Tracking with OMERO

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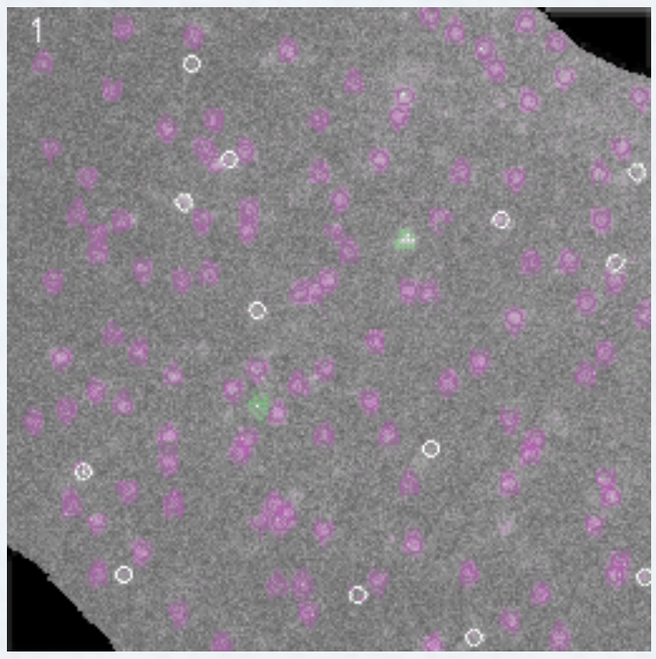
OME / Harvard Medical School

8th Annual OME Users Meeting
June 24, 2013 - Institut Pasteur

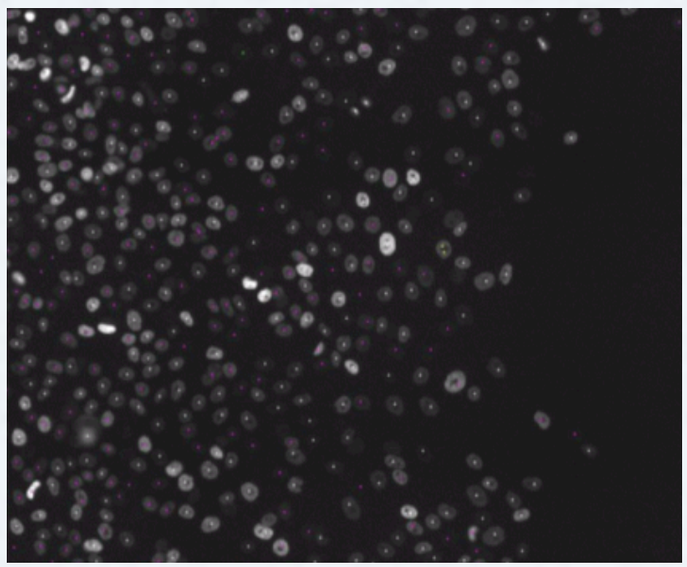
Tracking sub-cellular objects



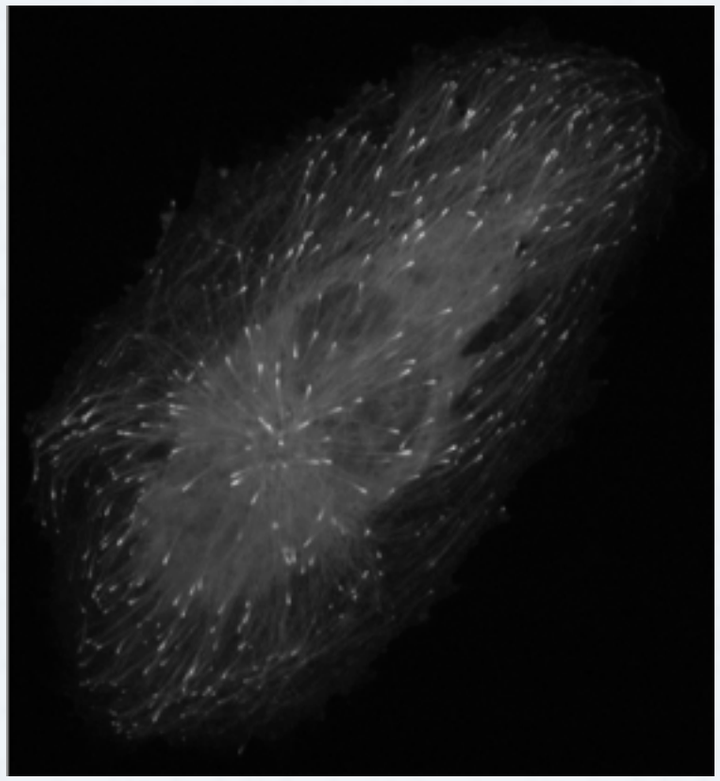
Jaqaman et al. Cell 2011

Single particles

Histone-marked nuclei



Ng et al. JCB 2012



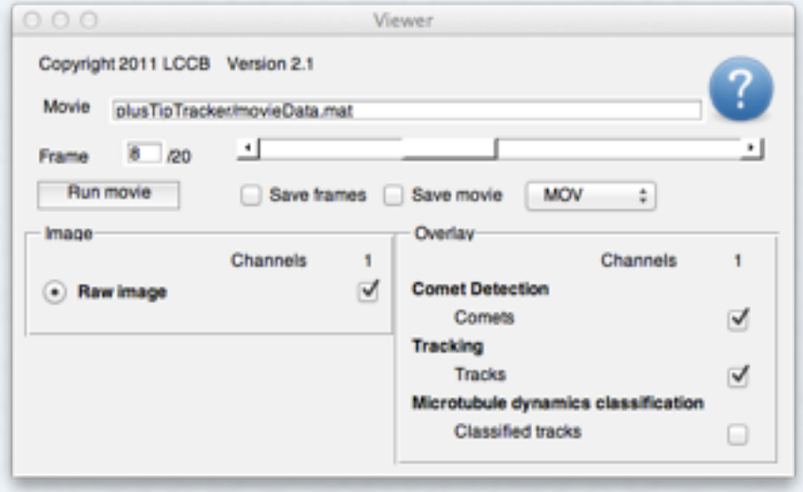
Applegate et al. JSB 2011

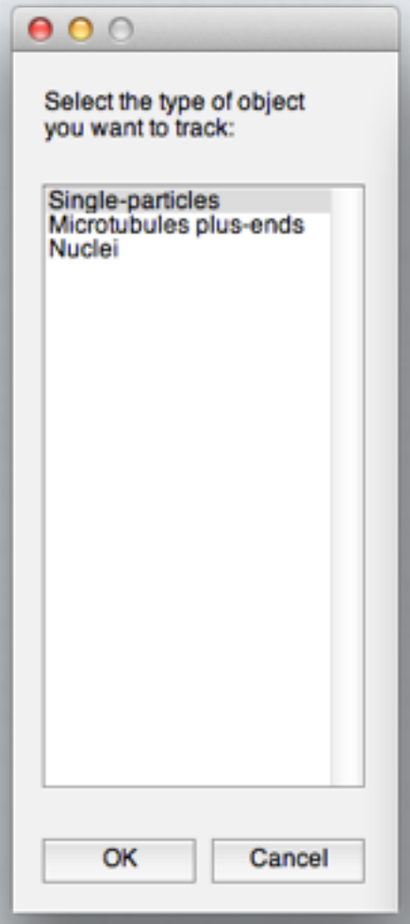
Microtubule plus-ends

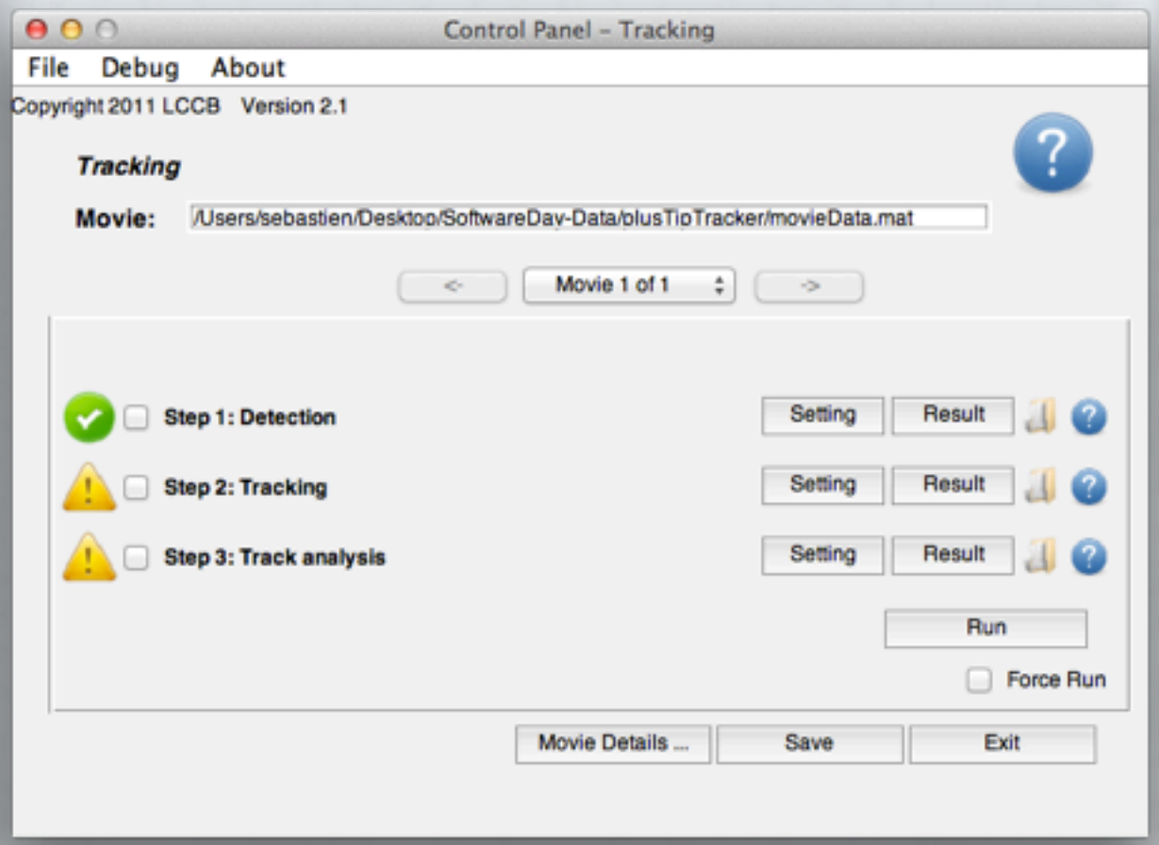
Tracking framework (Jaqaman et al. Nature Methods 2008)
Object detection and object tracking including gap closing (particle disappearance), merging (e.g. vesicle fuse) and splitting (e.g mitotic events)

