





Vilcek Institute of Graduate Biomedical Sciences

Our students train in an environment supportive of scientific discovery and professional growth.

NYU G Sch of Med.

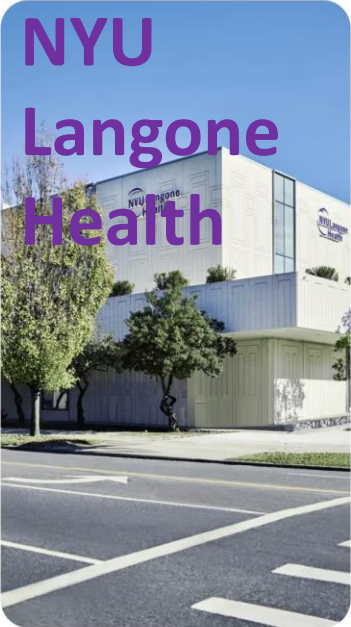

404
total students enrolled


276
PhD students enrolled


98
MD/PhD students enrolled


21
master's students enrolled

on
S



NYU Langone Ambulatory Care Garden City



NYU Langone Hospital—Long Island



Perlmutter Cancer Center—Sunset Park



NYU Langone Hospital—Brooklyn



Tisch Hospital & Kimmel Pavilion



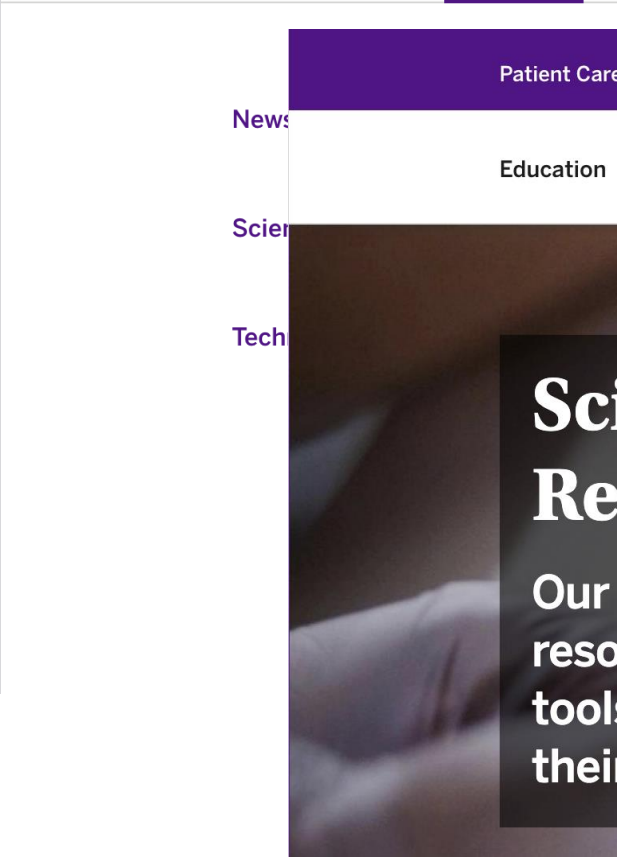
Hassenfeld Children's Hospital



NYU Langone Orthopedic Hospital



Mignone Women's Health Collaborative



Scientific Cores & Shared Resources

> Division of Advanced Research Technologies

> Advanced Rodent Transgenics Laboratory

> Anti-infectives Screening Core

> Applied Bioinformatics Laboratories

Biostatistics Resource

> Center for Biospecimen Research & Development

> Cryo–Electron Microscopy Laboratory

> Cytometry & Cell Sorting Laboratory

DataCore

> Environmental Exposure and Analytical Chemistry Laboratory

< Scientific Cores & Shared Resources

> Experimental Pathology Research Laboratory

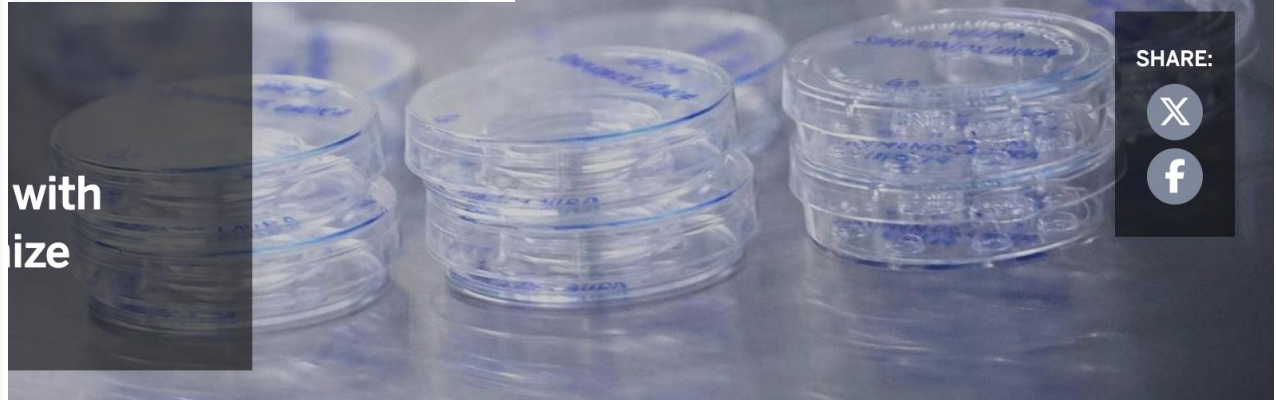
Technologies & Fees

Instruments

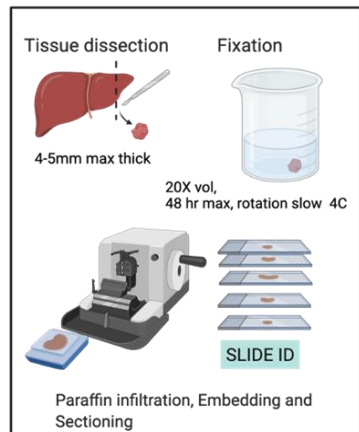
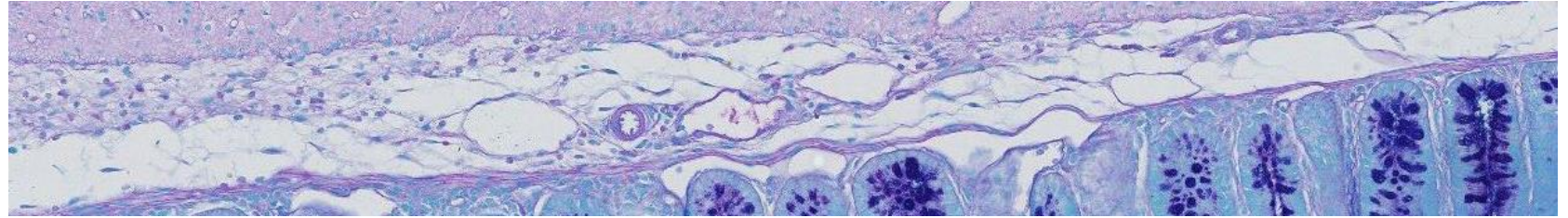
Policies

Technology Requests

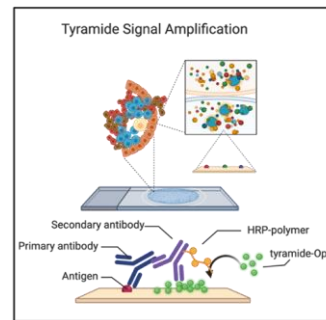
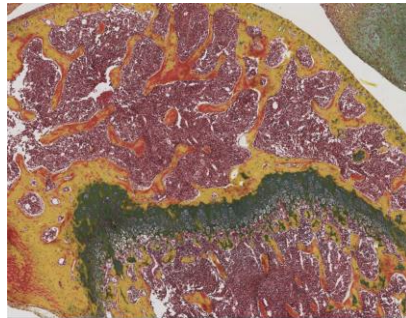
Staff



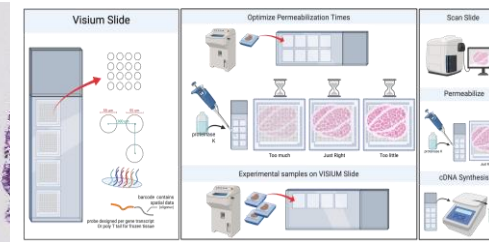
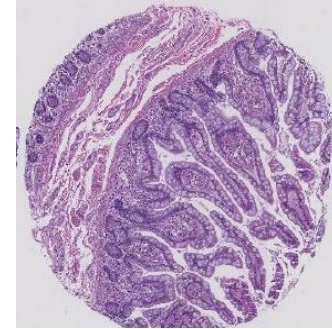
Experimental Pathology



