

Day-to-day image data management with OMERO

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2024-05-27



NFDI 4
BIOIMAGE



DFG Deutsche
Forschungsgemeinschaft

Funded by the Deutsche Forschungsgemeinschaft
(DFG, German Research Foundation) - 462231789



- Group leaders
 - Overview of projects
 - Monitor progress
 - Long term view

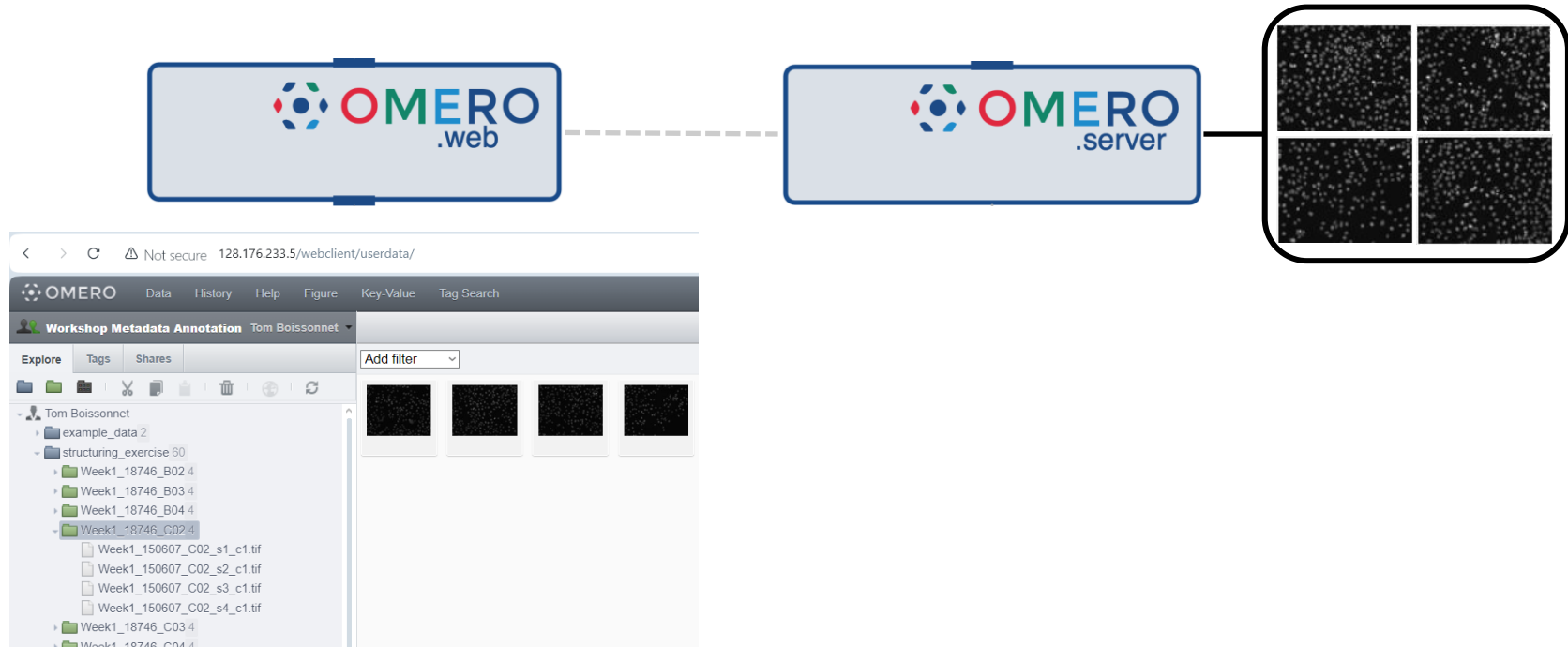


- Experimenters
 - Knows all the details of a project, which experiment worked, which had an issue
 - Can organize and annotate the data