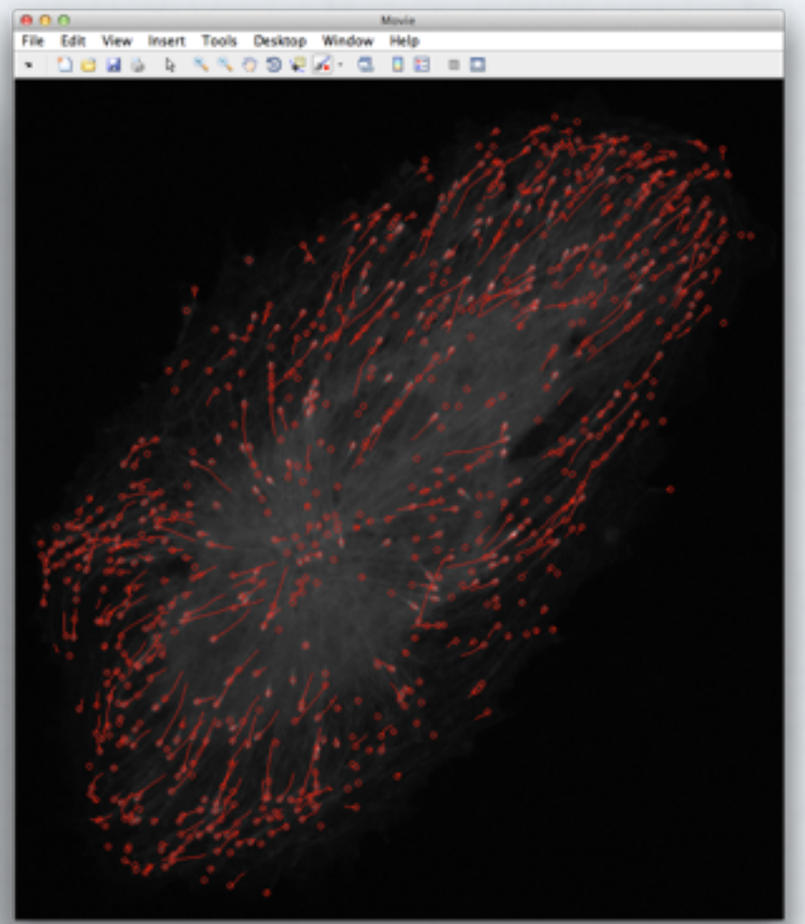
Matlab tracking tool

- U-Track: http://lccb.hms.harvard.edu/software.html
- Object-based tracker initialization
- Workflow management/batch analysis
- Tracks/labelled track visualization