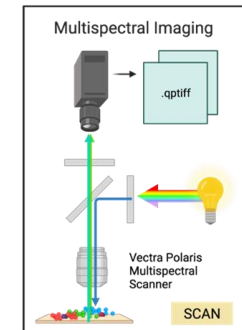
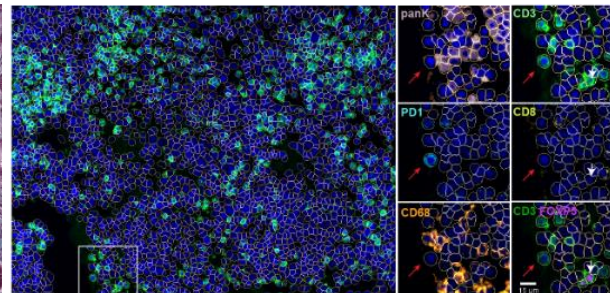
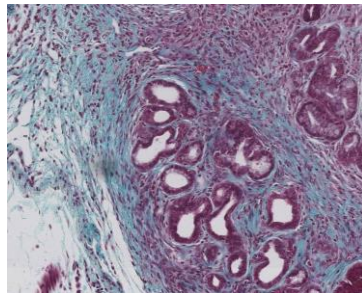
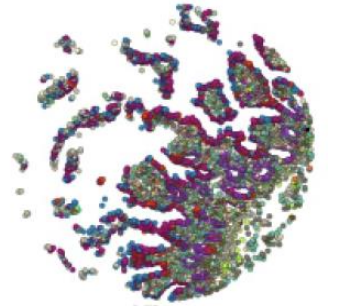
Pre-clinical tissue Processing



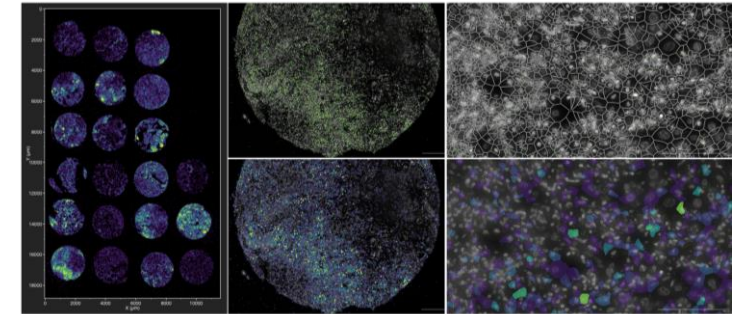
Staining



Spatial Profiling



Slide Scanning



Key Contact:

Cindy Loomis, M.D.,Ph.D. Director ExpPath

Cindy.Loomis@nyulangone.org

Medical Science Building 3rd floor rooms 370–380

Scan QR code
to learn more



How to provide whole slide viewer

270 GB of whole slide images from > 200 labs

~~Leica Aperio~~

OTHERS



OPEN SOURCE?

DATA TYPES:

Reading image data using Bio-Formats, which supports **170 image-file formats**.

Supported Formats

3i SlideBook
3i SlideBook 7
Andor Bio-Imaging Division (ABD) TIFF
AIM
Alicona 3D
Amersham Biosciences Gel
Amira Mesh
Amnis FlowSight
Analyze 7.5
Andor SIF
Animated PNG
Aperio AFI
Aperio SVS TIFF
Applied Precision CellWorX
AVI (Audio Video Interleave)
Axon Raw Format
BD Pathway
Becker & Hickl SPC FIFO
Becker & Hickl SPCImage
Big Data Viewer
Bio-Rad Gel
Bio-Rad PIC
Bio-Rad SCN
Bitplane Imaris
Bruker MRI
Burleigh
Canon DNG

Formats / Supported Formats

View page source

Supported Formats

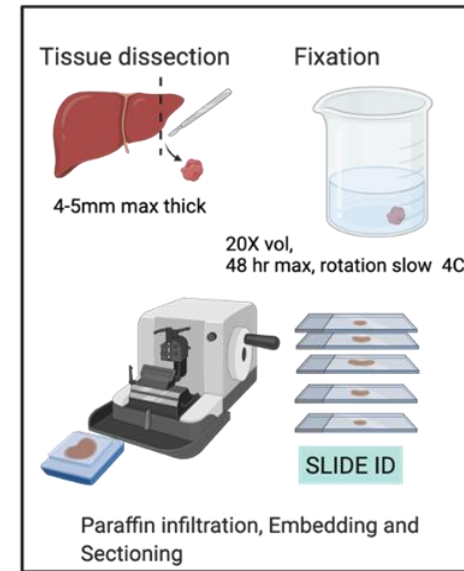
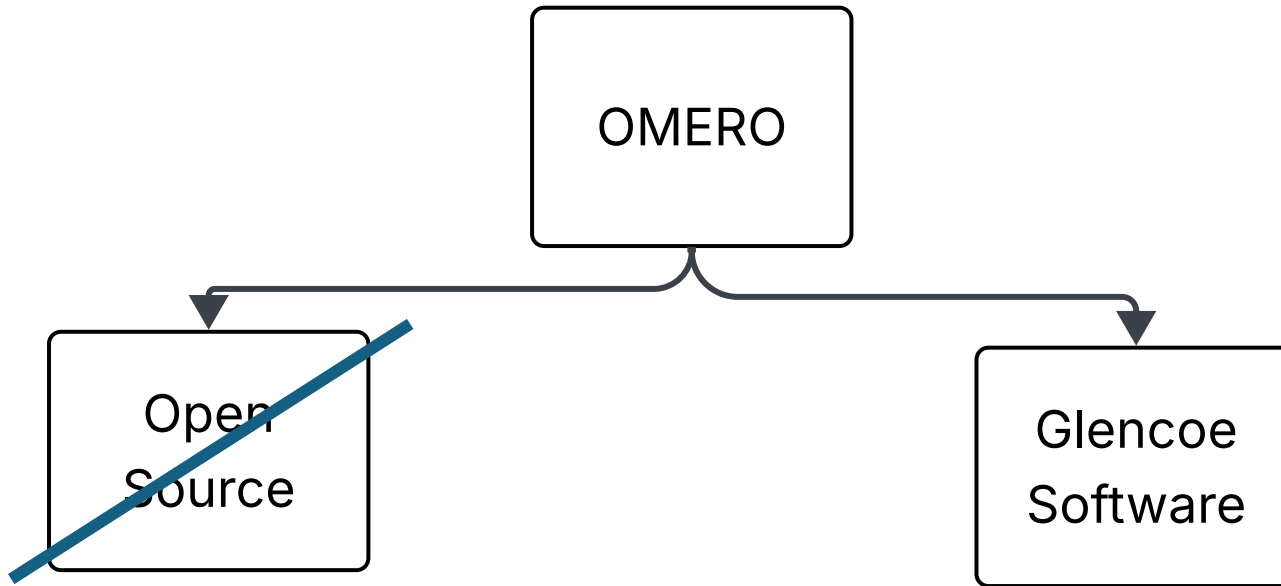
Ratings legend and definitions

Format	Extensions	Pixels	Metadata	Openness	Presence	Utility	Export	BSD	Multiple Images	Pyramid
3i SlideBook	.sld	▲	■	▼	▲	▼	✗	✗	✓	✗
3i SlideBook 7	.sldy	▲	▲	▲	▲	▲	✗	✓	✗	✗
Andor Bio-Imaging Division (ABD) TIFF	.tif	▲	▲	■	▼	■	✗	✗	✓	✗
AIM	.aim	■	▼	▼	▼	▼	✗	✗	✗	✗
Alicona 3D	.al3d	▲	▲	▲	▼	■	✗	✗	✗	✗
Amersham Biosciences Gel	.gel	▲	■	■	▼	▼	✗	✗	✗	✗
Amira Mesh	.am, .amiramesh, .grey, .hx, .labels	▲	▼	▼	▼	▼	✗	✗	✗	✗
Amnis FlowSight	.cif	■	■	■	▼	▼	✗	✓	✓	✗
Analyze 7.5	.img, .hdr	▲	▲	▲	■	▼	✗	✗	✗	✗
Andor SIF	.sif	■	▼	▼	▼	▼	✗	✗	✗	✗
Animated PNG	.png	▲	▲	▲	■	▼	✓	✓	✗	✗
Aperio AFI	.afi, .svs	▲	▲	▲	■	■	✗	✗	✓	✓
Aperio SVS TIFF	.svs	▲	▲	▲	■	■	✗	✗	✓	✓

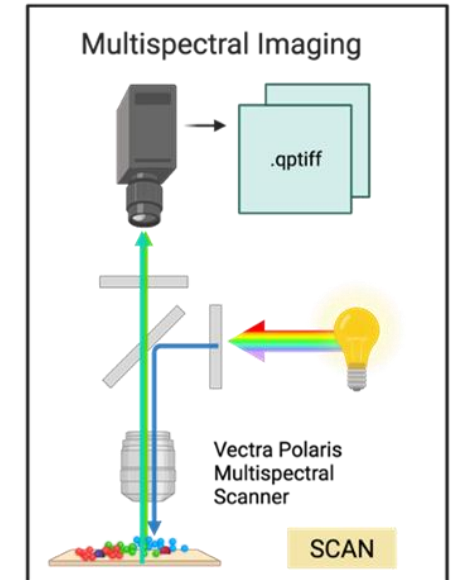
Bio-Formats is a software tool for reading and writing image data using standardized, open formats. Bio-Formats is a community driven project with a standardized application interface that supports open source analysis programs like [ImageJ](#), [CellProfiler](#) and [Icy](#), informatics solutions like [OMERO](#), and commercial programs like [MATLAB](#).