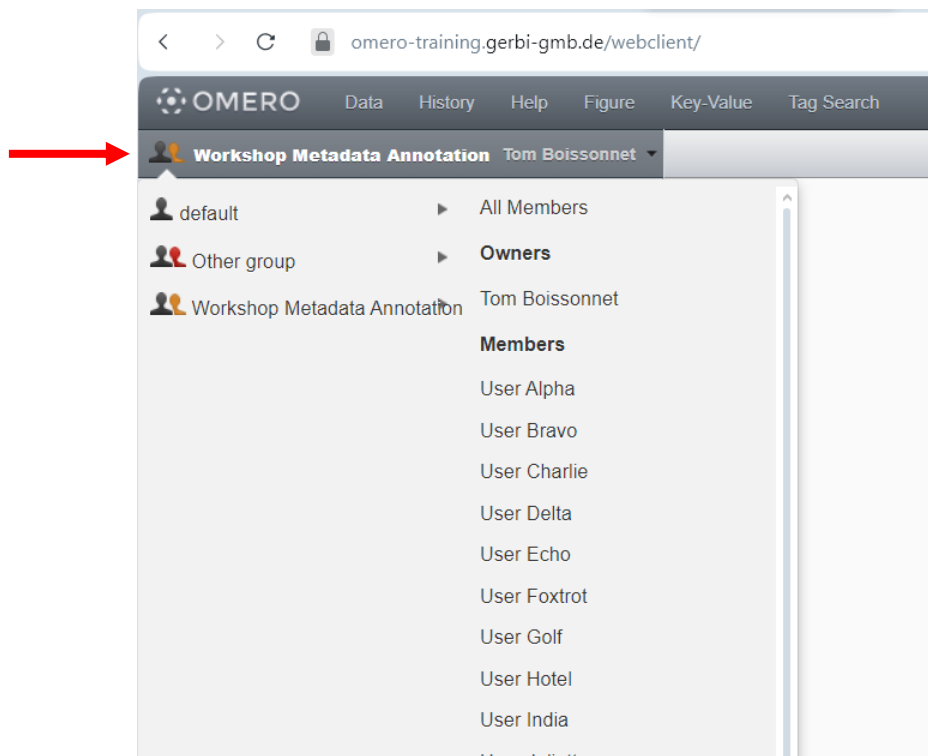


- Bioimage analyst
 - Needs metadata for processing
 - Share results back
 - Traceability of analysis

- OMERO.web is one of the ways to access data in OMERO.server



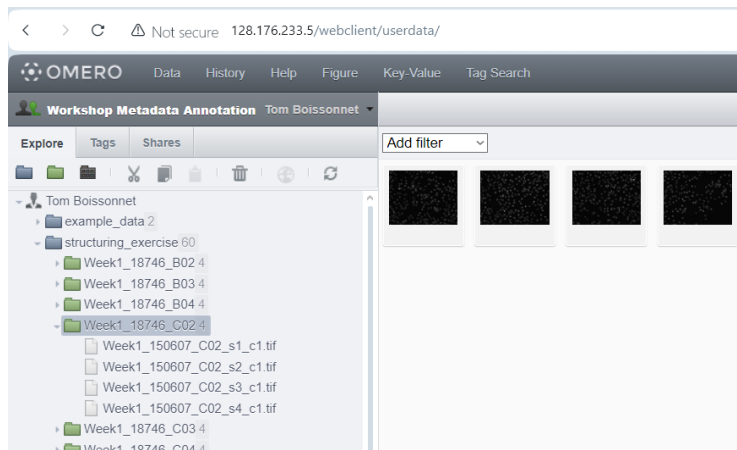
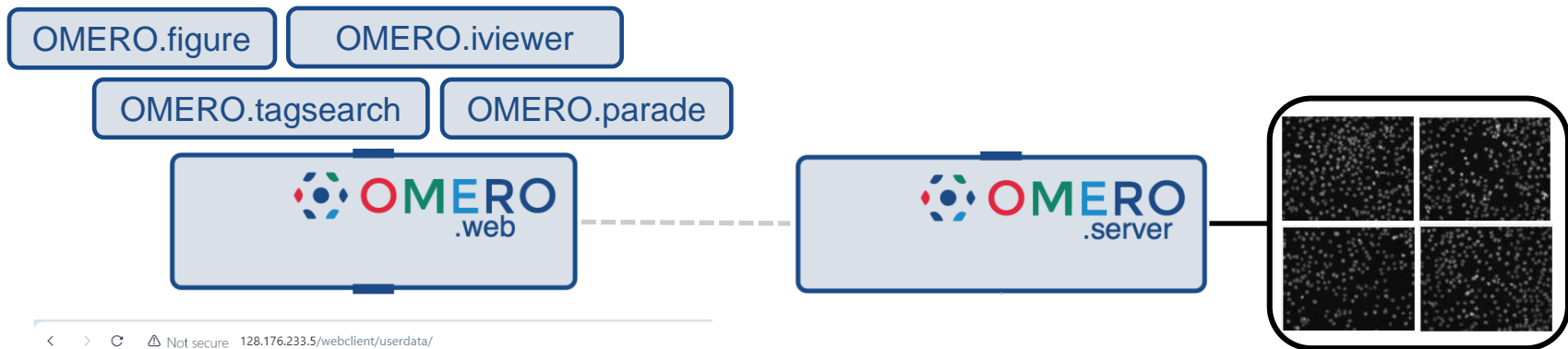
Data overview & exploration