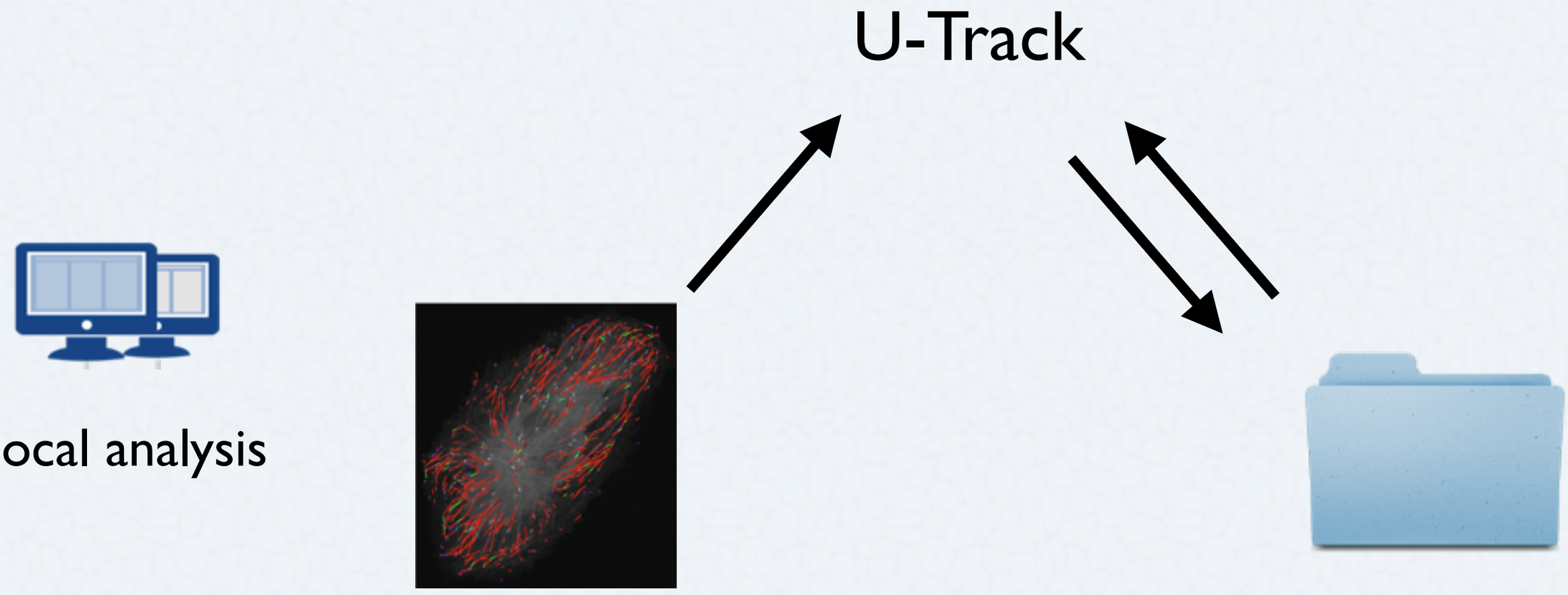








Integration with OMERO



Integration with OMERO

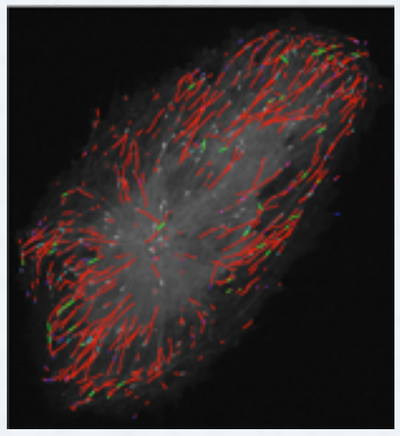
OMERO

Image

client-side analysis

U-Track

local analysis



Integration with OMERO

OMERO

Image

client-side analysis

OMERO.matlab

U-Track

local analysis

Integration with OMERO

hms-tracking

OMERO

Image

File annotation

client-side analysis

OMERO.matlab

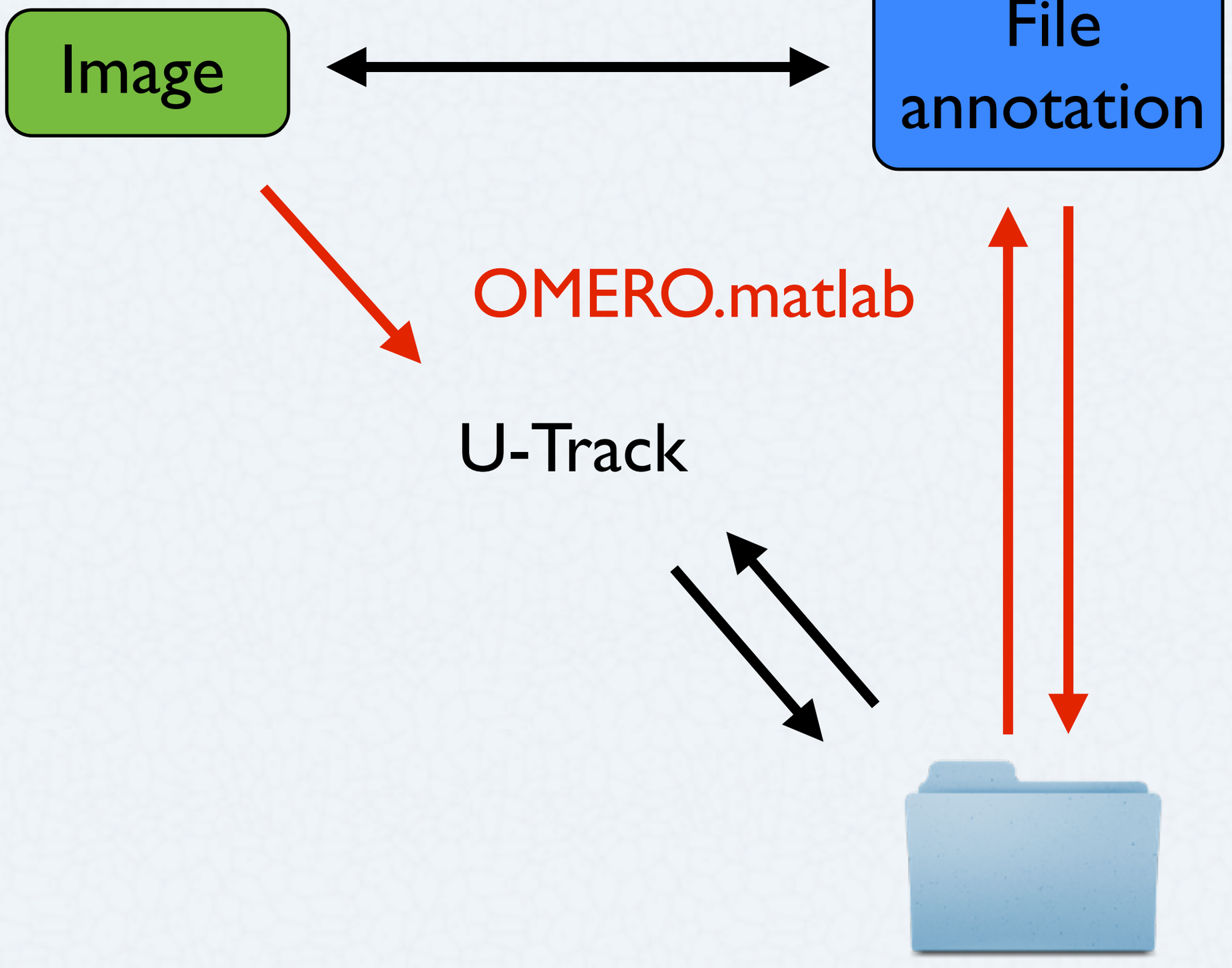
U-Track

local analysis

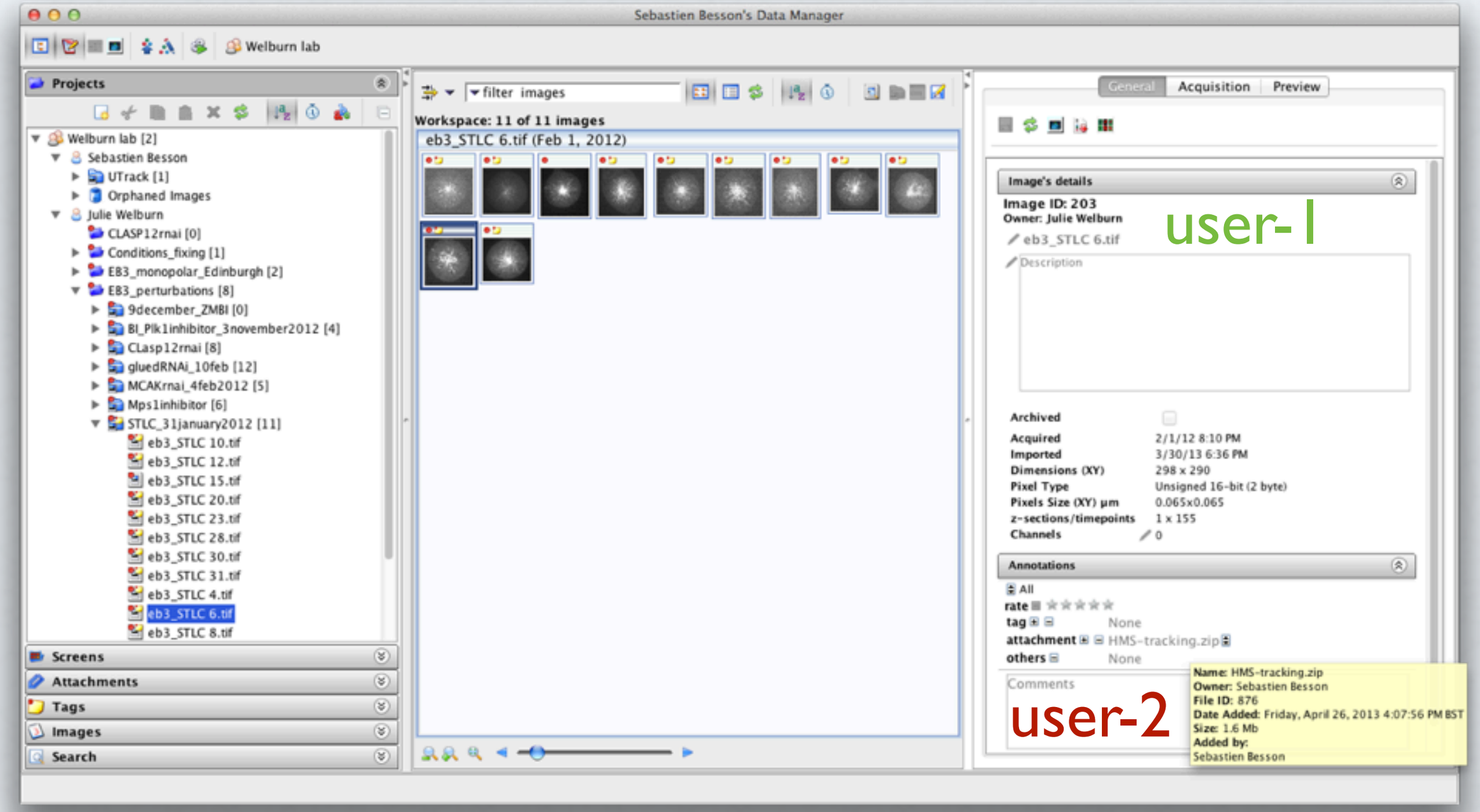
Integration with OMERO

client-side analysis

local analysis



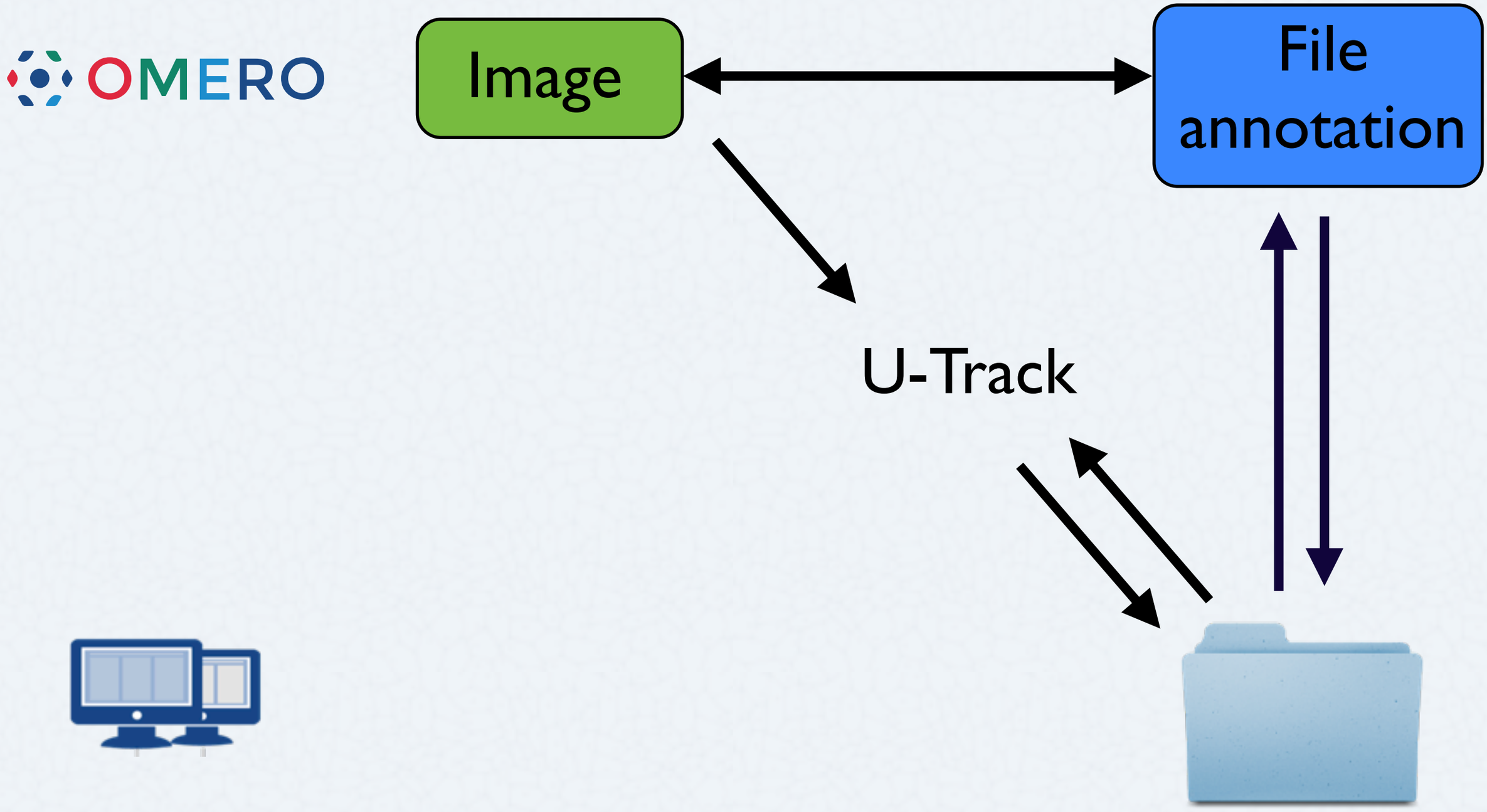