<https://www.openmicroscopy.org/bio-formats/>

DEPLOYMENT - MAINTENANCE



Pre-clinical tissue Processing



Slide Scanning

- DATA MIGRATION
- GROUPS onboarded during migration
- Instant access so that researcher wouldn't be affected.

THANK YOU GLENCOE !!!!

INTEGRATION TO MCIT SYSTEMS

Single Sign On SSO

Identification is managed by MCIT security and is the same for any system in the NYULMC/NYUGSOM

Access is requested through the MCIT ticketing system and granted to whoever asks

Group membership is managed by the Group Owner following OMERO permissions structure AND ExpPath with restricted Administration permissions for all its staff.

ExpPath data



DATA ACCESS

WEB



Web access to images: when you want to view from any computer, annotate, organize, or make figures that can be traced back to the original file.



DATA Management from ExpPath

In place import using the command line interface (CLI)

Instructions for ExpPath staff / embedding imports into the
'Production Pipeline'

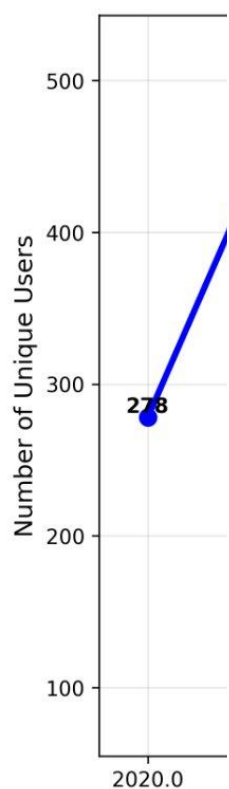
PROBLEMS: onboarding other image producing shared resource laboratories

- Management: More staff with restricted admin permissions on the webclient, **OK**
- Storage: Where their data lives, **difficult but achievable**
- Management: Command Line Import In Place for others, **Problematic but solvable**
- Human: Convincing other Core Directors it is worth investing time

TRAINING

- 30 minute quickstarts virtually as needed
- Onboarding emails from ExpPath contain a short pdf with some resources.

USAGE



Dear Valeria,

This is X from Dr. M lab.

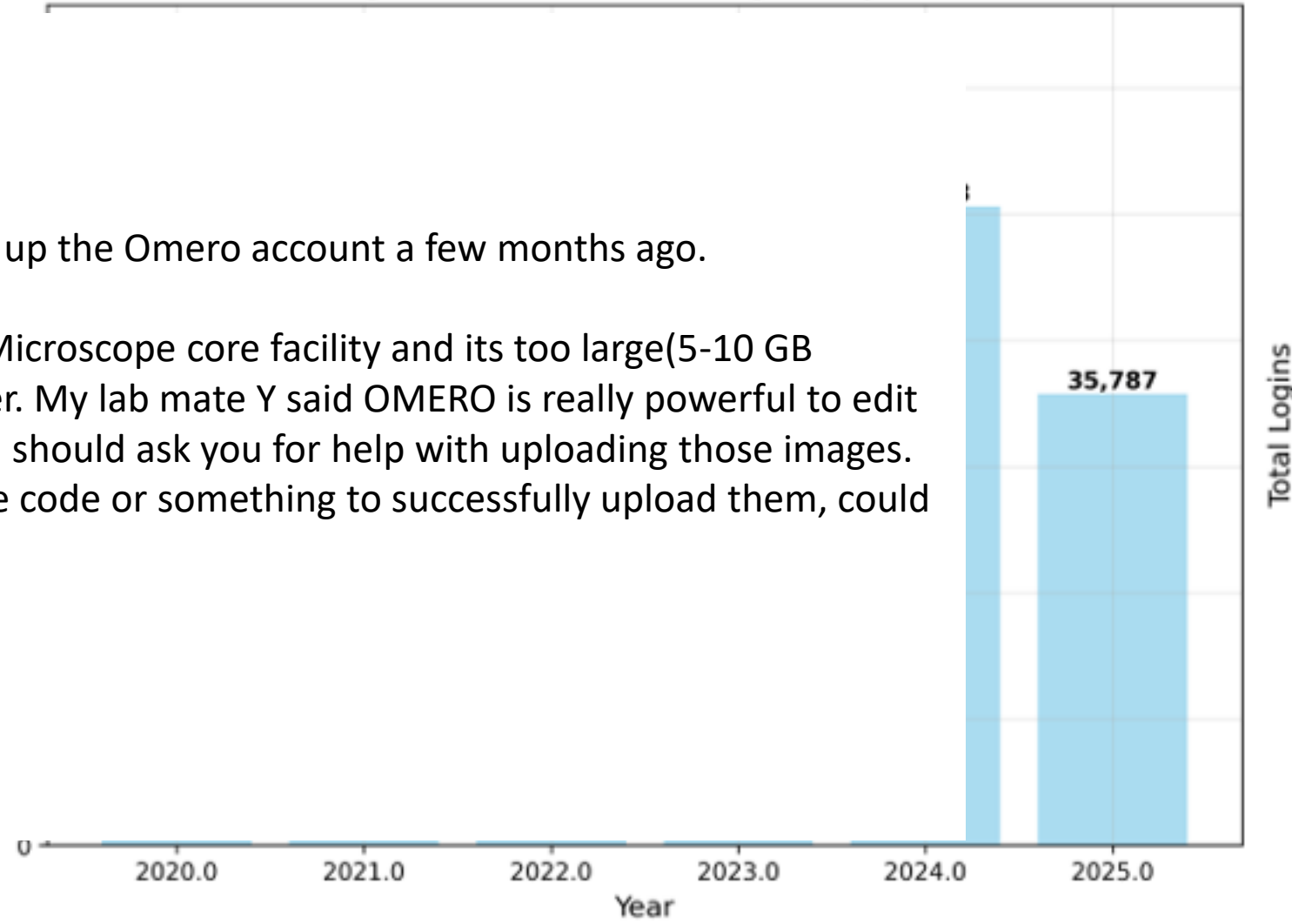
Thank you for helping me with setting up the Omero account a few months ago.

Recently, I took some pictures at our Microscope core facility and its too large(5-10 GB each) to open at our own lab computer. My lab mate Y said OMERO is really powerful to edit them if I upload them to OMERO and I should ask you for help with uploading those images. He mentioned that I should have some code or something to successfully upload them, could you help me with it? Thank you!