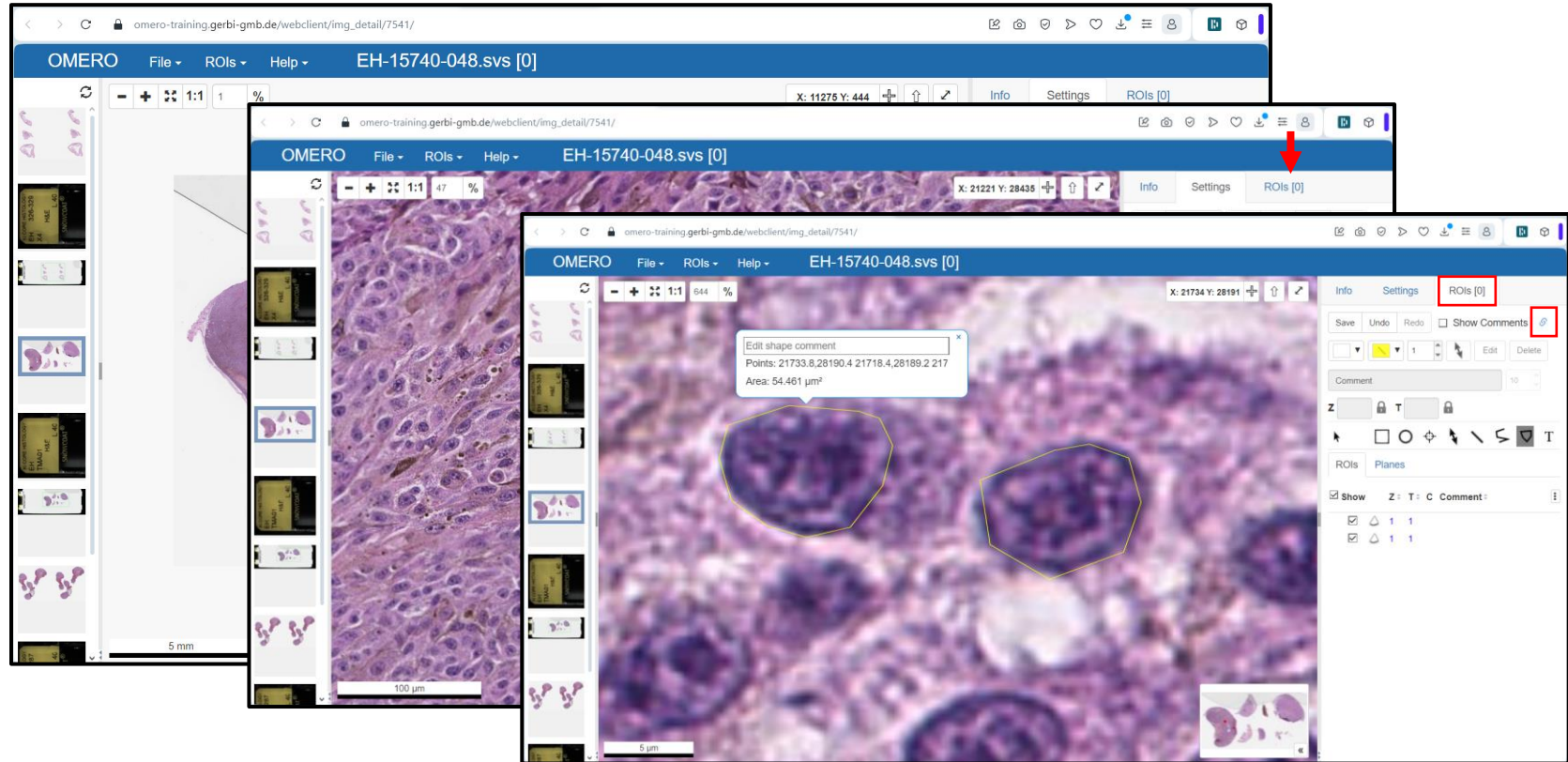
Data overview & exploration — links

The screenshot displays the OMERO web client interface at omero-training.gerbi-gmb.de/webclient/. The interface is divided into several sections:

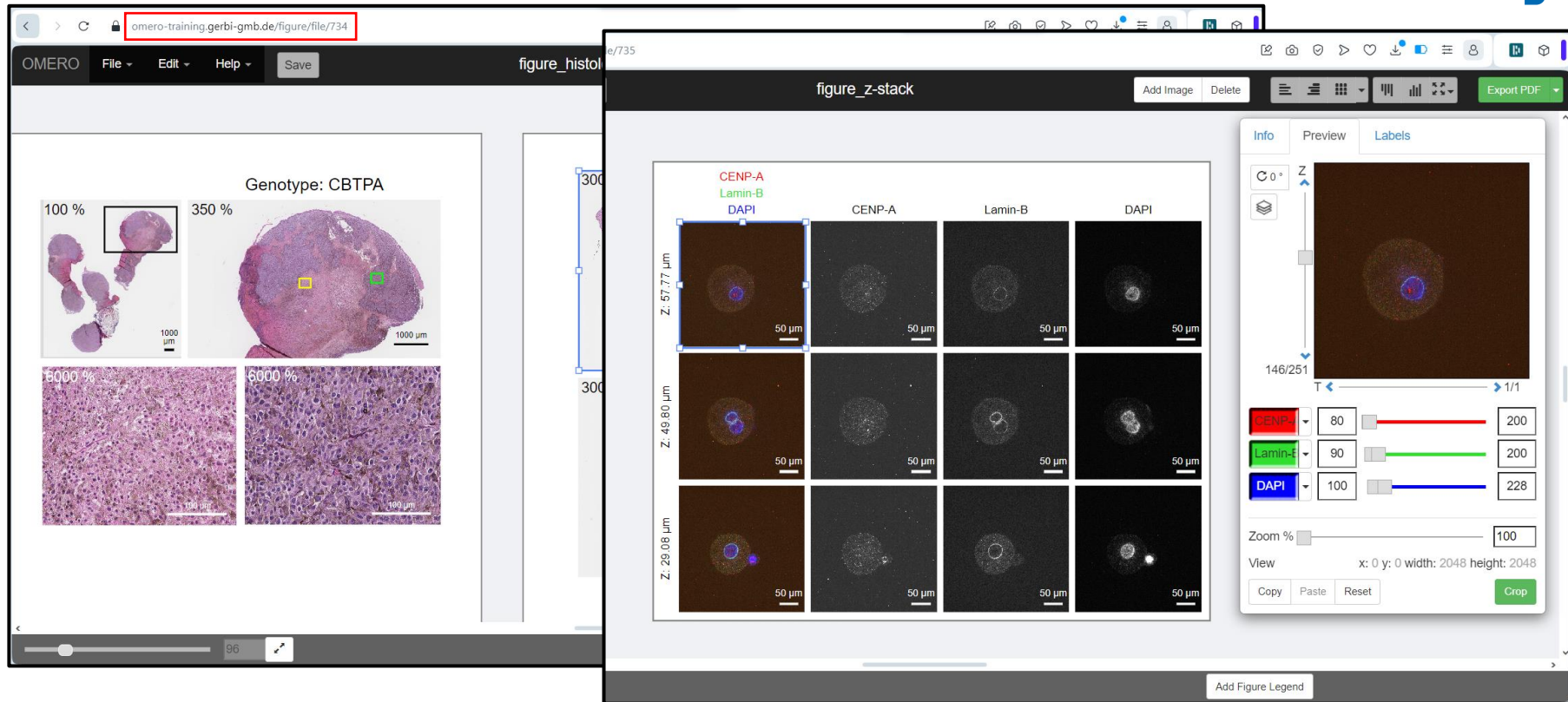
- Top Bar:** Includes navigation links (Data, History, Help, Figure, Key-Value, Tag Search) and a search bar.
- Left Panel (Explore):** Shows a file tree under the user 'Tom Boissonnet'. The tree includes folders like 'example_data 2' and 'histology 9', and files such as 'EH-15740-047.svs [0]', 'EH-15740-047.svs [label image]', 'EH-15740-047.svs [macro image]', 'EH-15740-048.svs [0]', 'EH-15740-048.svs [label image]', 'EH-15740-048.svs [macro image]', 'EH-15740.svs [0]', 'EH-15740.svs [label image]', 'EH-15740.svs [macro image]', 'z-stack 2', 'embryo06_stain.ome.tiff', 'embryo07_stain.ome.tiff', 'structuring_exercise 62', and 'Orphaned Images'.
- Center Panel (Thumbnails):** Displays a grid of image thumbnails. A red arrow points to the thumbnail of image EH-15740-047.
- Right Panel (Details):** Shows the details for image EH-15740-047. It includes a 'Full viewer' button, a 'Show all' button, and a 'Show all' dropdown. The 'Image Details' section shows the following information:
 - Image ID: 7549
 - Owner: Tom Boissonnet
 - Image Details: Aperio Image Library v12.0.15
 - Acquisition Date: 2020-09-12 01:53:32
 - Import Date: 2024-04-28 12:31:58
 - Dimensions (XY): 89640 x 68869
 - Pixels Type: uint8
 - Pixels Size (XYZ) (µm): 0.25 x 0.25 x -
 - Z-sections/Timepoints: 1 x 1
 - Channels: 0, 1, 2
 - ROI Count: 0



Working with images — OMERO.iviewer



Working with images — OMERO.figure



Working with images — organizing

The screenshot shows the OMERO web client interface. The left sidebar displays a tree view of datasets under 'CAI-Microscopy_course 63'. A dataset named '2023-06-20_ConfocalAdvanced_Grp1' is selected. The main panel shows a 'General' tab with details for this dataset, including its ID (10837), owner (Sebastian Hänsch), and creation date (2023-06-21 17:42:09). A 'Tags' section is highlighted, showing four tags: 'group-1', 'LSM710', 'day2', and 'confocal_advanced'. A red box highlights the 'Tags' section in the main panel, and a blue box highlights the 'Tags' section in the sidebar.