Tracking in OMERO: application



Impact on OMERO resources

- Major rewriting of OMERO.matlab toolbox (4.4.7 and above) cf Tuesdays analysis worskhop
- Resources set up for daily testing of OMERO.matlab and derived Matlab-based projects (e.g. U-Track)
- Future development
    - Stronger articulation between various Matlab projects: Michael Porter (Dundee), Ian Munro/Yuriy Alexandrov (Imperial)
    - More writing functions / better exposition of the permissions...
    - Addition of integration test suites

Caching images for analysis



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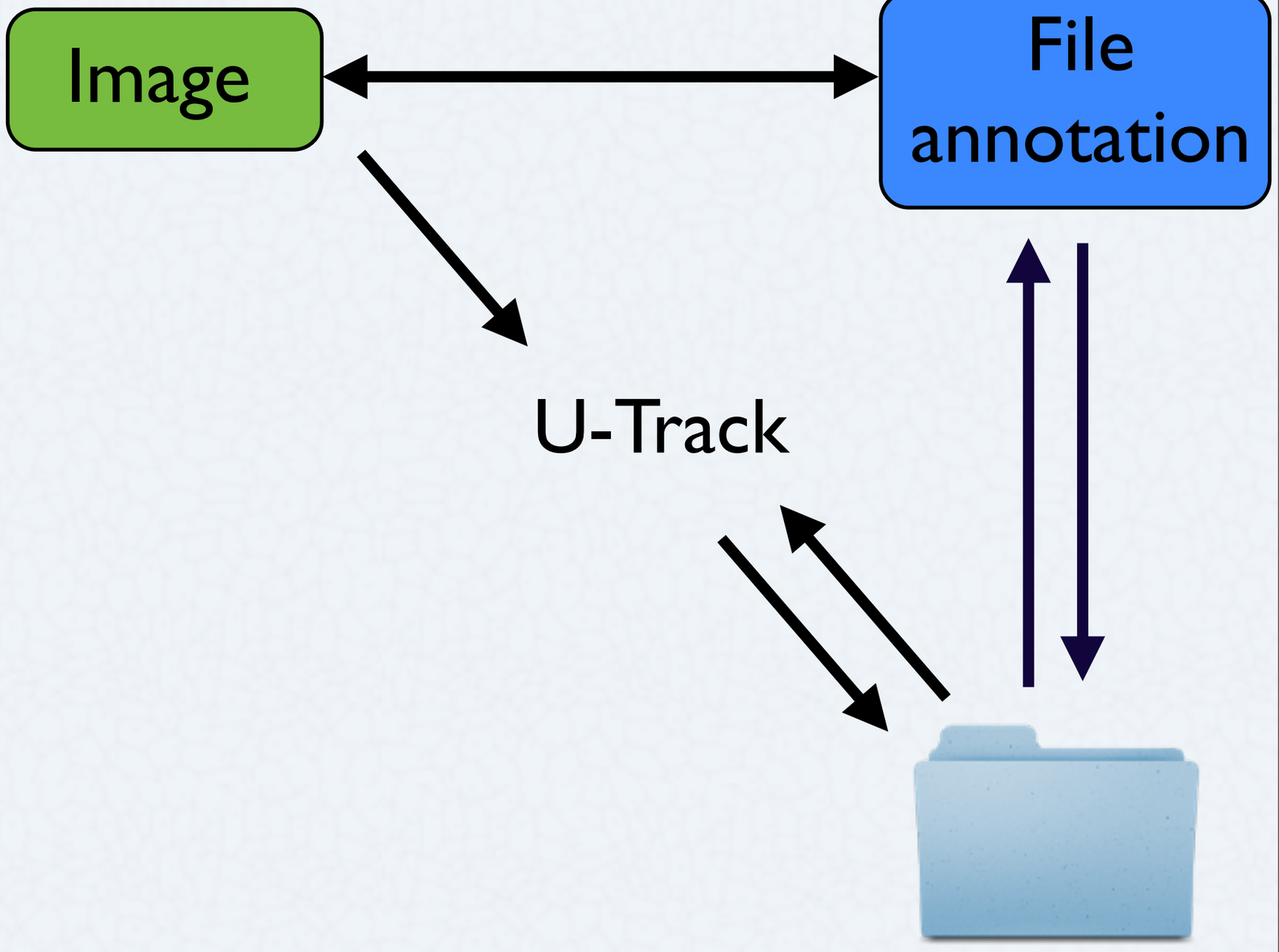