Best,

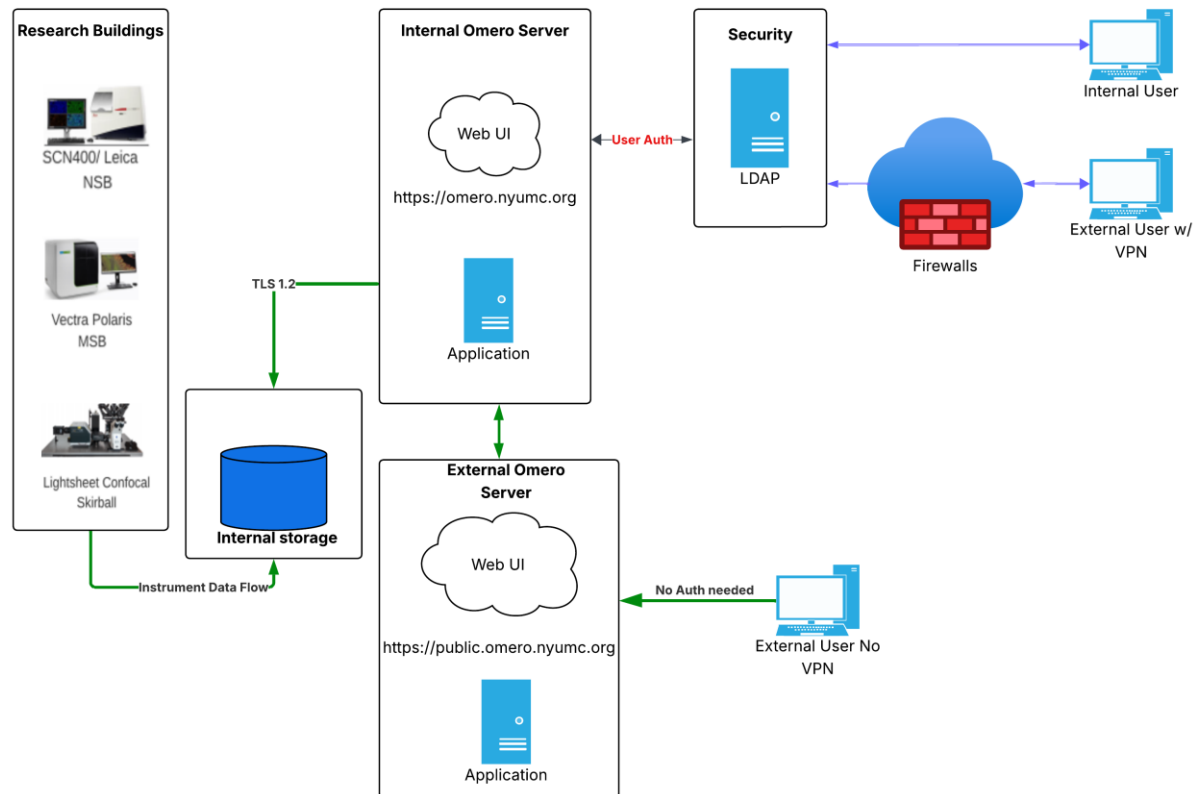
X

Regular Users: Total Logins by Year



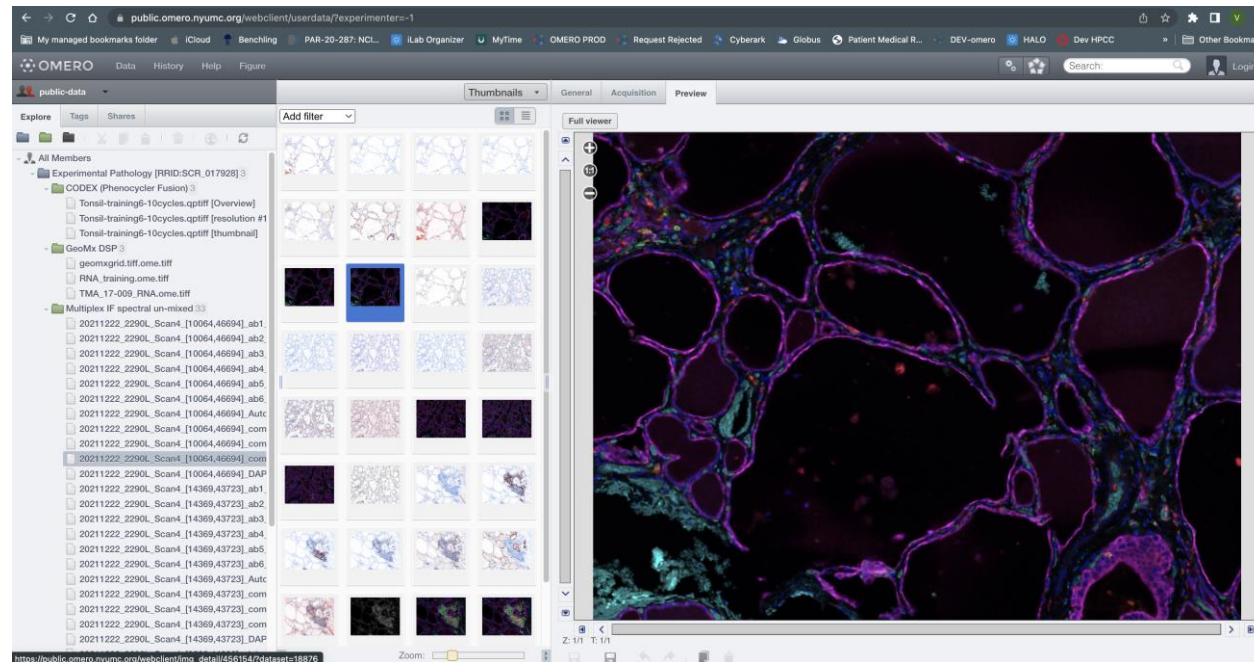
Expansion : Transparency / Collaboration

PUBLIC USER and linking to NYU Langone Health Library



Expansion : Transparency / Collaboration

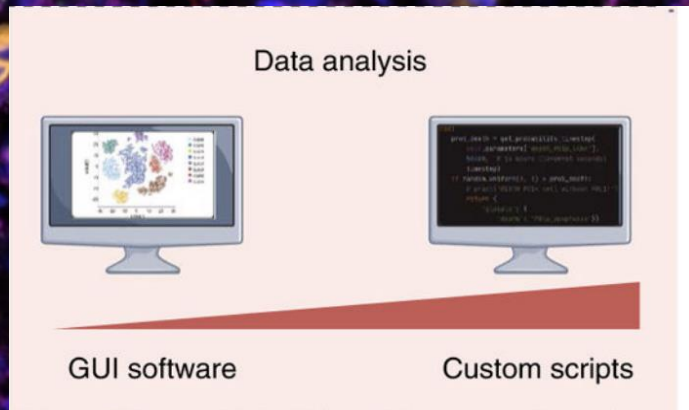
PUBLIC OMERO



PERMANENT DATA REPOSITORY FOR IMAGES – DOI – ACCESSIBLE – SEARCHABLE

VALIDATE BY COLLABORATION

Accurate identification of cells can take MONTHS for an experienced postdoctoral trainee.



Creation of a pre-processing pipeline and feature extraction can take MONTHS for an experienced computer scientist.

4. Data analysis

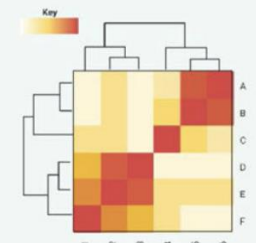
Data management (>TB)



