

- OBJECTIVE

Simplifying metrology data exchange and cross-comparison by defining a file format where all data and metadata are included

Format definition was the subject of deliverable D3.2
due date 30 / 09 /2023

- Progress

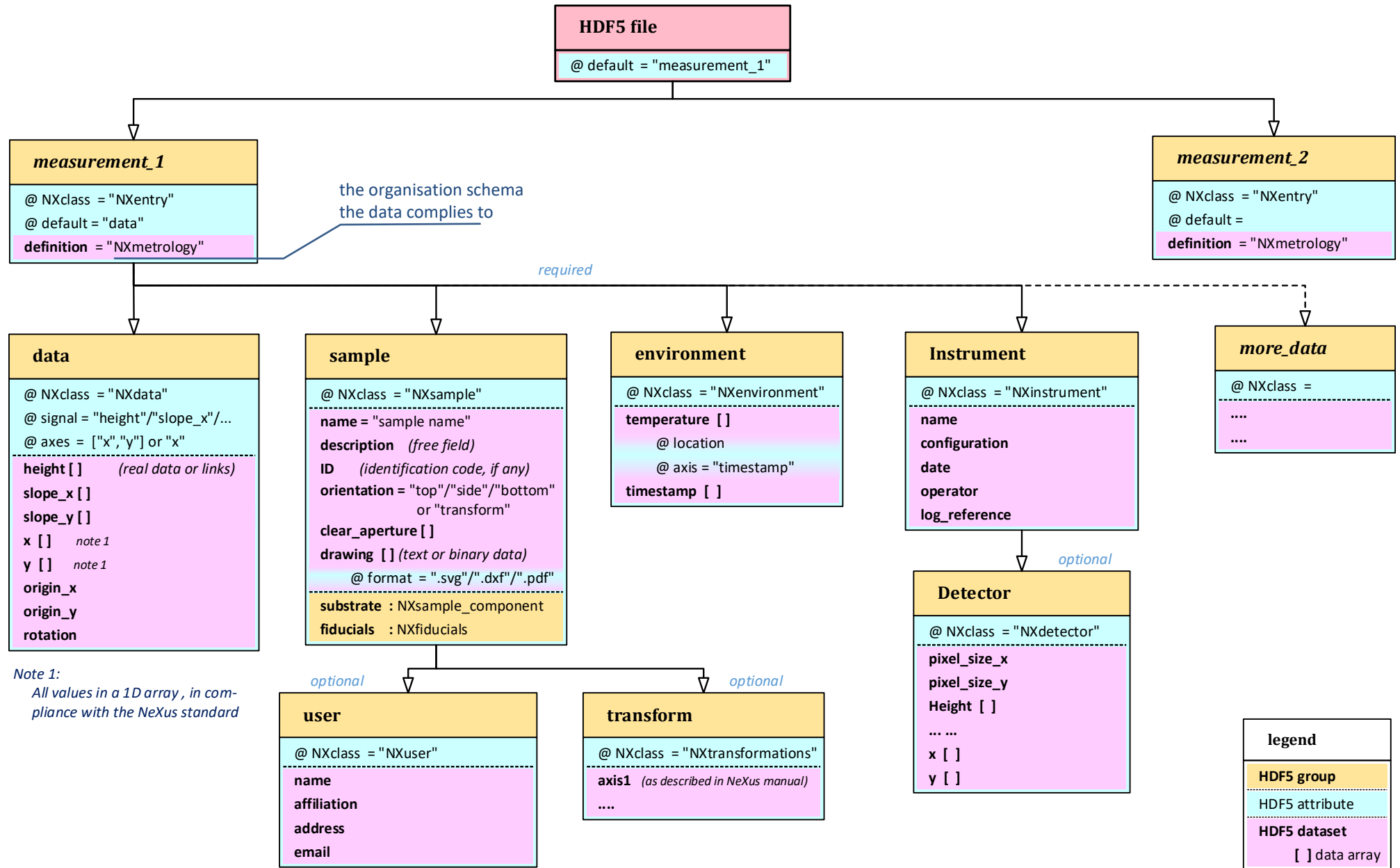
Guiding concepts presented at 2 previous WP3 meetings
but not really discussed