Limitations

offline work

Caching images for analysis

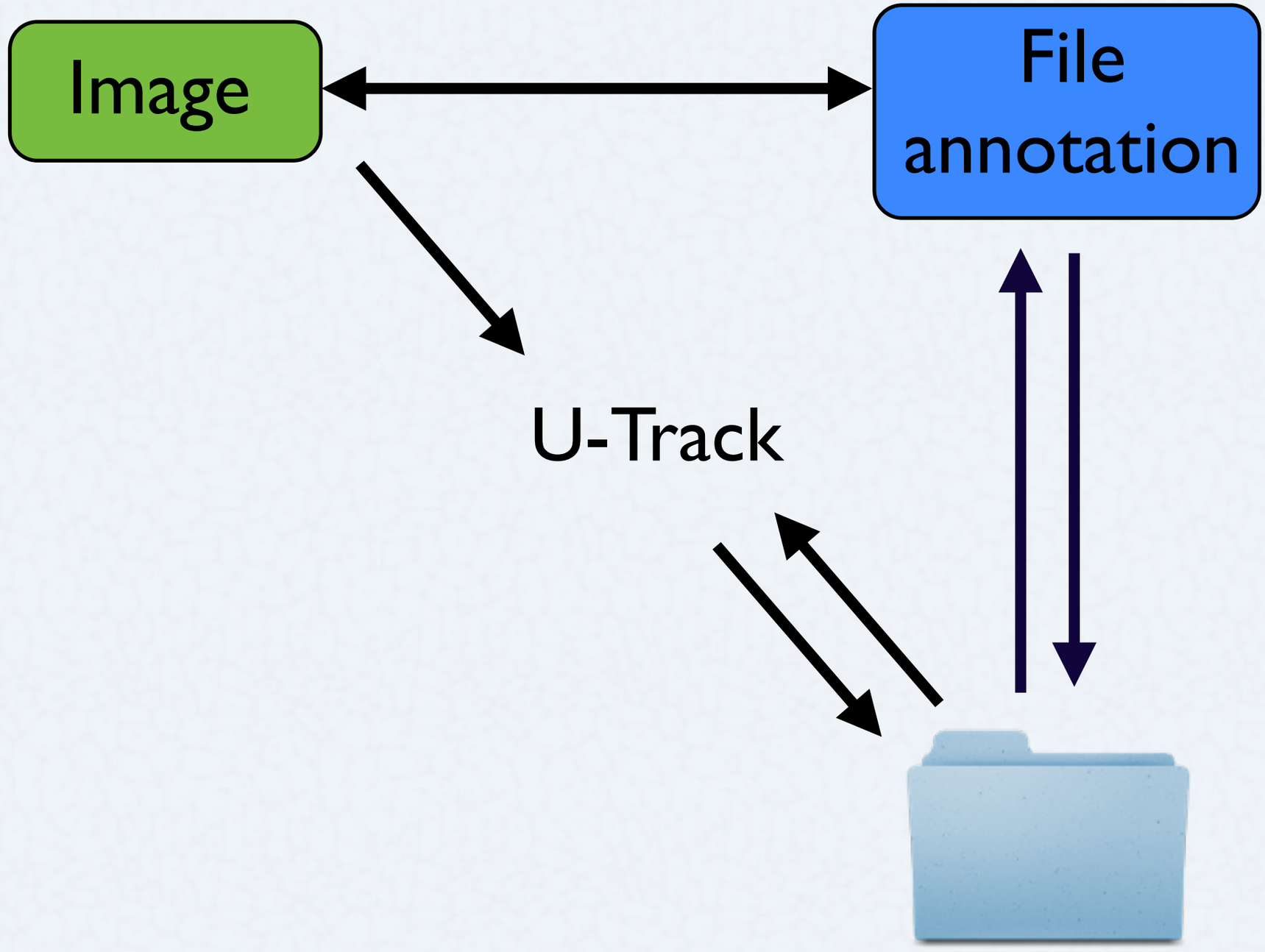
WTCCB
Edinburgh

OMERO

Limitations

offline work

poor/distant connection



UT Southwestern
Dallas

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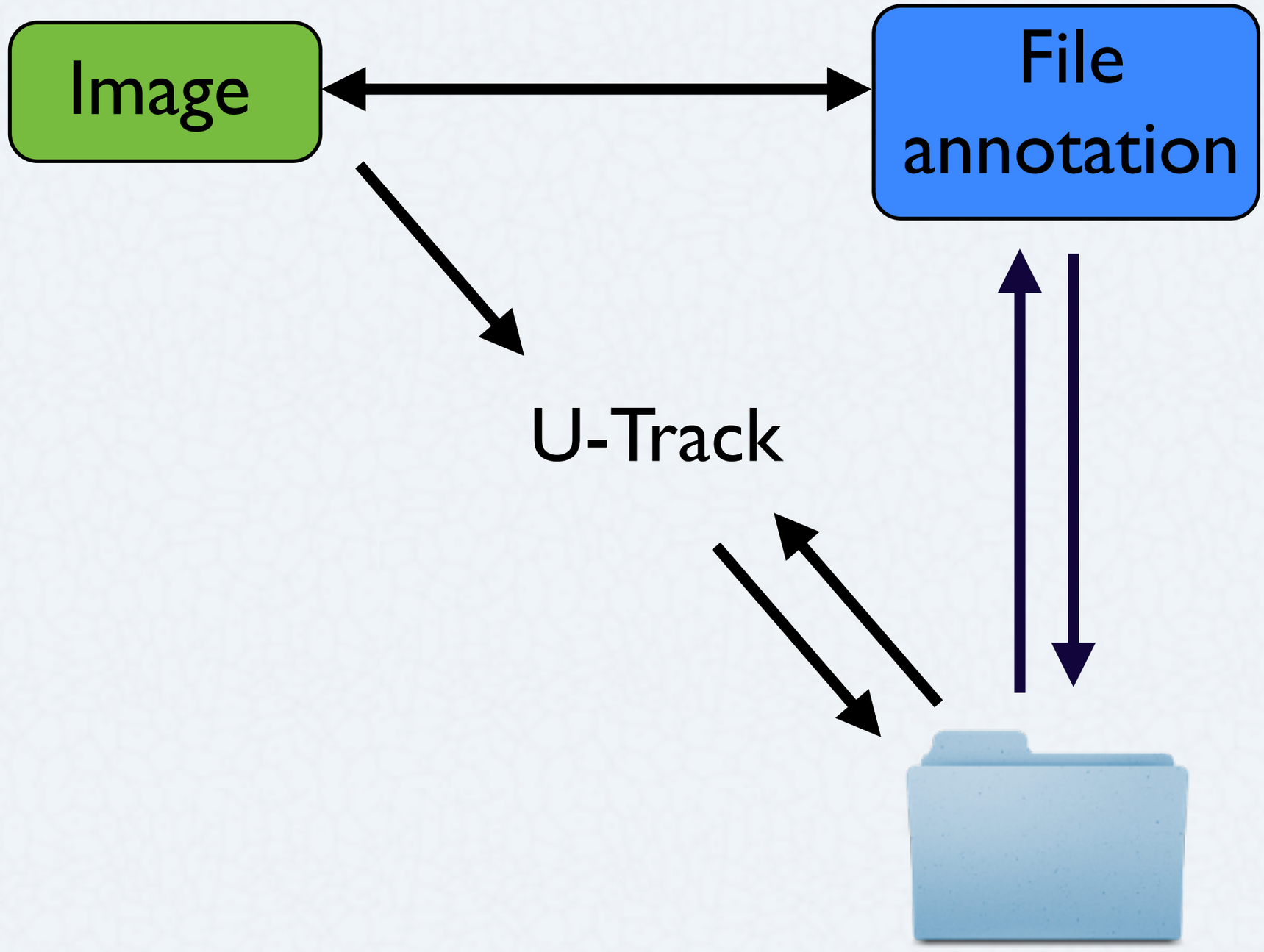
parameters optimization



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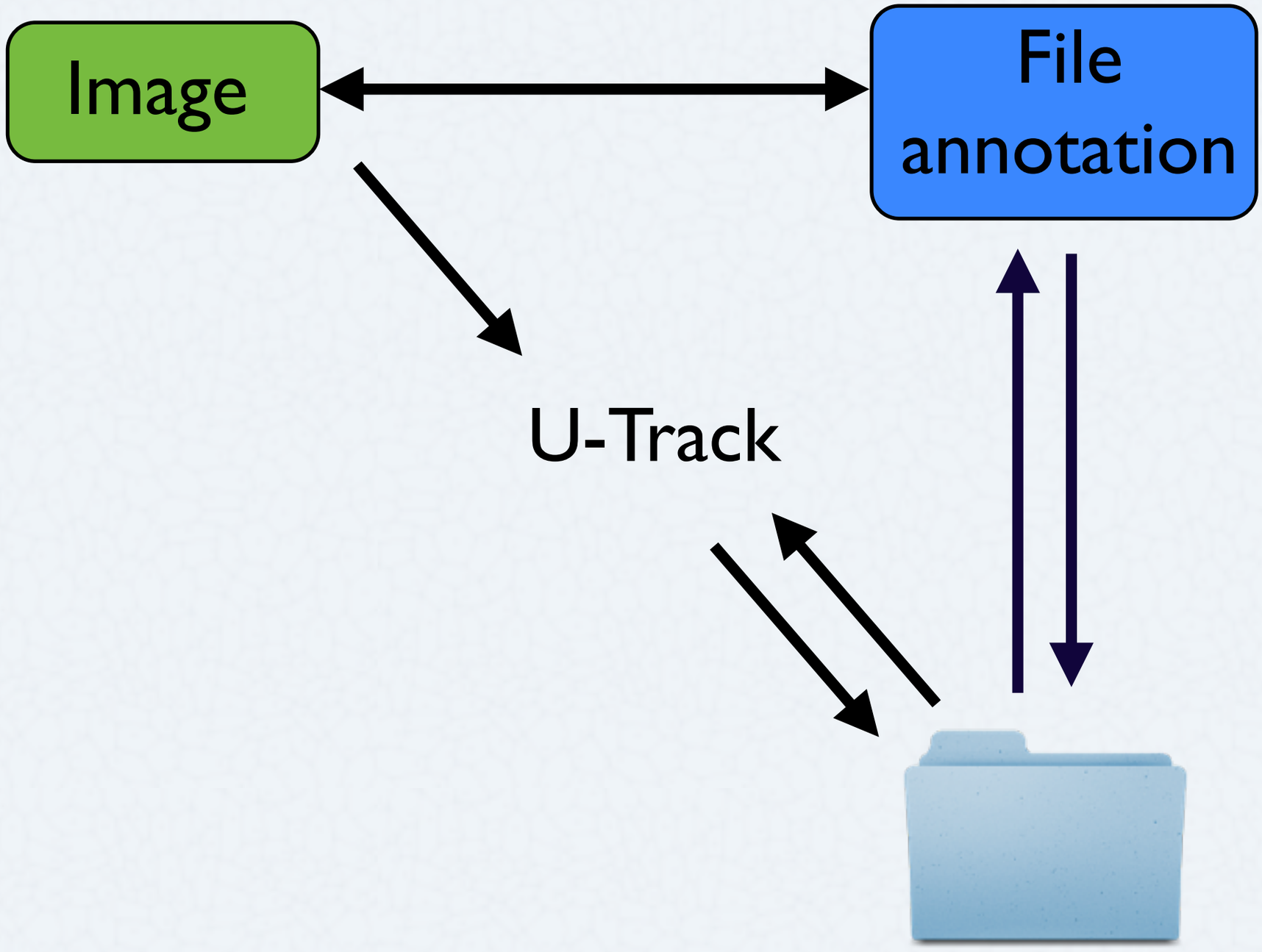

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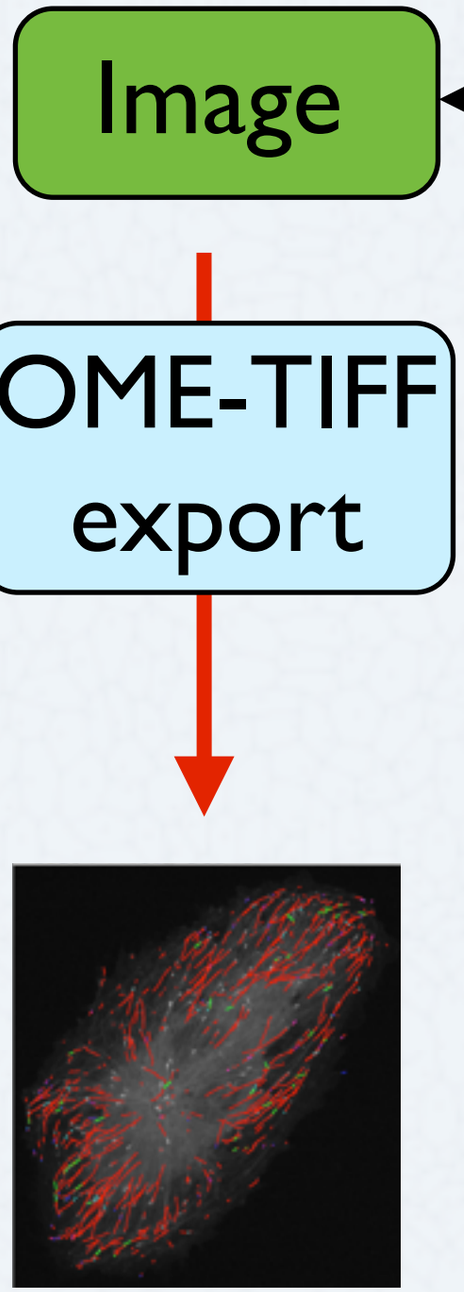