Image processing pipelines



Spatial statistics

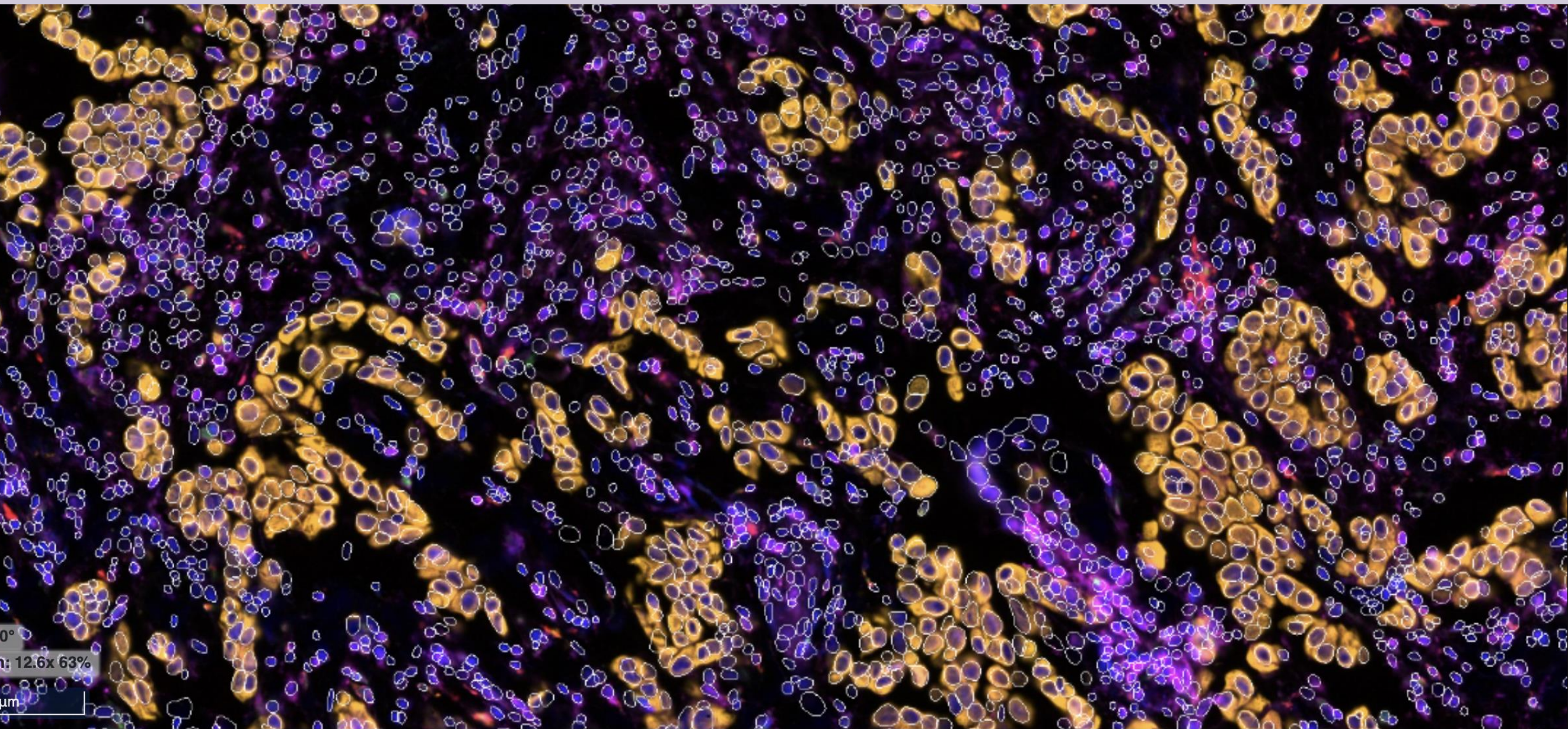


Months to years

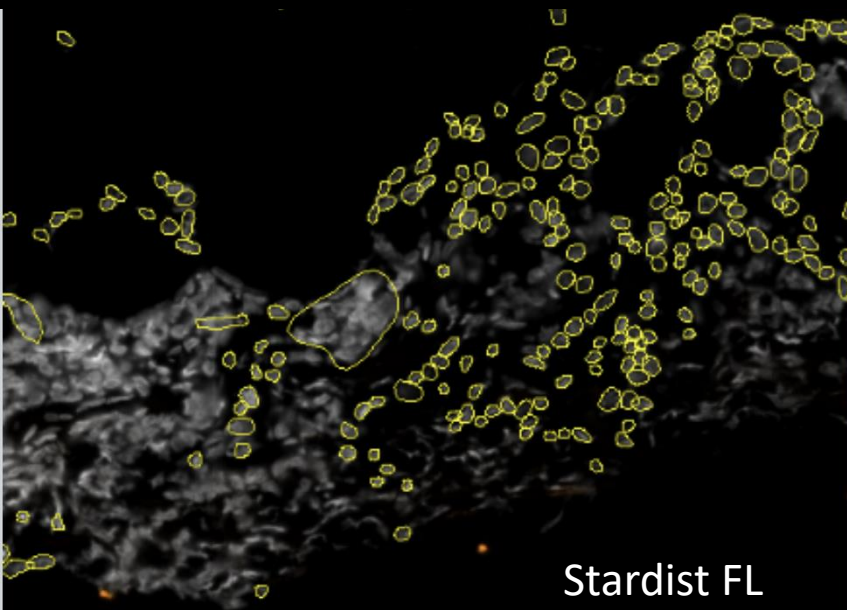
Hickey, J.W. et al. Nat Methods. 2022

OMERO-HPC Cell Segmentation Connector

Glencoe Software



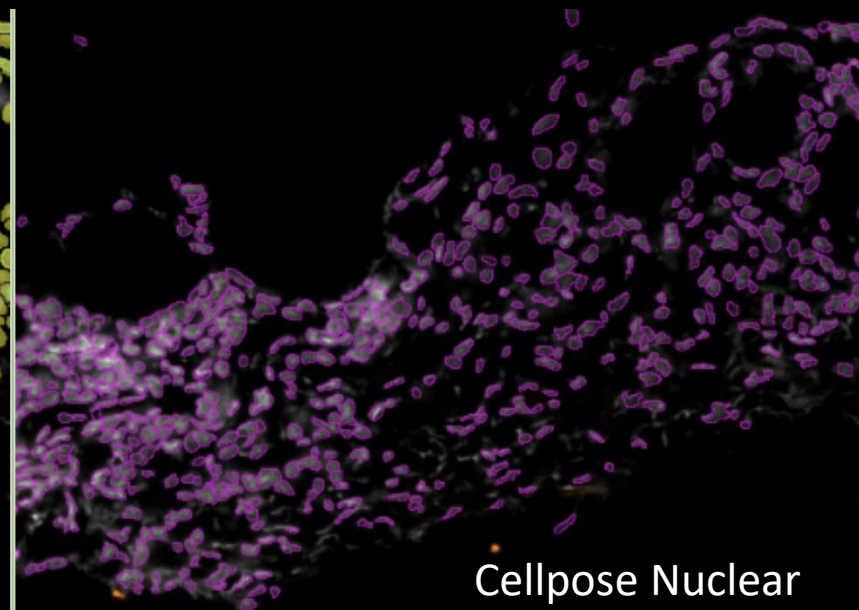
PATHVIEWER



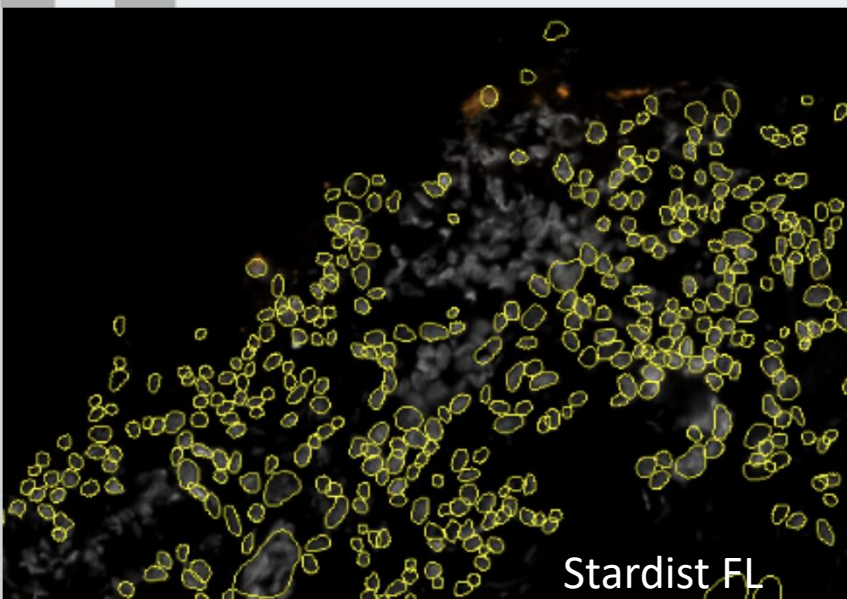
Stardist FL



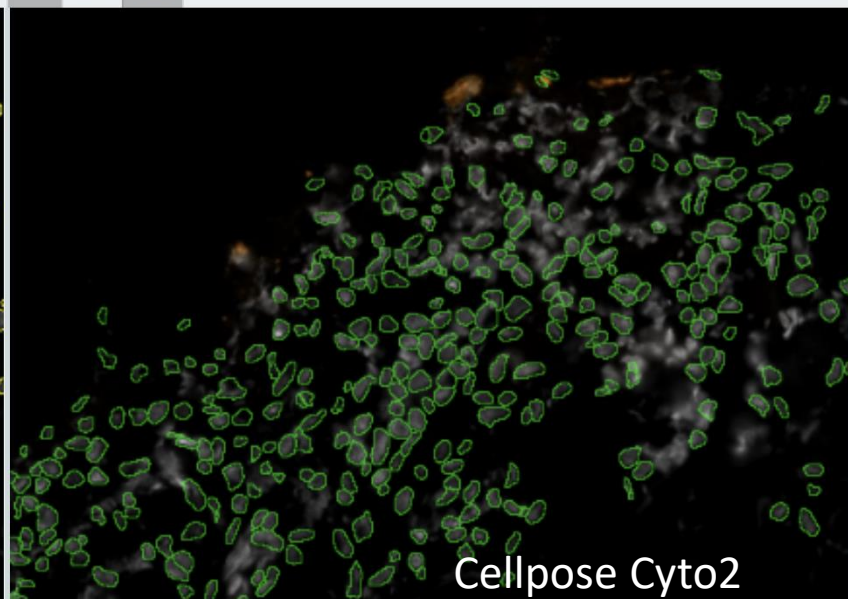
Halo Custom Trained FL