CAI-OMERO Data History Help Figure Key-Value Tag Search Admin

Search: Tom Boissonnet

CAI-OptoMicroQuant_SoSe-23 Tom Boissonnet

Explore Tags Shares

Add filter

Tom Boissonnet

CAI-Microscopy_course 63

- 2023-06-19_ConfocalBasic_Grp1 3
- 2023-06-19_ConfocalBasic_Grp2 1
 - 20231906_LSM880_Grp2_DAPI_488Actin_56
- 2023-06-19_ConfocalBasic_Grp3 3
- 2023-06-19_ConfocalBasic_Grp4 3
- 2023-06-20_ConfocalAdvanced_Grp1 3
 - 20230620_LSM710_Grp1_DAPI_488Ki67_56
 - 20230620_LSM710_Grp1_DAPI_488Ki67_56
 - 20230620_LSM710_Grp1_DAPI_488Ki67_56
- 2023-06-20_ConfocalAdvanced_Grp2 10
- 2023-06-20_ConfocalAdvanced_Grp3 4
- 2023-06-20_ConfocalAdvanced_Grp4 6
- 2023-06-21_SuperRes_Grp1 175
- 2023-06-21_SuperRes_Grp1_STED_Extracted 3
- 2023-06-21_SuperRes_Grp2 6
- 2023-06-21_SuperRes_Grp3 238
- 2023-06-21_SuperRes_Grp3_STED_Extracted 3
- 2023-06-21_SuperRes_Grp4 6
- 2023-06-22_SuperRes_Grp1 9
- 2023-06-22_SuperRes_Grp2 181
- 2023-06-22_SuperRes_Grp2_STED_Extracted 3
- 2023-06-22_SuperRes_Grp3 6
- 2023-06-22_SuperRes_Grp4 194
- 2023-06-22_SuperRes_Grp4_STED_Extracted 3
- 2023-06-23_UnknownSample_Grp1 8
- 2023-06-23_UnknownSample_Grp2 10
- 2023-06-23_UnknownSample_Grp3 14
- 2023-06-23_UnknownSample_Grp4 10

General Acquisition Preview

2023-06-20_ConfocalAdvanced_Grp1

Dataset ID: 10837
Owner: Sebastian Hänsch Show all

Dataset Details

Day 2 - introduction to advanced confocal microscopy for the group 1

Creation Date: 2023-06-21 17:42:09

Tags 4

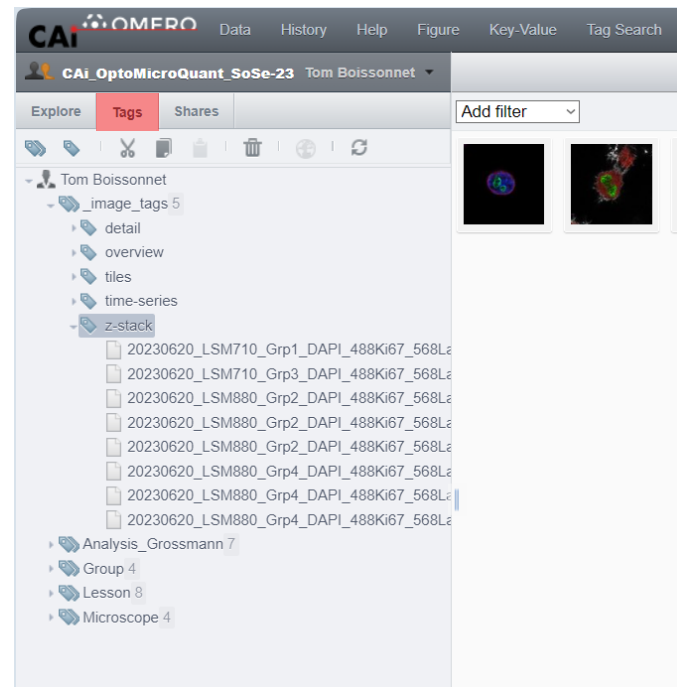
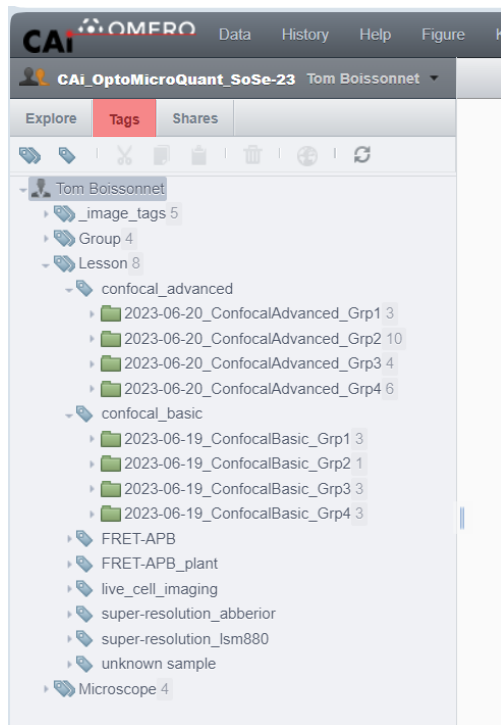
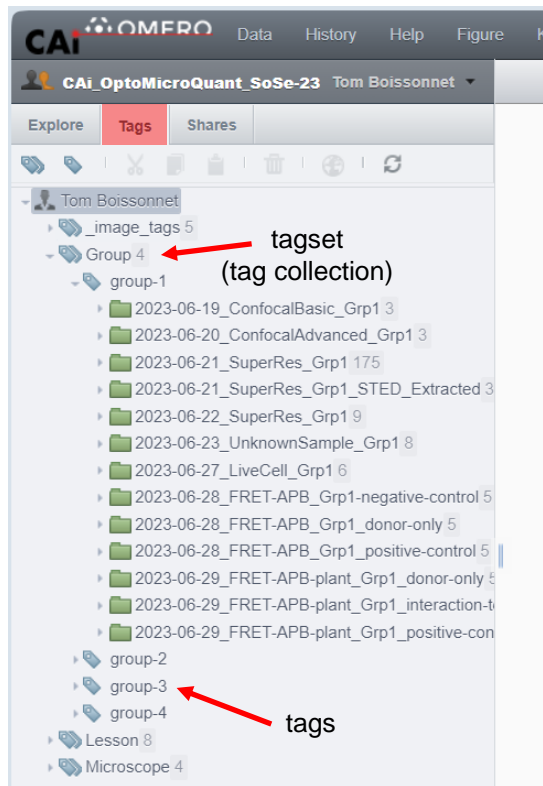
group-1 - LSM710 - day2 -

confocal_advanced -

accession number source: chemical methods ontology
REF
Biosample
biological entity HEp2 cells
biological entity term http://purl.obolibrary.org/obo/BTO_0000976
accession number