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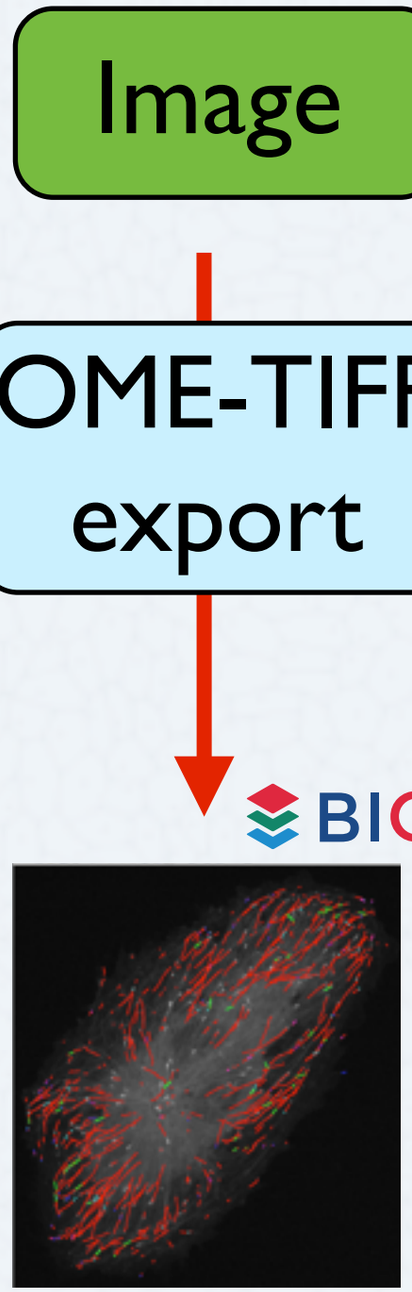

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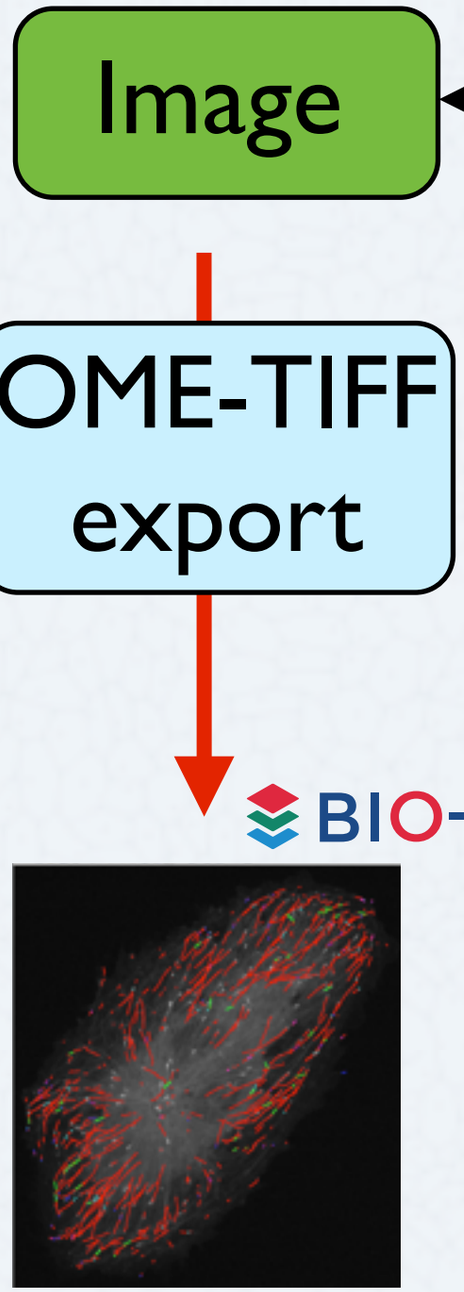
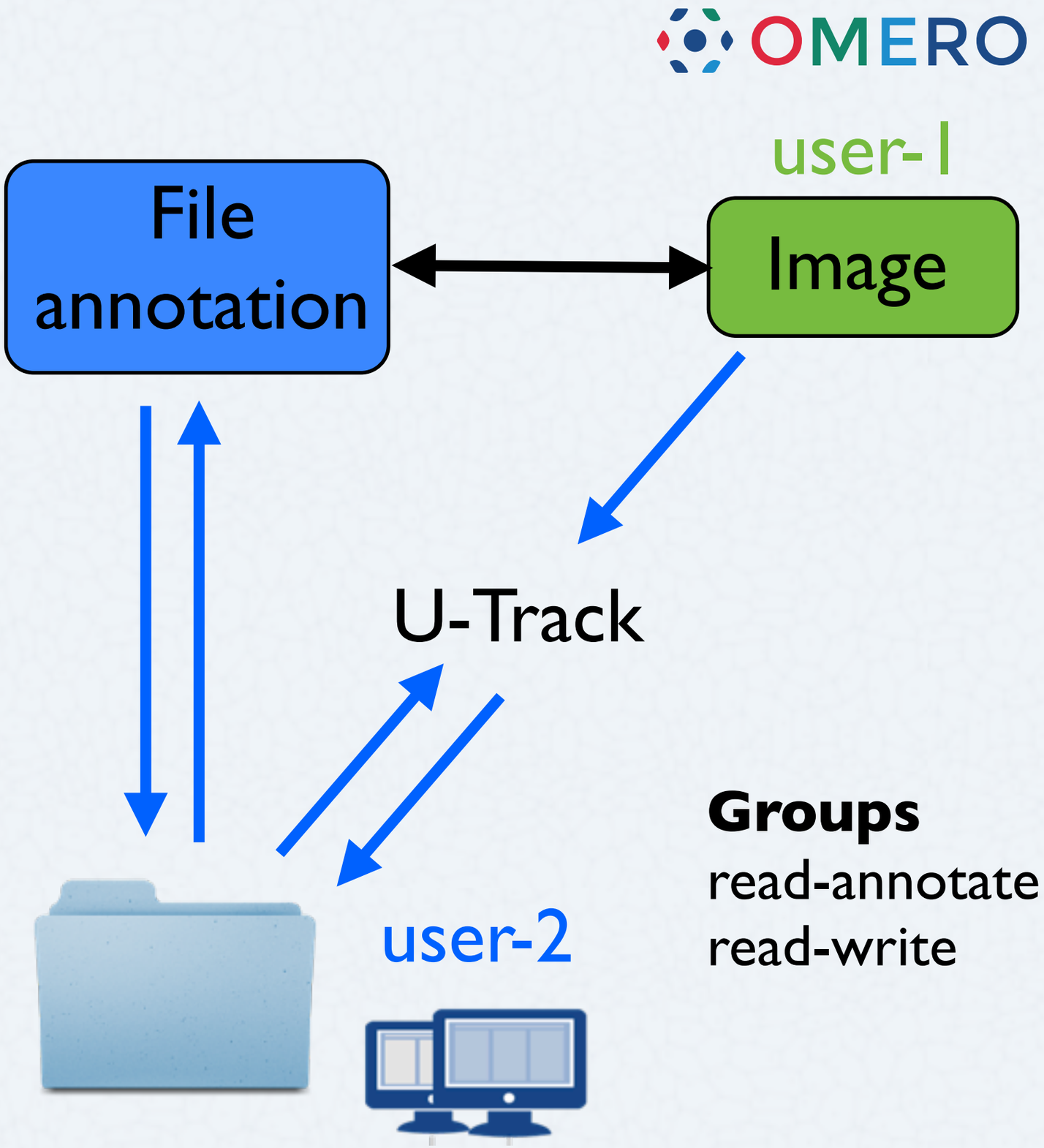
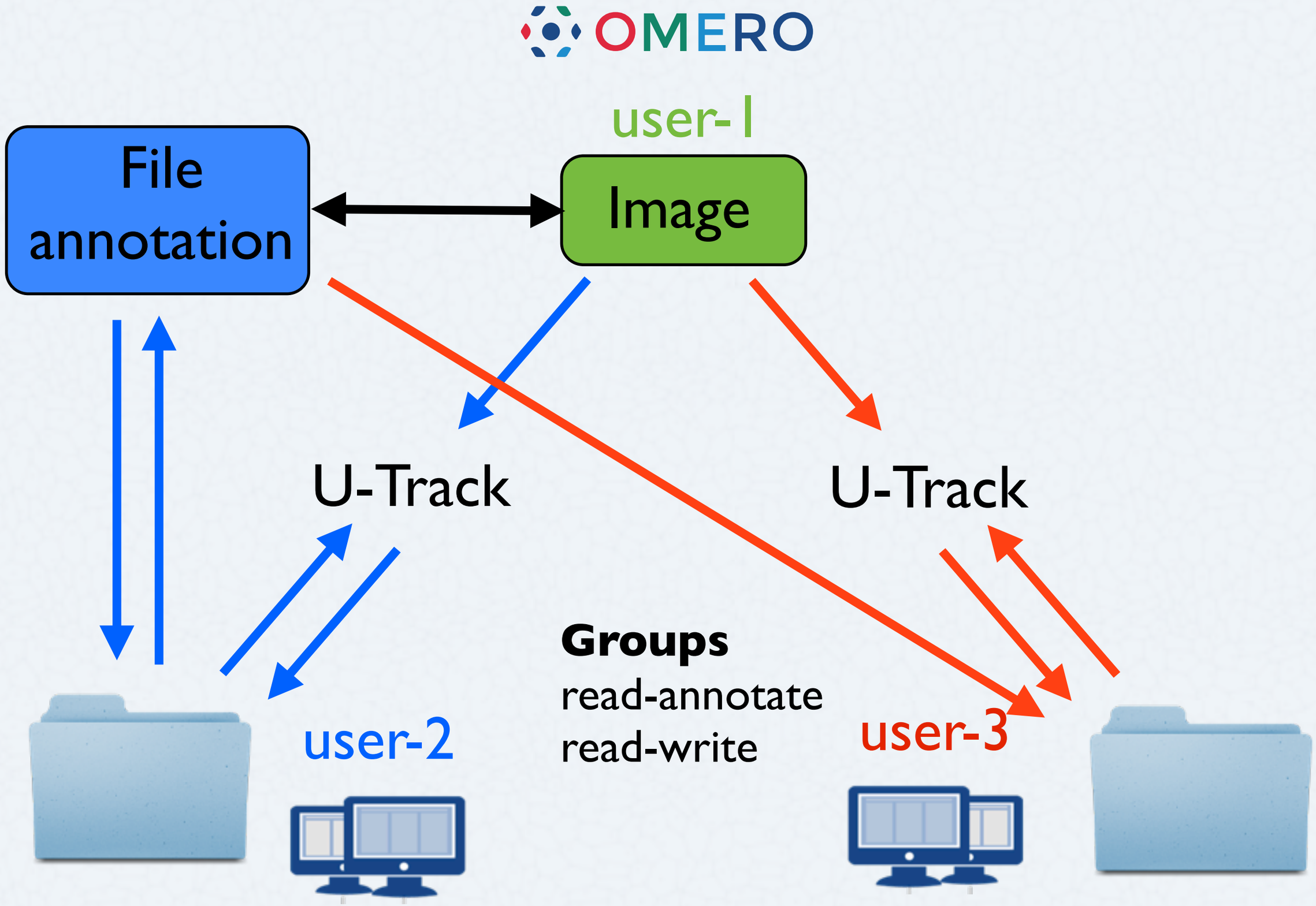