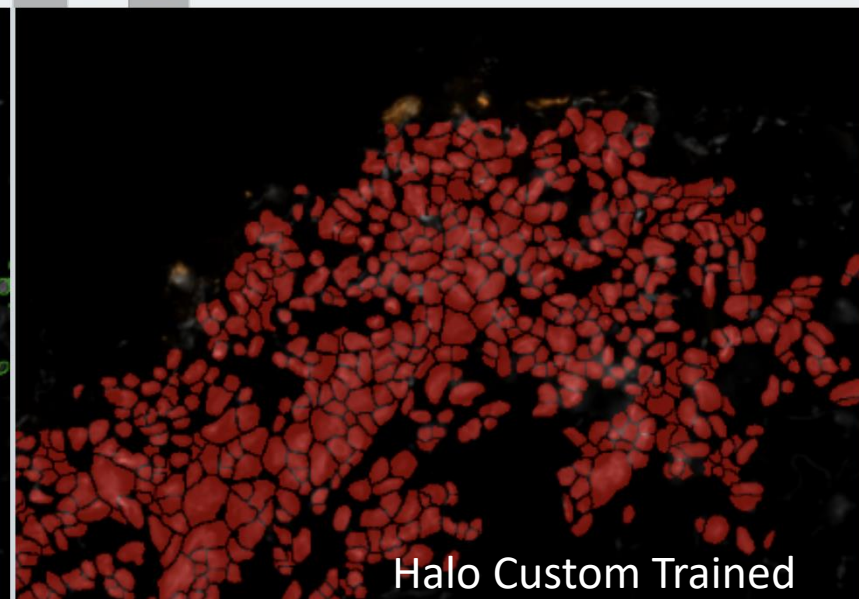
Cellpose Nuclear



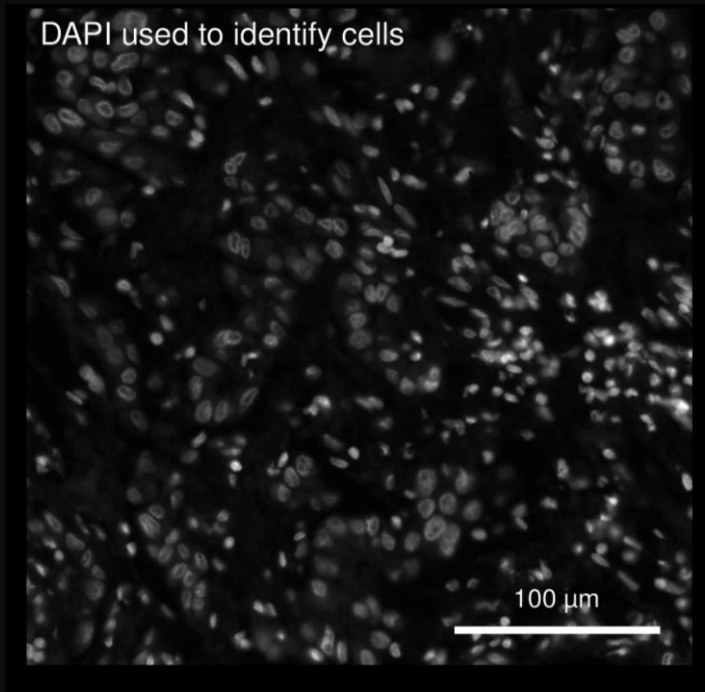
Stardist FL



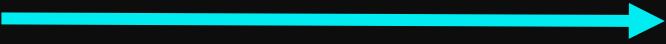
Cellpose Cyto2



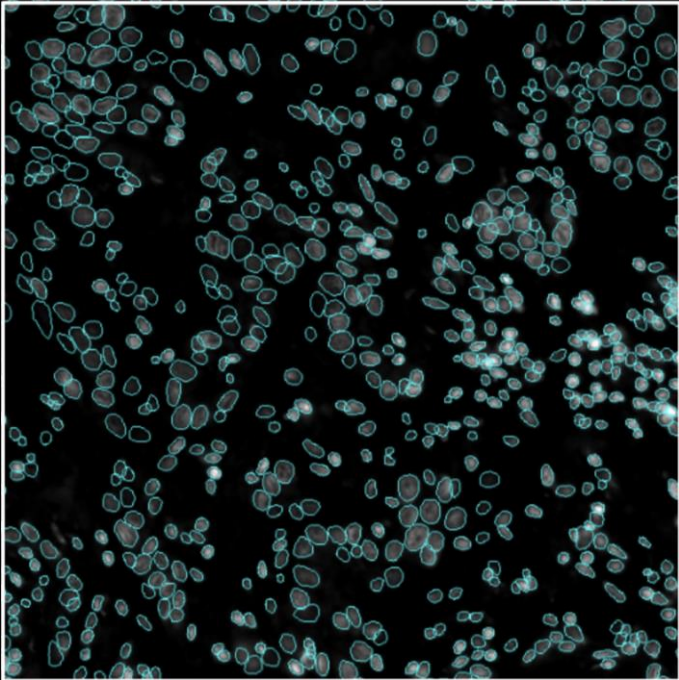
Halo Custom Trained



IMAGES IN OMERO



CELL SEGMENTATION
with one click

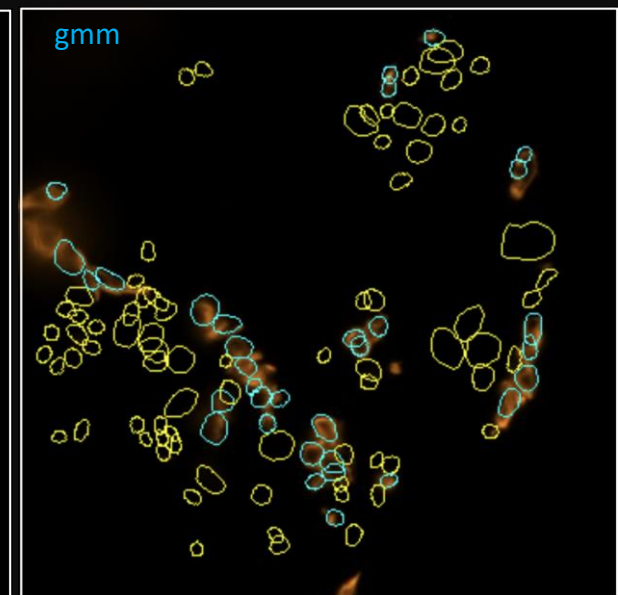
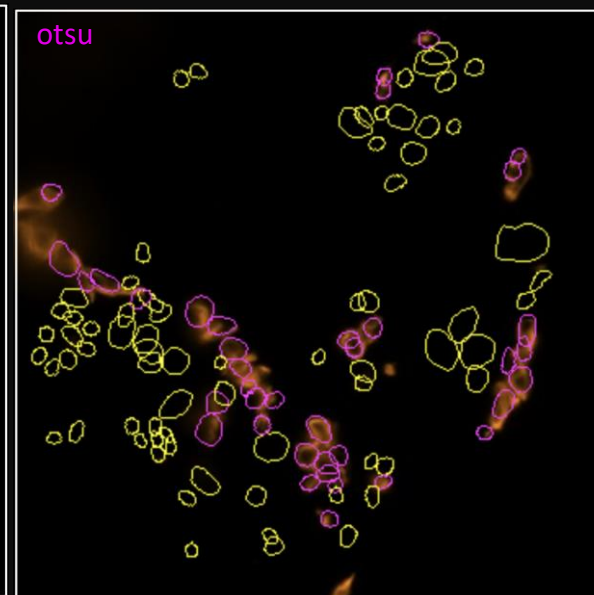
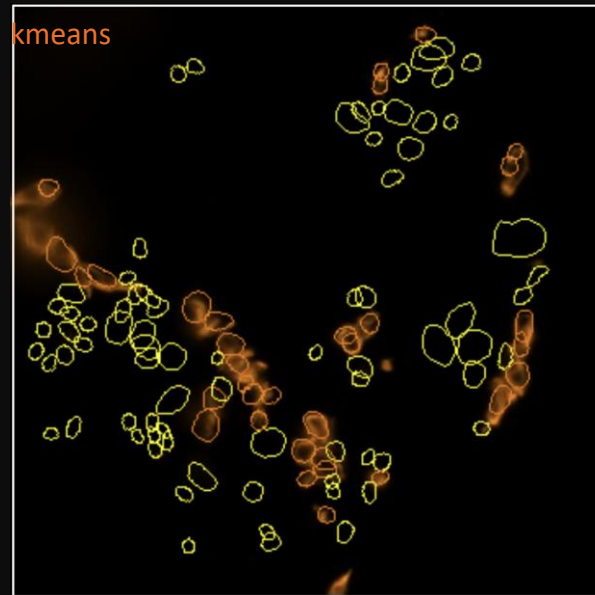
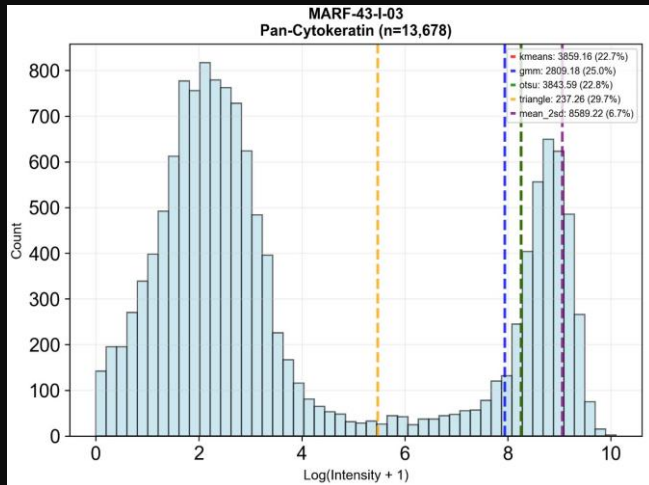