A document was prepared and submitted to EU as D3.2
Contains provision that it has to be validated and improved from
experience

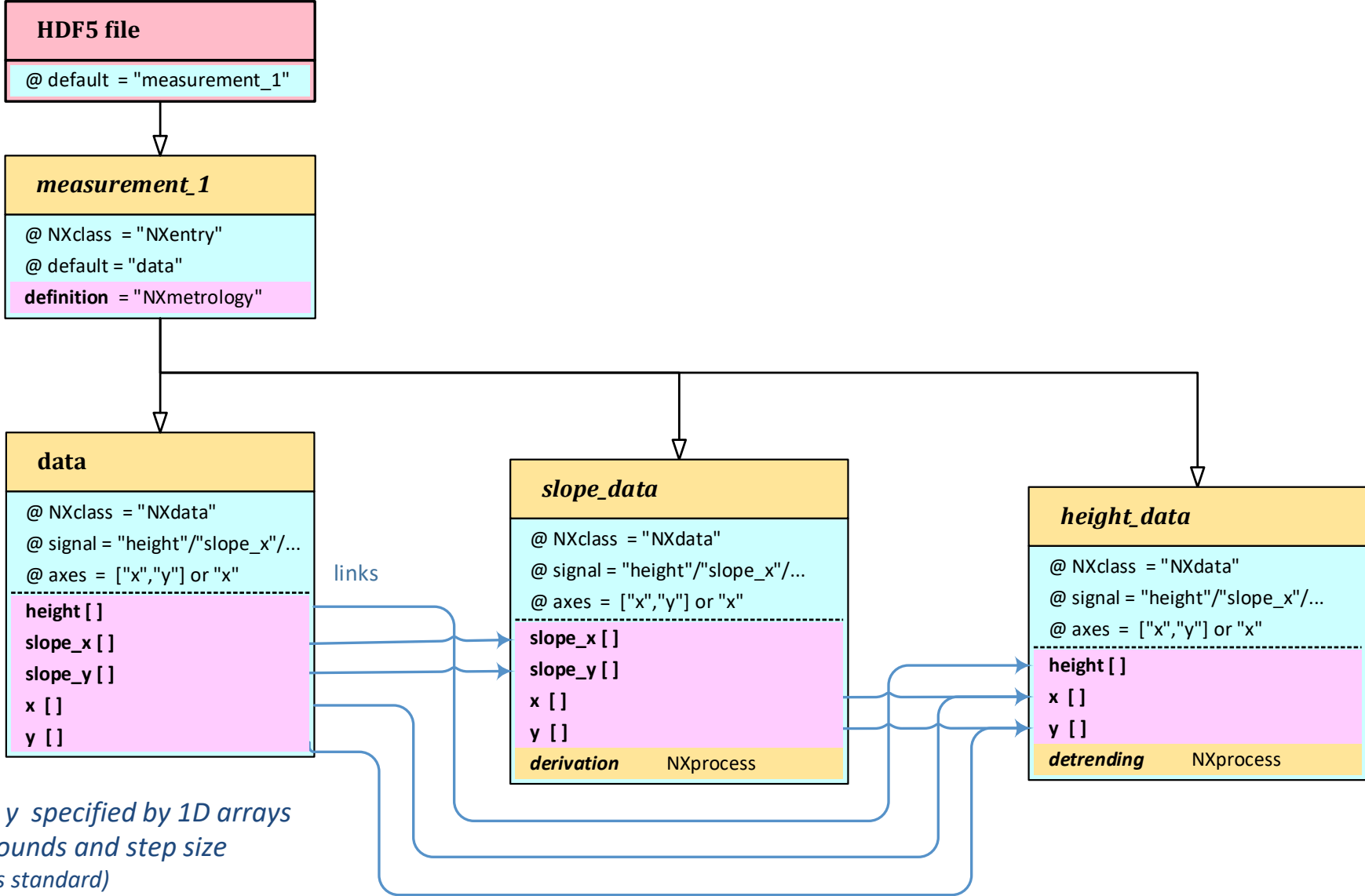
Data management scheme

- Based on hdf5/NeXus:
 - readable using common software tools at LEAPS facilities (HDFview, h5py, nexpy)
 - navigation into data conforming to NeXus standards
- Provision for including metadata to describe
 - sample (including fiducial marks and drawings)
 - instrumentand document data processing steps
- Assist application of FAIR data principles