Collaborative analysis



Groups
read-annotate
read-write

Collaborative analysis



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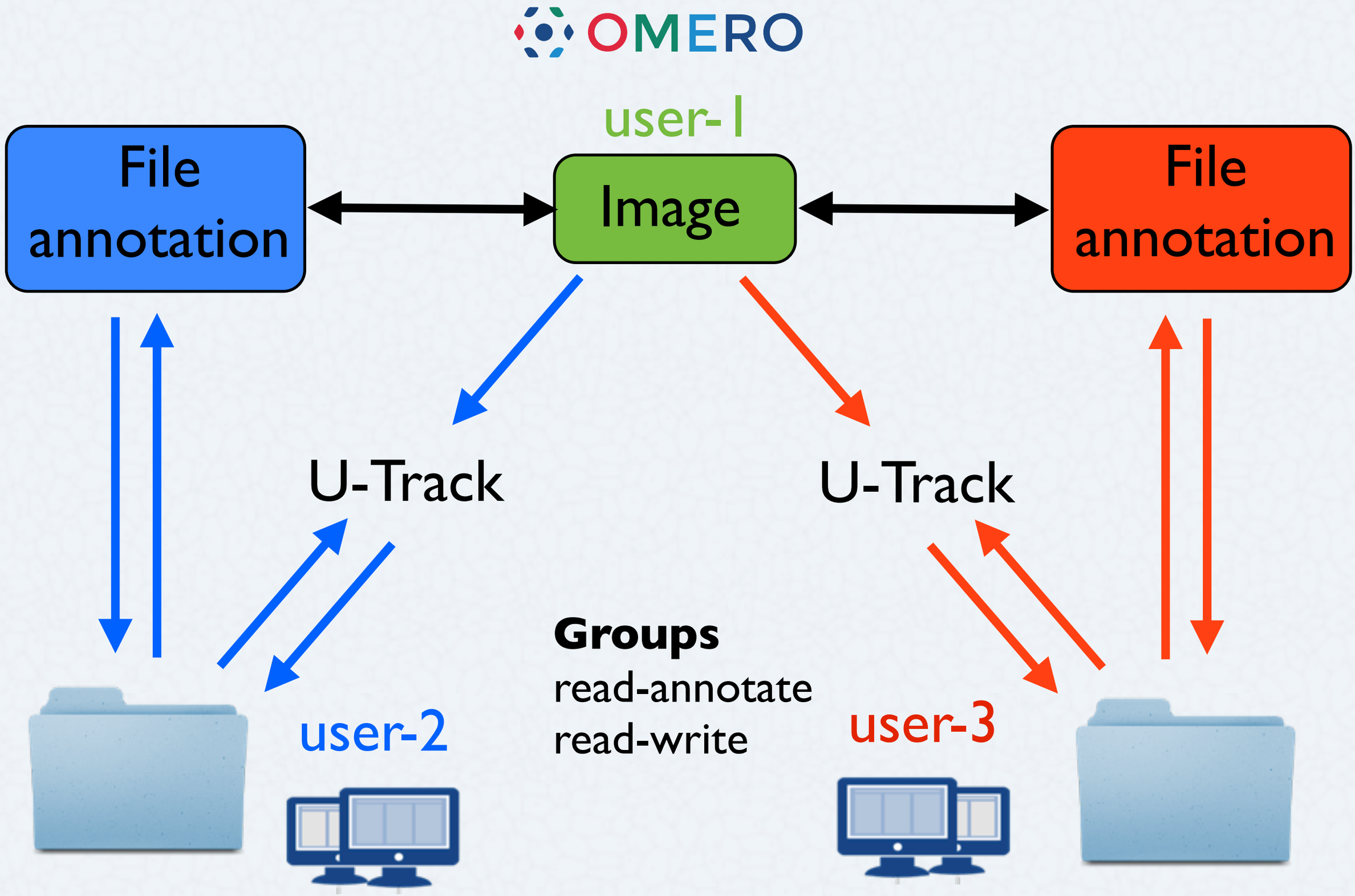
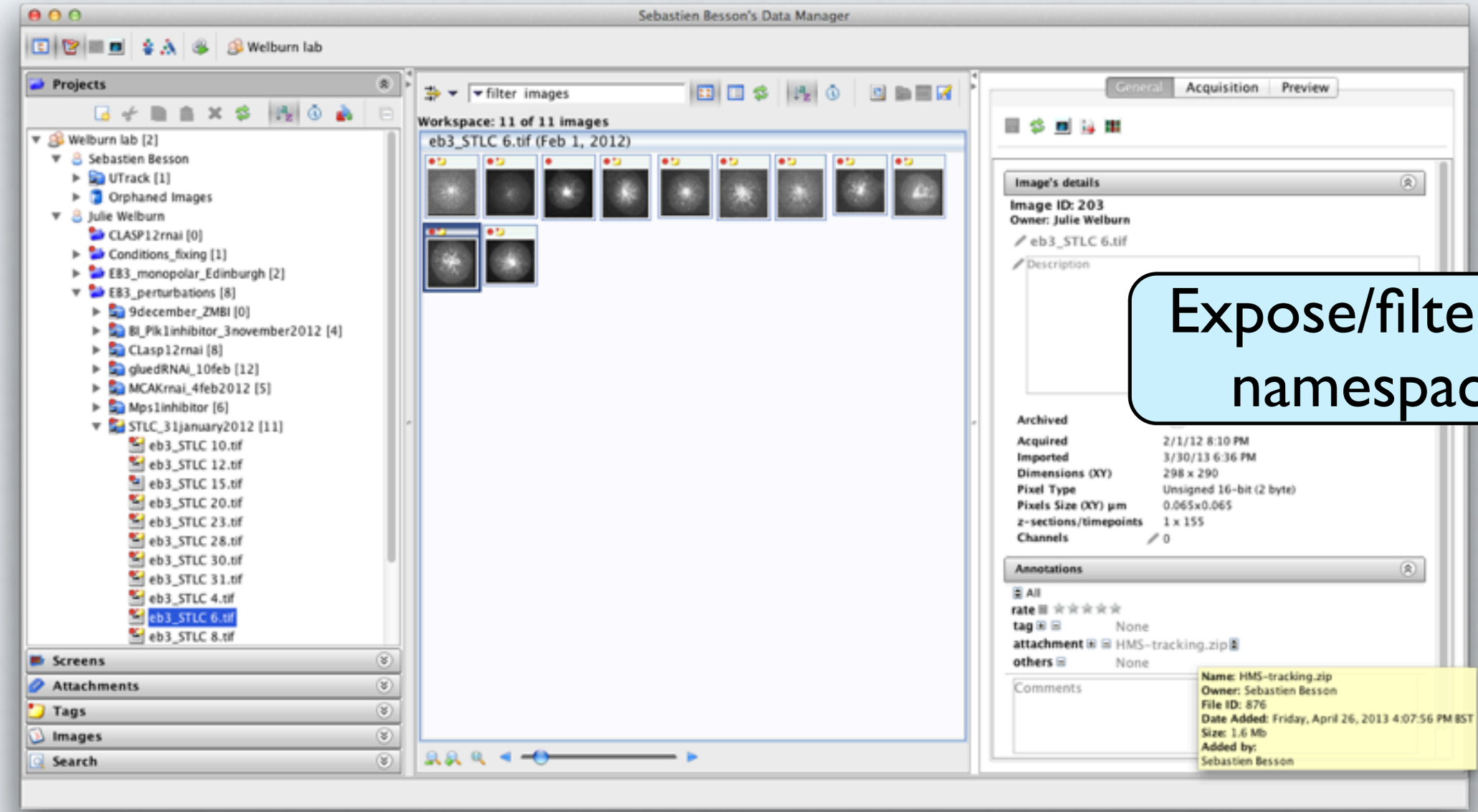