Working with images — organizing



Working with images — filtering

The screenshot displays the Omero web interface for managing microscopy data. The 'Tag Search' tab is active, showing a list of tags and a dropdown menu for 'group-1 [Group]'. The 'Filter Results' table lists various microscopy datasets, including their names, import dates, owners, and groups. The right sidebar shows the 'Dataset Details' for '2023-06-19_ConfocalBasic_Grp1', including its ID, owner, and creation date. A red box highlights the 'Key-Value Pairs' section in the sidebar, which lists metadata for the dataset.

Object	Name	Import Date	Owner	Group	Link
2023-06-19_ConfocalBasic_Grp1	2023-06-19_ConfocalBasic_Grp1	19 Jun 2023, 5:20 p.m.	Sebastian Hänsch	CAI_OptoMicroQuant_SoSe-23	Browse
2023-06-21_SuperRes_Grp1	2023-06-21_SuperRes_Grp1	21 Jun 2023, 5:30 p.m.	Sebastian Hänsch	CAI_OptoMicroQuant_SoSe-23	Browse
2023-06-20_ConfocalAdvanced_Grp1	2023-06-20_ConfocalAdvanced_Grp1	21 Jun 2023, 5:42 p.m.	Sebastian Hänsch	CAI_OptoMicroQuant_SoSe-23	Browse
2023-06-22_SuperRes_Grp1	2023-06-22_SuperRes_Grp1	26 Jun 2023, 9:09 a.m.	Sebastian Hänsch	CAI_OptoMicroQuant_SoSe-23	Browse
2023-06-23_UnknownSample_Grp1	2023-06-23_UnknownSample_Grp1	26 Jun 2023, 9:11 a.m.	Vanessa Fuchs	CAI_OptoMicroQuant_SoSe-23	Browse
2023-06-21_SuperRes_Grp1_STED_Extracted	2023-06-21_SuperRes_Grp1_STED_Extracted	26 Jun 2023, 4:04 p.m.	Sebastian Hänsch	CAI_OptoMicroQuant_SoSe-23	Browse
2023-06-27_LiveCell_Grp1	2023-06-27_LiveCell_Grp1	27 Jun 2023, 5:16 p.m.	Anna Hamacher	CAI_OptoMicroQuant_SoSe-23	Browse
2023-06-28_FRET-APB_Grp1_donor-only	2023-06-28_FRET-APB_Grp1_donor-only	29 Jun 2023, 2:40 p.m.	Vanessa Fuchs	CAI_OptoMicroQuant_SoSe-23	Browse
2023-06-28_FRET-APB_Grp1_positive-control	2023-06-28_FRET-APB_Grp1_positive-control	29 Jun 2023, 3:19 p.m.	Vanessa Fuchs	CAI_OptoMicroQuant_SoSe-23	Browse
2023-06-28_FRET-APB_Grp1-negative-control	2023-06-28_FRET-APB_Grp1-negative-control	29 Jun 2023, 3:19 p.m.	Vanessa Fuchs	CAI_OptoMicroQuant_SoSe-23	Browse
2023-06-29_FRET-APB-plant_Grp1_positive-control	2023-06-29_FRET-APB-plant_Grp1_positive-control	29 Jun 2023, 3:28 p.m.	Vanessa Fuchs	CAI_OptoMicroQuant_SoSe-23	Browse
2023-06-29_FRET-APB-plant_Grp1_donor-only	2023-06-29_FRET-APB-plant_Grp1_donor-only	29 Jun 2023, 3:28 p.m.	Vanessa Fuchs	CAI_OptoMicroQuant_SoSe-23	Browse
2023-06-29_FRET-APB-plant_Grp1_interaction-test	2023-06-29_FRET-APB-plant_Grp1_interaction-test	29 Jun 2023, 3:29 p.m.	Vanessa Fuchs	CAI_OptoMicroQuant_SoSe-23	Browse

Key-Value Pairs

Key	Value
Study component	confocal laser scanning microscopy
imaging method term accession number	http://purl.obolibrary.org/obo/HMO_0000089
imaging method term accession number source	chemical methods ontology
Biosample	
biological entity	HEP2 cells
biological entity term accession number	http://purl.obolibrary.org/obo/BTO_0000976
biological entity term accession number source	BRENDA tissue / enzyme source
species	human

Working with images — key-value pairs

The screenshot shows the CAI OptoMicroQuant SoSe-23 interface. The top navigation bar includes Data, History, Help, Figure, Key-Value, Tag Search, and Admin. The main area displays a file tree under the user Tom Boissonnet. A folder named '2023-06-20_ConfocalAdvanced_Grp1 3' is highlighted with a red box. A 'Tags' popup is visible, showing 4 tags: 'group-1', 'LSM710', 'day2', and 'confocal_advanced'.