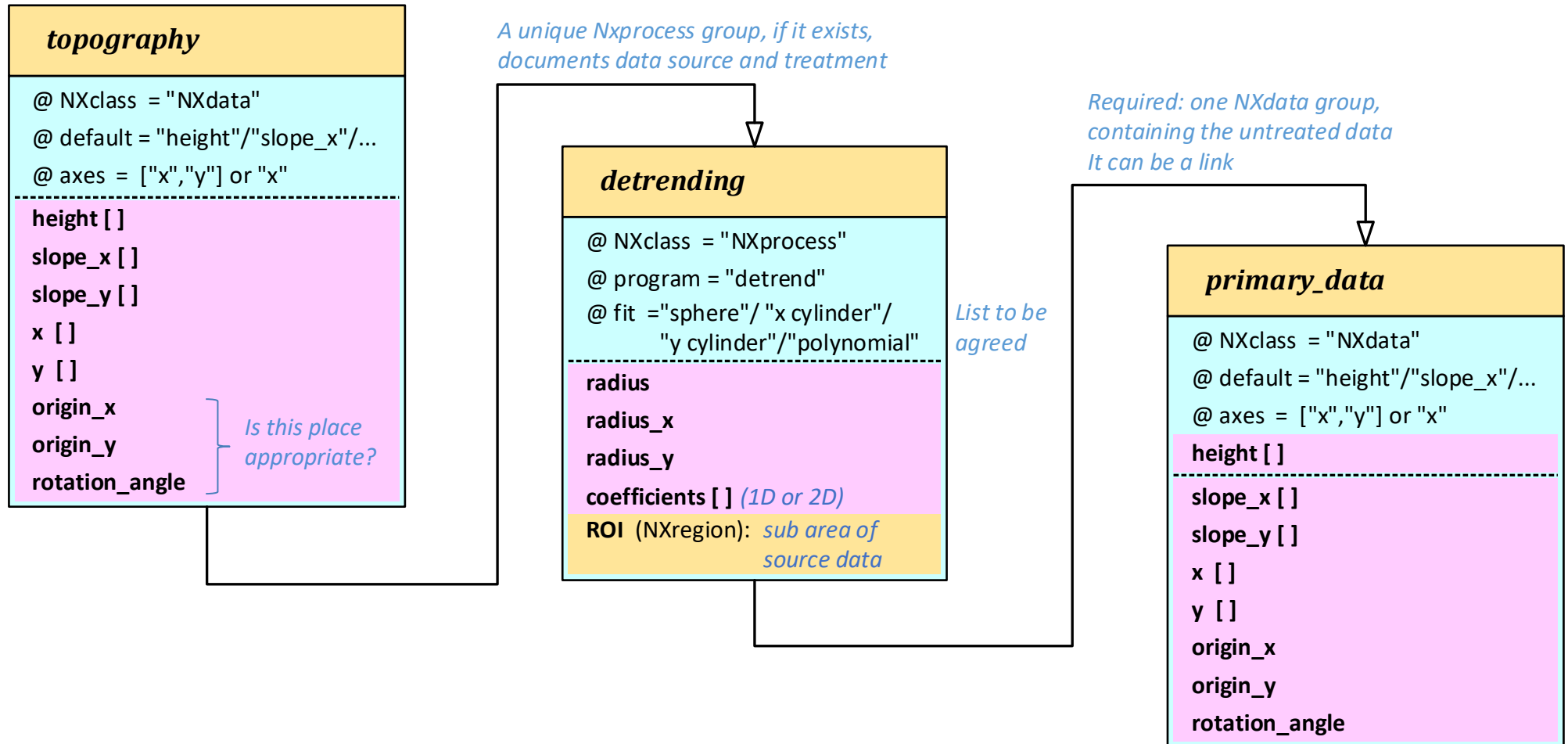
General file organisation



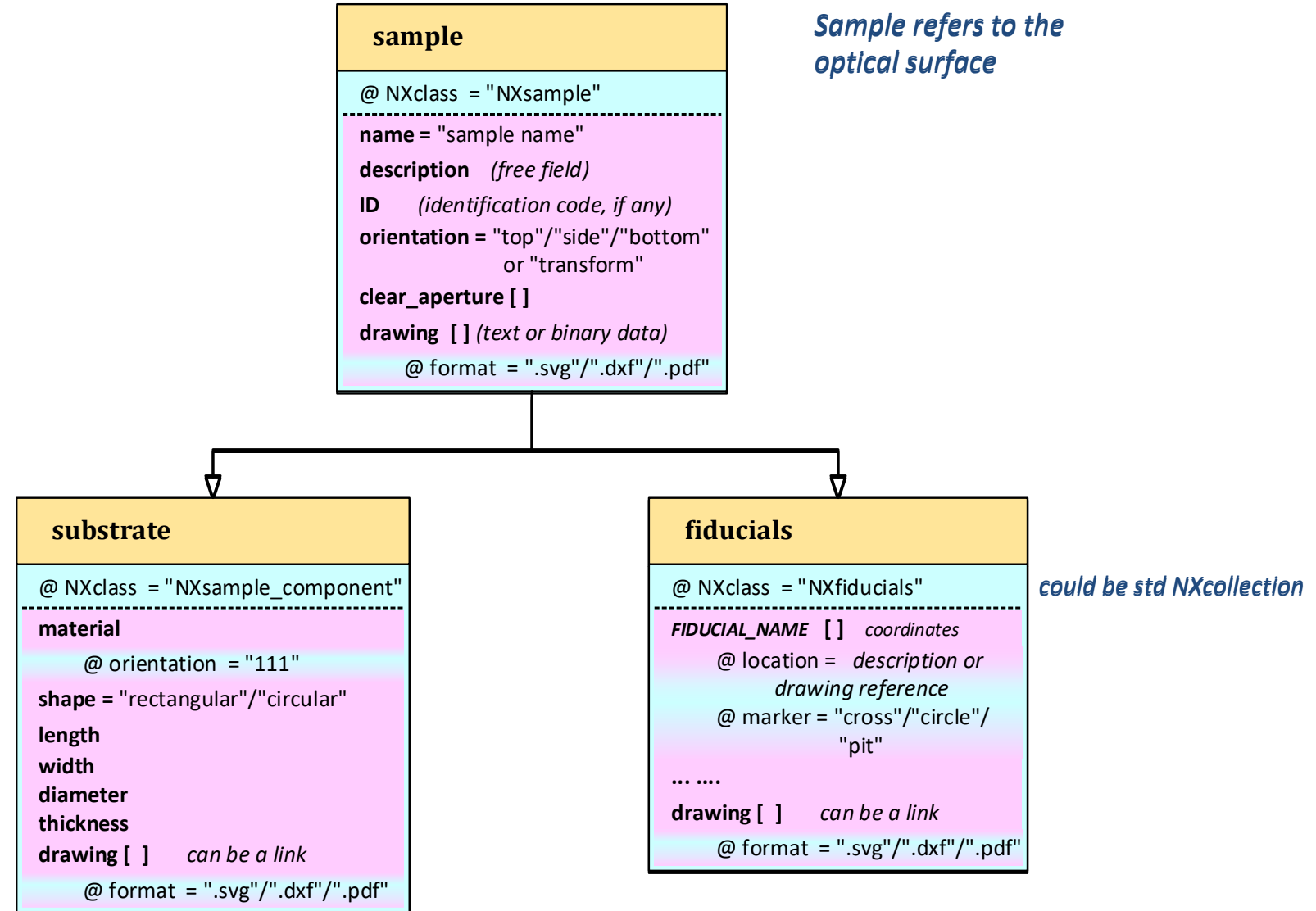
Navigating through data



Documenting data processing



Documenting the sample



Navigation with HDF view

HDFView 3.1.3

File Window Tools Help

Recent Files: D:\Documents SOLEIL\Projets-recherche\LEAPS\SOLEIL_oct23\nexus\NXmetro_format_example2.nxs