object	prob	geometry	centroid	Bbox_min_x	Bbox_min_y	Bbox_max_x	Bbox_max_y	tile_index	orig_object	Area	Perimeter	Centroid_x	Centroid_y	Longest_axis	Convexity	Compactness	Compaction	Area_convex	Min_rect	Ext
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22	0.896257	POLYGON	([POINT (2084. 20834.8262 22852.7695 20846.1172 22865.3145					0	22	105.291248	38.0836072	20840.1965	22859.1354	13.0747251	0.97663894	0.78421881	1.16154517	107.809799	POLYGON	([POINT (2084. 20834.8262 22852.7695 20846.1172 22865.3145
23	0.8958486	POLYGON	([POINT (2167. 21665.1152 22517.0254 21677.25 22527.9785					0	23	102.034382	37.2739923	21671.1244	22522.4893	12.6523035	0.9577262	0.81155406	1.1144459	106.588634	POLYGON	([POINT (2167. 21665.1152 22517.0254 21677.25 22527.9785
24	0.8953334	POLYGON	([POINT (2086. 20852.5563 22572.2598 20872.918 22587.6953					0	24	224.967014	55.7055483	20862.1145	22579.682	20.4649868	0.99391206	0.68392114	1.15995708	226.34499	POLYGON	([POINT (2086. 20852.5563 22572.2598 20872.918 22587.6953
25	0.8957717	POLYGON	([POINT (2159. 21585.8281 22873.3711 21597.3973 22881.2402					0	25	96.5638924	37.1489653	21591.581	22875.9489	12.8423016	0.95993081	0.84782434	1.11954435	100.597488	POLYGON	([POINT (2159. 21585.8281 22873.3711 21597.3973 22881.2402
26	0.8956035	POLYGON	([POINT (2166. 21659.4402 22573.1309 21678.9785 22586.0547					0	26	191.760384	52.2099457	21669.1174	22579.0296	19.961803	0.99380235	0.61273047	1.12556969	192.956259	POLYGON	([POINT (2166. 21659.4402 22573.1309 21678.9785 22586.0547
27	0.8946032	POLYGON	([POINT (2111. 21103.8203 22817.3516 21116.2715 22828.9668					0	27	111.351882	41.312827	21110.2387	22822.9369	13.7500549	0.97489176	0.74289923	1.14691769	114.221676	POLYGON	([POINT (2111. 21103.8203 22817.3516 21116.2715 22828.9668
28	0.8945358	POLYGON	([POINT (2155. 21551.125 22360.2227 21563.3711 22372.332					0	28	111.639998	39.1657126	21557.1864	22366.1659	12.6059068	0.97118176	0.8449651	1.16446829	114.952715	POLYGON	([POINT (2155. 21551.125 22360.2227 21563.3711 22372.332
29	0.8941062	POLYGON	([POINT (2113. 21132.1035 22620.8438 21144.1211 22634.0234					0	29	117.672894	39.934223	21137.9327	22627.2173	13.4826496	0.96389634	0.82420654	1.18060859	119.598873	POLYGON	([POINT (2113. 21132.1035 22620.8438 21144.1211 22634.0234

Machine Learning Clustering, etc.

OMERO-HPC-Segmentation Connector

- Provides High Performance Computing Power to analyze large image datasets.
- Allows non-computational scientists to use available models to identify cells
- Interactive validation of segmented cells through a graphic user interface available onsite and remotely



HUMAN-IN-THE-LOOP verification

TRAINING/COMMUNICATION

Going forward....

What Are ROIs and GeoJSON?

What is an ROI in OMERO?

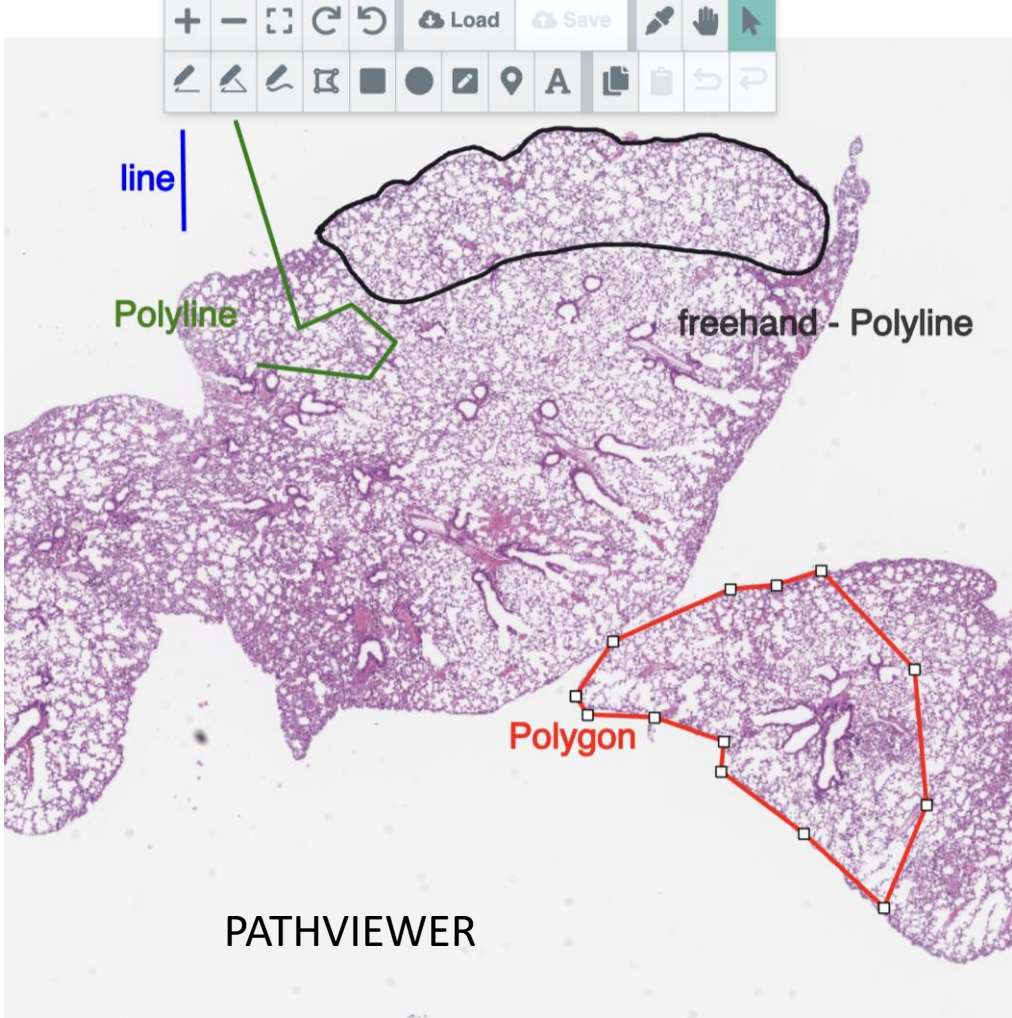
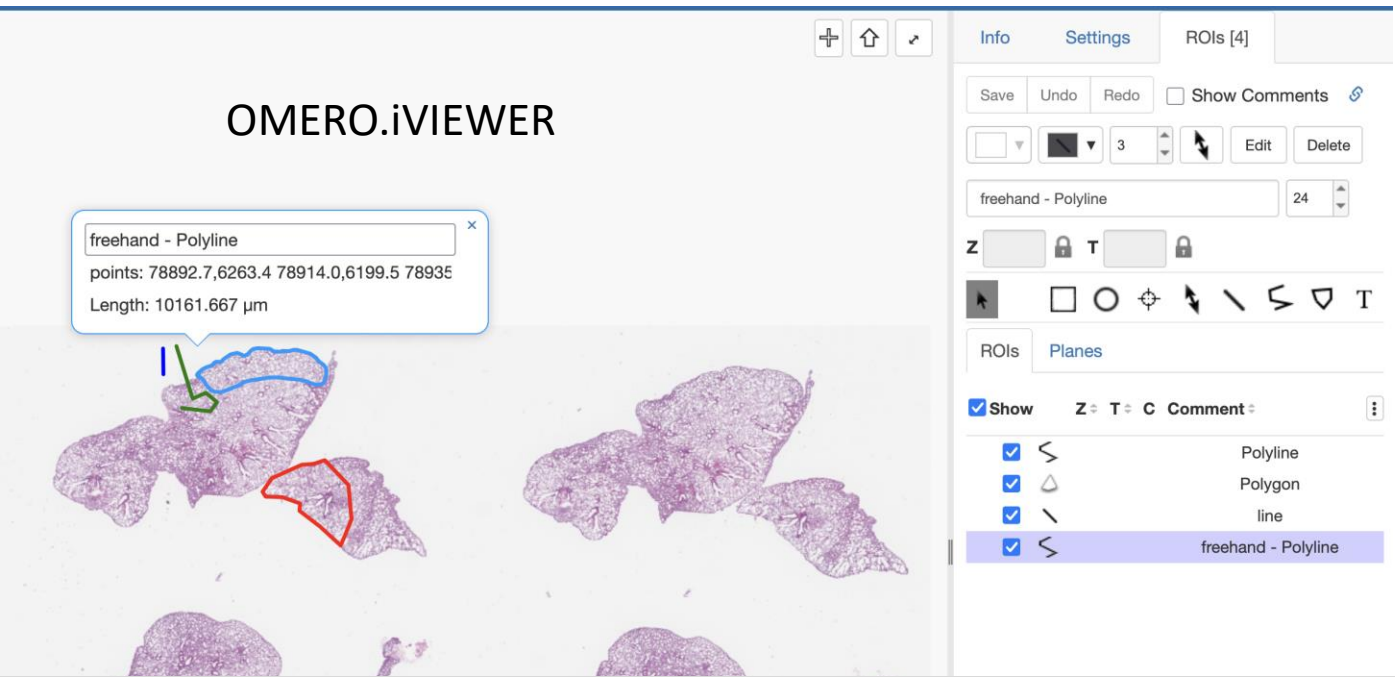
- A **Region of Interest (ROI)** in OMERO marks a specific area on an image — for example: - A rectangle around a cell - A polygon tracing a nucleus boundary - A point marking a spot
- Each ROI can contain **one or more shapes** (e.g., annotations across multiple Z-planes or timepoints).