The screenshot shows the 'Key-Value Pairs' panel. It displays metadata for a project and a dataset.

Added on Project CAI-Microscopy_course

Key	Value
study type	master course
study name	OptoMicroQuant SoSe23
study description	practical course for master students

Added on Dataset 2023-06-19_ConfocalBasic_Grp3

Key	Value
Study component	confocal laser scanning microscopy
imaging method	confocal laser scanning microscopy
imaging method term accession number	http://purl.obolibrary.org/obo/CHMO_0000089
imaging method term accession number source REF	chemical methods ontology
Biosample	
biological entity	HEp2 cells
biological entity term accession number	http://purl.obolibrary.org/obo/BTO_0000976
biological entity term accession number source REF	BRENDA tissue / enzyme source
species	human
species term accession number	http://purl.obolibrary.org/obo/NCBITaxon_9606
species term accession number source REF	NCBI organismal classification
Specimen	
preparation method	#EXP00114_20230615_CAI_Test_Staining_for_Practicals
staining	#EXP00114_20230615_CAI_Test_Staining_for_Practicals
channel1 - content	DAPI
channel1 - content - ontology	http://purl.obolibrary.org/obo/NCIT_C122989
channel1 - biological entity	DNA, mainly nucleus
channel2 - content	phalloidin - 488
channel2 - biological entity	filamentous Actin
channel3 - content	anti-Tom20(mouse), antiMouse-AlexaFluorophore568
channel3 - biological entity	mitochondrial import receptor
channel4 - content	antiVimentin(rabbit), antiRabbit-StarRed
channel4 - biological entity	intermediate filaments