Object Attribute Info | General Object Info

Attribute Creation Order: Creation Order NOT Tracked

Number of attributes = 2

Name	Type	Array Size	Value[50](...)
target	String, length = variabl...	Scalar	measurement1/detrended_height/height
unit	String, length = variabl...	Scalar	meter

HDFView root - D:\Documents SOLEIL\Projets-recherche\LEAPS\SOLEIL_oct23\nexus

Navigation with Silx viewer

The screenshot displays the Silx viewer application window. The title bar reads "Silx viewer". The menu bar includes "File", "Options", "Views", and "Help". Below the menu bar is a toolbar with icons for file operations and viewing options.

The left pane shows a hierarchical tree view of the data structure:

Name	Description	Type
~ y	1D data	float64
instrument		NXinstrumenter
detector		NXdetector
pixel_size_x	5.1519e-05	float64
pixel_size_y	5.1519e-05	float64
raw_data		NXdata
height	Compressed 2D data	float64
height_mask	Compressed 2D data	bool
~ x	1D data	float64
~ y	1D data	float64
sample		NXsample
drawing	"<?xml version="1.0" e...	string
fiducials		NXfiducials
~ C1	[0.005 -0.015]	float64
~ C2	[0.0699912 -0.0150515]	float64
~ C3	[0.0700427 0.0150098]	float64
~ C4	[0.0375085 0.0150871]	float64
~ C5	[0.00505152 0.0150613]	float64
~ P1	[-0.00375823 0.00019810...	float64
~ P2	[0.0763023 9.5067e-05]	float64
~ Pc1	[-0.00247025 9.5067e-05]	float64
~ Pc2	[0.0775903 -7.971e-06]	float64

The right pane displays a heatmap plot titled "/measurement1/raw_data/height". The plot shows a rectangular region with a color scale ranging from -4.00e-08 (blue) to 2.00e-08 (red). The X-axis ranges from 0 to 1600, and the Y-axis ranges from -200 to 1000. A toolbar above the plot includes icons for zooming, panning, and other viewing functions.

Below the plot, the current coordinates and dimensions are shown: X: 180.4844, Y: 931.5141, Data: -, Dims: 1737x648. The "Axis selection" section shows Dimension 0 set to "y" and Dimension 1 set to "x". At the bottom, there are buttons for "HDF5", "Curve", "Image", and "Raw", with "Image" currently selected.

Navigation with myHDF5 *(added after the presentation)*

<https://myhdf5.hdfgroup.org/>

The screenshot displays the myHDF5 web application interface. On the left, a sidebar contains the myHDF5 logo, navigation options like 'Open HDF5' and 'Help', and a list of 'Opened files' including 'NXmetro_format_example2.n...'. The main panel shows a file tree for 'NXmetro_format_example2.n...' with 'measurement1' expanded to show 'data' and 'height'. The 'height' dataset is selected, showing its dimensions as 388 x 1456. The right side of the interface features a heatmap visualization of the 'height' data. The heatmap is titled 'height' and has a color scale ranging from $-1.851e-8$ (dark purple) to $6.555e-9$ (yellow). The x-axis ranges from 0 to 1400, and the y-axis ranges from -600 to 1000. The heatmap shows a horizontal band of high values (yellow/orange) between y=0 and y=400, with lower values (purple) below and above this band. The interface also includes a top navigation bar with 'Display', 'Inspect', and 'Feedback' buttons, and a toolbar with 'Matrix', 'Line', and 'Heatmap' options.

Pending questions

- Do we need to define specific classes (*NXfiducials*, *NXtopography*) or rely on standardized ones (*NXcollection*, *NXdata*)?
- Where to place measurement frame / sample frame transform information?

Example file available at: <https://drive2.demo.renater.fr/index.php/s/zPEFSq9DwSMKZHC>

LEAPS INNOVATION

*“ Foster open innovation for
accelerator-based lightsources in
Europe”*

<https://www.leaps-innov.eu>



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