What is GeoJSON?

- **GeoJSON** is a standard text format for describing geometric shapes. It is widely used in: - Spatial analysis tools - GIS software (e.g., QGIS) - Web visualization tools - Downstream Python libraries (e.g., shapely, geopandas)
- **Why export ROIs to GeoJSON?** - Enables spatial analysis outside OMERO - Compatible with many open-source tools - Human-readable and portable - Can be re-imported or used to cross-reference image regions

Shape Types Handled

OMERO Shape	GeoJSON Output	Notes
Polygon	Polygon	Points parsed from string
Rectangle	Polygon	Converted from x, y, w, h
Ellipse	Point (center)	Radii stored as properties
Point	Point	Direct x, y
Line	LineString	x1,y1 → x2,y2



Which Script Should I Use?

Situation	Use This Script
I want to see what ROIs exist on my image	ROI_retrieve_OMERO_API.py
I already know my ROI IDs and want to export many	ROI_list_retrieve_to_geoJson.py
I want to check one ROI's shape details	ROI_retrieve_OMERO_API.py
I have a CSV of 50 ROI IDs to export	ROI_list_retrieve_to_geoJson.py

Important: OMERO Groups

OMERO organizes data into **Groups**. If an ROI belongs to a different group than your default, the scripts will handle this:

Batch script: prompts you interactively to switch groups

Interactive script: requires you to edit the group ID before running

💡 **Tip:** If your ROIs return “not found”, the most common reason is that they belong to a different group.

Connecting to OMERO

```
from omero.gateway import BlitzGateway
import getpass

password = getpass.getpass("Enter OMERO password: ")

conn = BlitzGateway(
    "your_username",
    password,
    host="omero.nyumc.org",
    port=4064
)
conn.connect()
```

 **Security note:** Your password is never stored in the script. It is entered interactively using getpass.

PRESENTATIONS FOR PRINCIPAL INVESTIGATORS

From Solo Experimentalist to Team-Based Imaging Science

Traditional imaging workflow:

- Samples prepared in the lab
- multiplexed, and live-cell imaging
- Gigabytes of data per experiment
- AI- and ML-based analysis pipelines

Single linear workflow

Biologist: Design → Acquire → Analyze

One person owns the question, the experiment and the data.

The New Reality (Data Explosion & Complexity)

- Samples from different sources and labs
- High-content, multiplexed, and live-cell imaging
- Terabytes of data per experiment
- AI- and ML-based analysis pipelines

Collaborative, iterative workflow

Biologist ↔ Microscopist ↔ Data Scientist ↔
Software Engineer ↔ Biologist

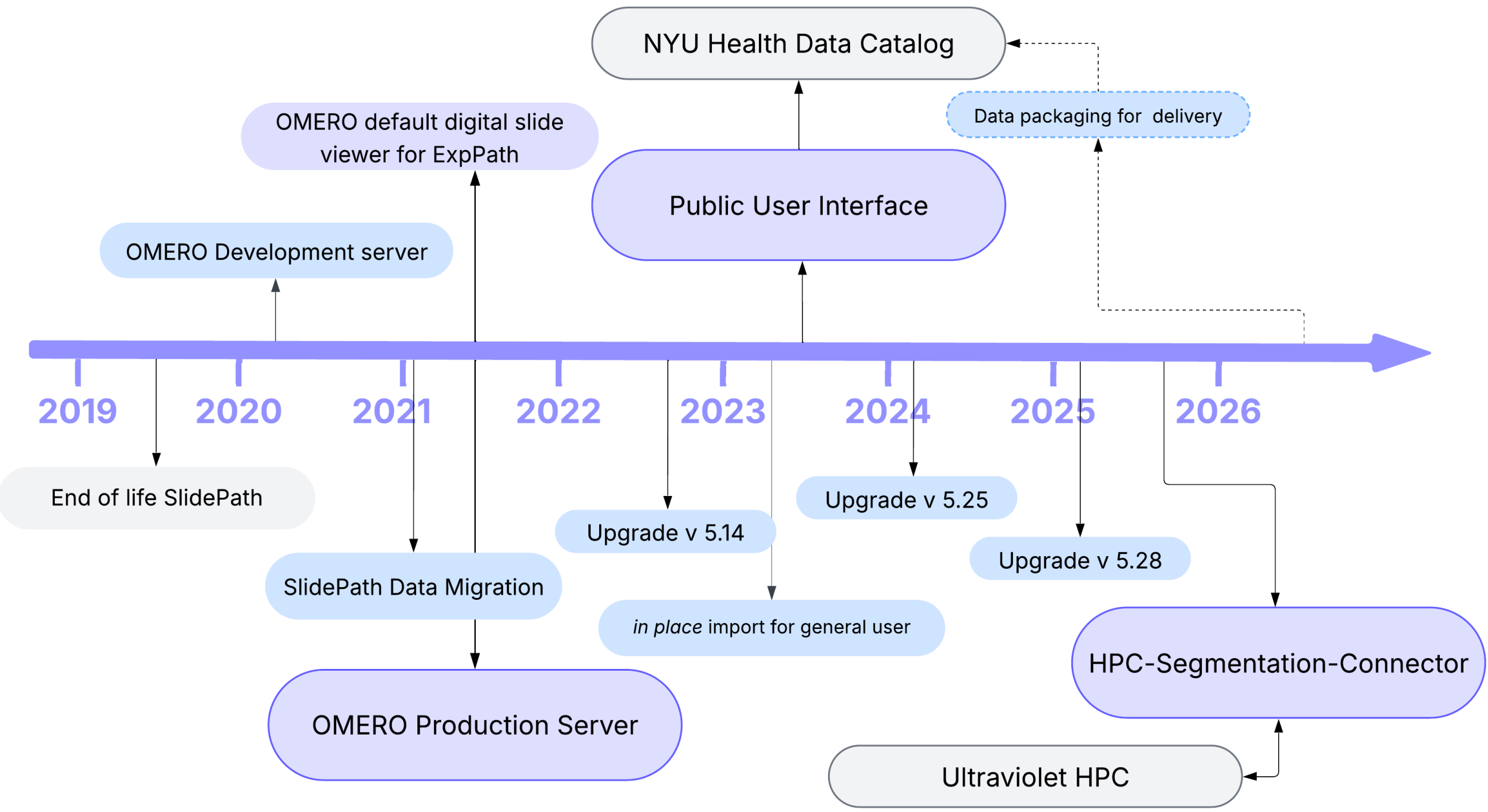
This is no longer something a single person can realistically handle end-to-end.

PRESENTATIONS FOR OTHER STAKEHOLDERS IN THEIR LANGUAGE

Tools, communication, and pipelines haven't caught up with team-based imaging.

We need frameworks supporting:

- Interdisciplinary collaboration
- Integrated, reproducible pipelines
- Fast iteration from data to biological insight



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PUBLIC INTERFACE CHRIS A/ CHRIS M