Working with images — OMERO.figure

omero-training.gerbi-gmb.de/figure/file/798

OMERO File Edit Help Save figure_kv-pairs Add Image Delete Export PDF

added from key-value pairs

compound: C
concentration: 2 μ M
sample ID: 18746

compound: D
concentration: 10 μ M
sample ID: 22123

Week: 1

Week: 2

100 μ m

Info Preview Labels

0° Z

1/1 T 1/1

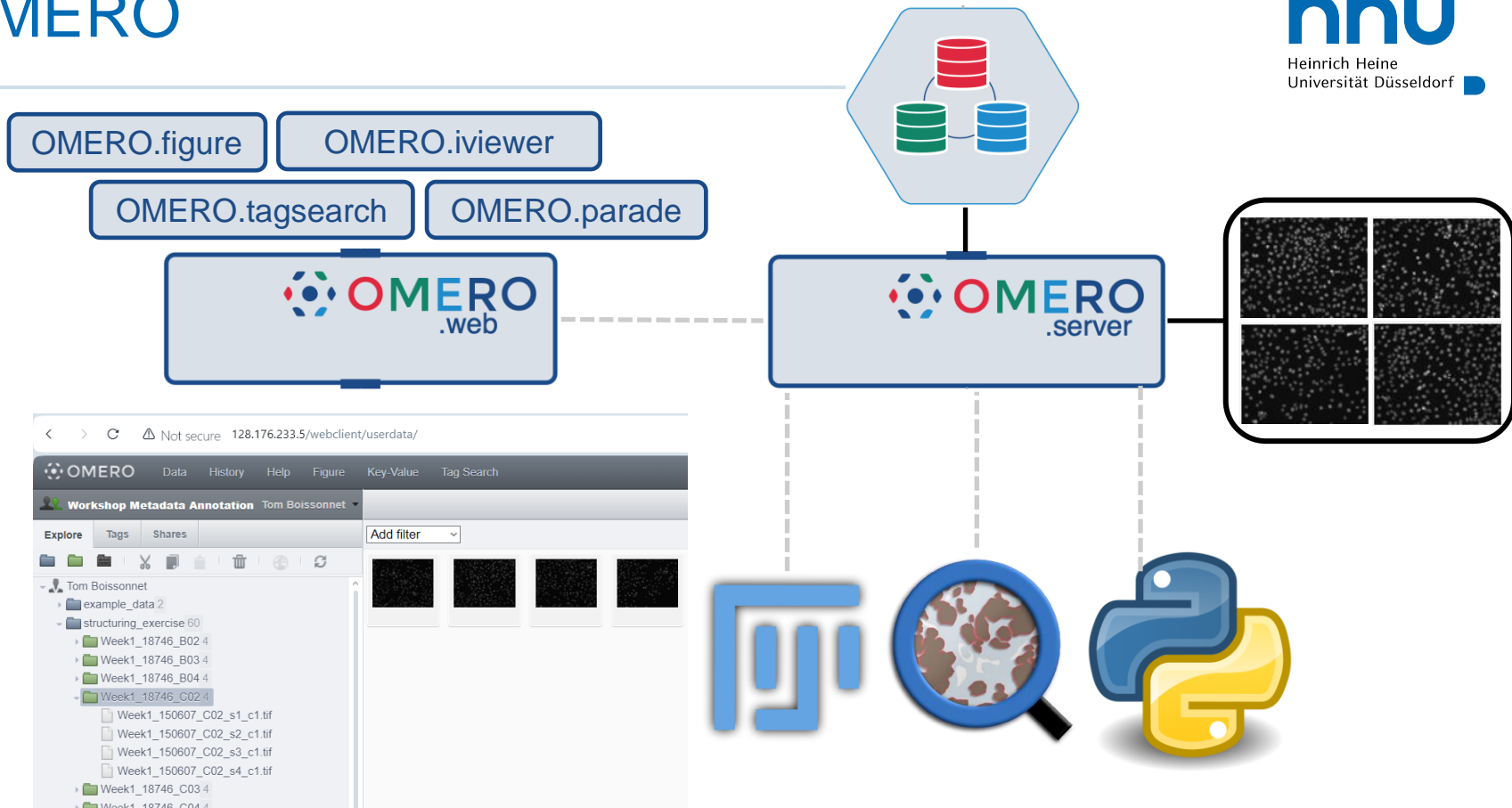
DAPI 112 6437

Zoom % 100

View x: 0 y: 0 width: 1280 height: 1024

Copy Paste Reset Crop

109 Add Figure Legend



Storing results — tables

roi_analysis

Download as CSV: [Whole Table](#)

Show current page as: [CSV](#) | [JSON](#)

To filter rows you can use a query based on named columns. For example, to filter for rows where **shape** is greater than **501669** add [?query=shape>501669](#) to the URL.

For a more complex example, try [?query=\(shape>501669\)&\(shape<501672\)](#)

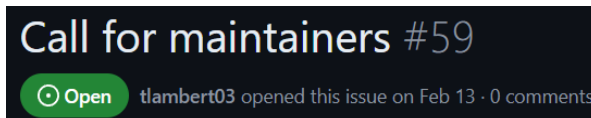
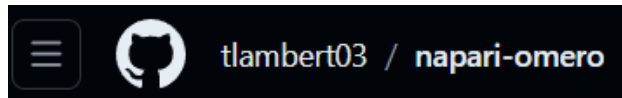
Table rows: **252**.

Showing page **1** (**200** rows). Prev | [Next](#)

dataset	image	roi	shape	cell_index	temperature	roi_area	roi_mean	roi_sum	roi_std
12409	381487	69002	501669	1	T32	0.21474598181052906	81.41065830721003	25970	47.2751965878439
12409	381487	69003	501670	1	T32	0.19387725003583817	97.52083333333333	28086	56.2723990896563
12409	381487	69004	501671	1	T32	0.06933804428365045	77.90291262135922	8024	49.5281648936262
12409	381487	69005	501672	1	T32	0.1837794765964716	94.41025641025641	25774	60.2766531347010
12409	381487	69006	501673	1	T32	0.24369293233671324	114.26519337016575	41364	62.8933268038376
12409	381487	69007	501674	1	T32	0.09289951564217244	79.01449275362319	10904	50.9007254165508
12409	381487	69008	501675	1	T32	0.11376824741686337	80.03550295857988	13526	49.4825166053536
12409	381487	69009	501676	1	T32	0.16358392971773844	88.90946502057614	21605	53.5748393217914
12409	381487	69010	501677	1	T32	0.13127105471176542	71.82051282051282	14005	49.1809176017210
12409	381487	69011	501678	1	T32	0.061933010428114964	90.40217391304348	8317	54.1385219644154
12409	381487	69012	501679	1	T32	0.08347492709876365	105.70161290322581	13107	57.9794151233323

Beyond — topics for discussion

- Large images - symbolic linking from fileserver (in-place imports)
 - no difference from OMERO side of things
 - able to programmatically locate images (path in OMERO database)
- Data publication - submission to BioImageArchive (omero-cli-transfer)
- Developing OMERO
 - give other means of working with structured data, metadata, database
 - small changes, large impacts (thousands of users globally)
- Electronic lab notebook
 - now only weak linking between OMERO and elabs
 - elab API standardization?



- Data management is for everyone throughout a project
 - group leaders
 - experimenters
 - bioimage analysts
- Data management purpose is to increase your ability to explore data
 - remote access to data - sharing links over files
 - traceability from acquisition to analysis
 - extensions to solve specific needs: OMERO.figure

Thank you for your attention

■ Center for Advanced imaging

- Stefanie Weidtkamp-Peters
- Susanne Klichowski
- Sebastian Hänsch
- Miriam Bäumers
- Anna Hamacher
- Jessica Hausmann
- Steffen Köhler
- Sarah Loeck
- Manuel Anlauf
- Vanessa Fuchs
- Ksenia Krooß
- Katharina Schmitz
- Tehmina Enayat
- Fiona Heimes

■ I3D:bio

- Christian Schmidt
- Susanne Kunis
- Julia Dohle
- Elisa Ferrando-May
- Roland Nitschke
- Tobias Wernet

■ Many more

- German Biolmaging
- NFDI4BIOIMAGE