Analysis integration in OMERO clients



Expose/filter by namespace

Export analysis: ROIs/tables

Open with menu

Acknowledgments

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Jean-Marie Burel
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OME team

Wellcome Trust Centre, Edinburg

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UT Southwestern, Dallas

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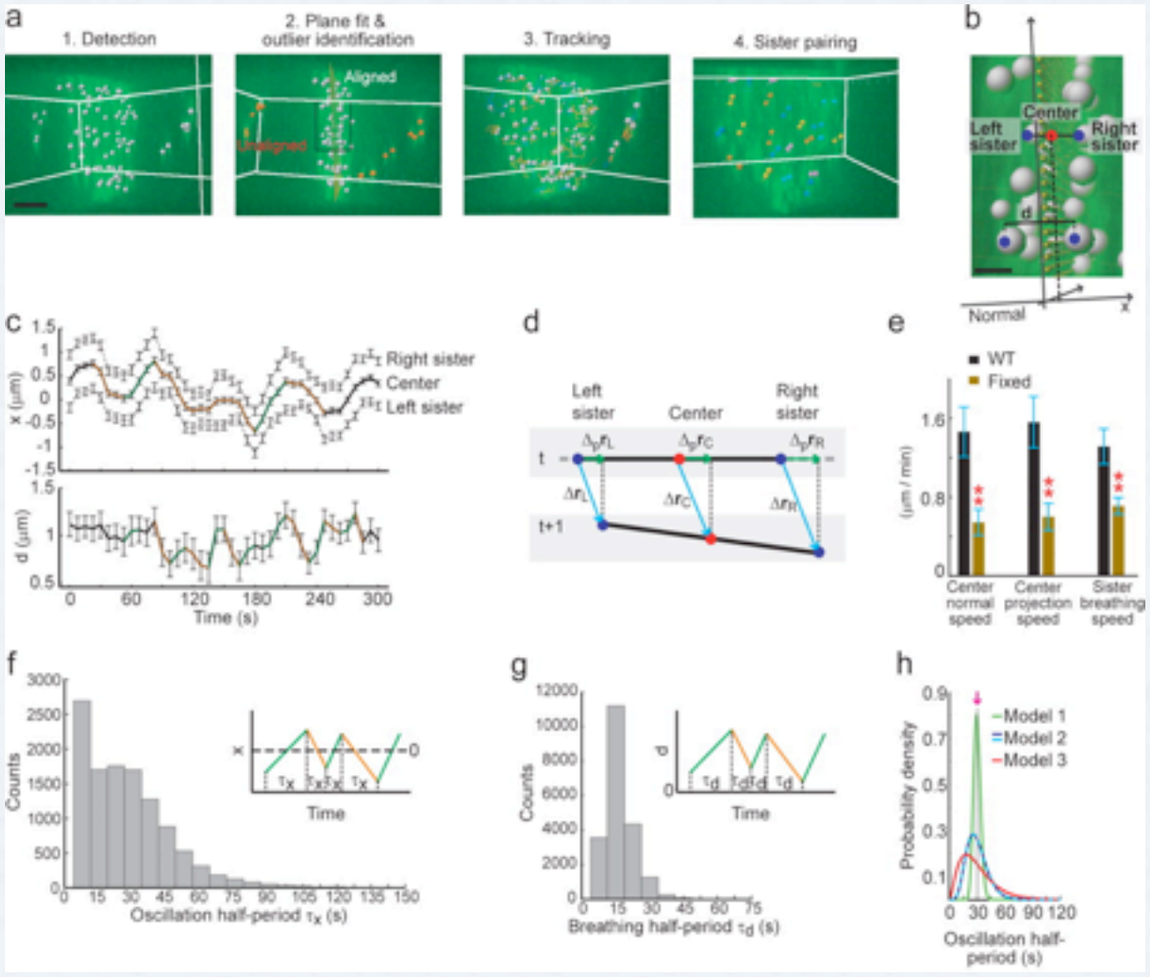
Harvard Medical School, Boston

Hunter Elliott
Mei Rosa Ng
François Aguet
Gaudenz Danuser

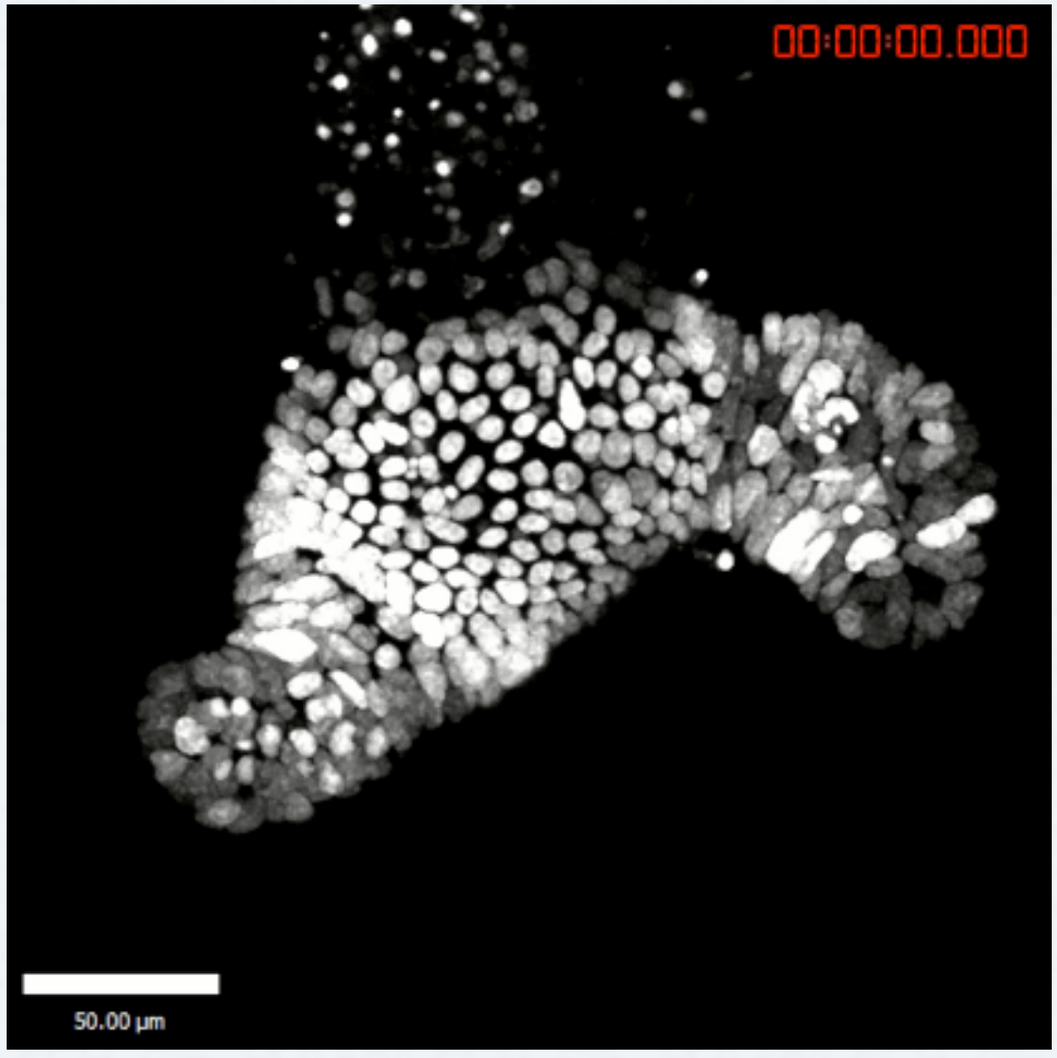
Suppoer 3D support

Mammalian kinetochores



Jaqaman et al. JCB 2010

3D nuclei tracking



Nathke lab, Dundee

Tracking in OMERO: example (II)