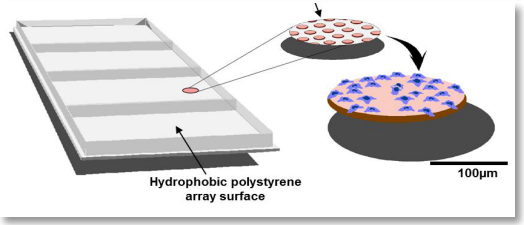
Accessible imaging analytics to elucidate microenvironment perturbations

Damir Sudar
Quantitative Imaging Systems LLC
Oregon Health & Science University
LINCS consortium

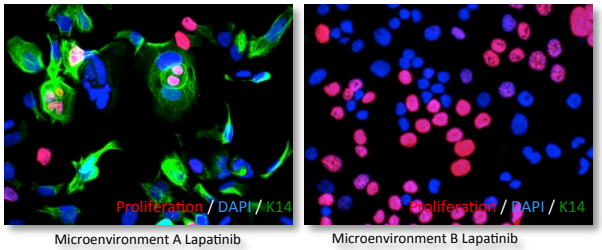
OREGON HEALTH & SCIENCE UNIVERSITY OHSU
HARVARD MEDICAL SCHOOL
Icahn School of Medicine at Mount Sinai
NIH LINCS PROGRAM

MEP-LINCS project: Systematic assessment of the impact of micro-environmental perturbagens

20 cell lines
~2,500 perturbations

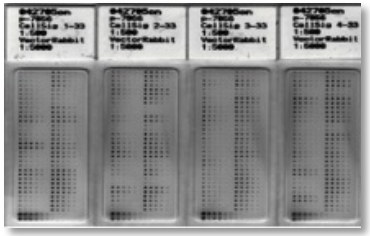


2 perturbagens per spot:
1 ECM (insoluble) +
1 ligand (soluble)

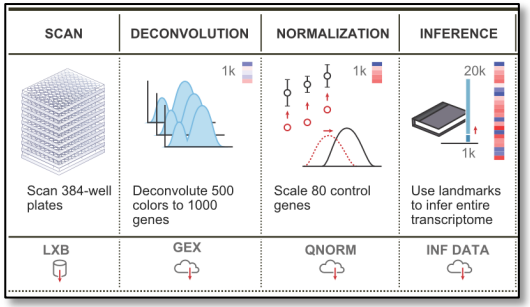


Microenvironment A Lapatinib
Microenvironment B Lapatinib

Immunofluorescent staining for
10+ biological endpoints
Quantitative novel image analysis algorithms to identify morphology, cell cycle, staining intensity,…



Reverse Phase Protein Lysate arrays to assess up to **500 proteins and phospho-proteins**



L1000 assay to assess
1000 landmark genes

Back-end infrastructure

To date:
220 plates
2M images
300M cells
3B features

80TB of data

omero.lincsclarion.org
Public web-only OMERO server on EC2 instance (r4.large w/ Ubuntu)

Future read-only OMERO servers (see presentations by Douglas Russell and Chris Allan)

www.lincsclarion.org
Portal server providing query and visualization tools

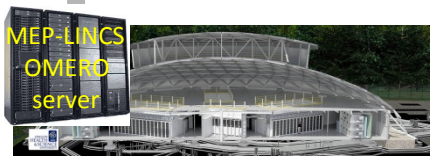
ZFS file system

EBS volume | … | …

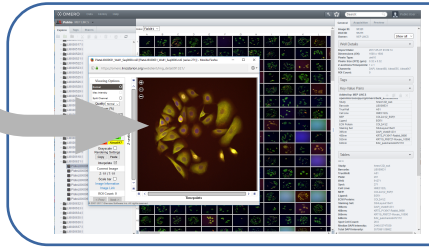
Dehydrated archives in S3

amazon web services™

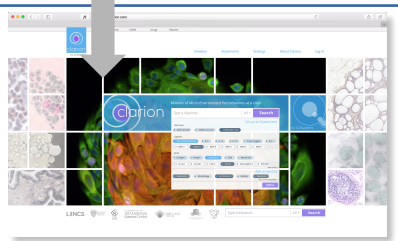
Firewall



OHSU on-site data center



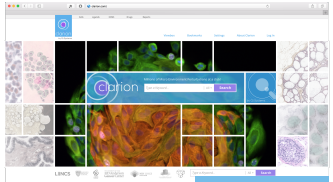
World



LincsClarion portal

User Feedback Mechanism

Out-of-session File Transfer

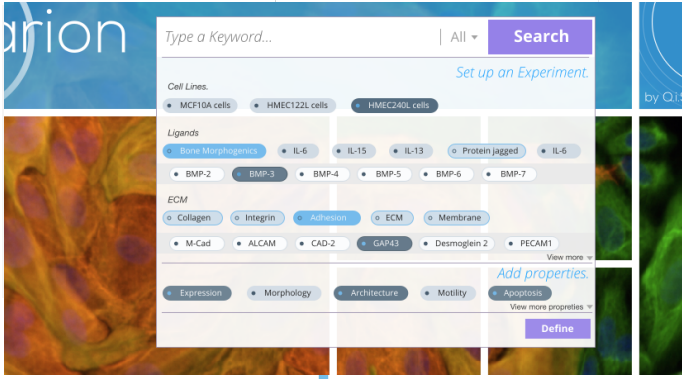


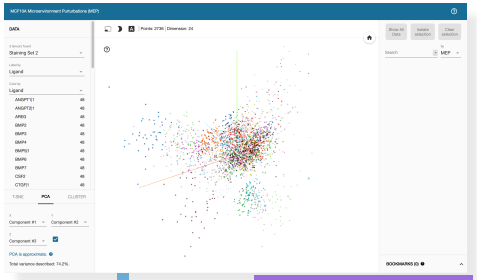
Main Page

DCIC Related Experiments
DCIC Metadata Info

Image Feature Info Viewer

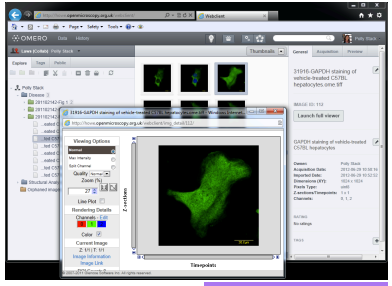
R/Shiny App Reports



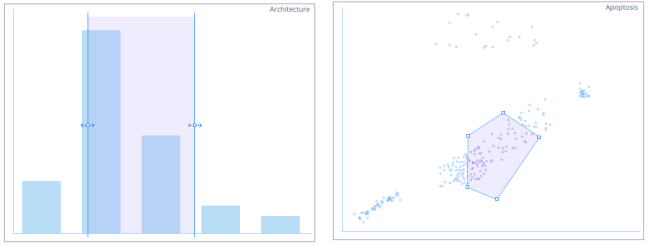


Tensor MEMA Board & Clustergrammer

Gating drives dynamic image collection



OMERO Browser

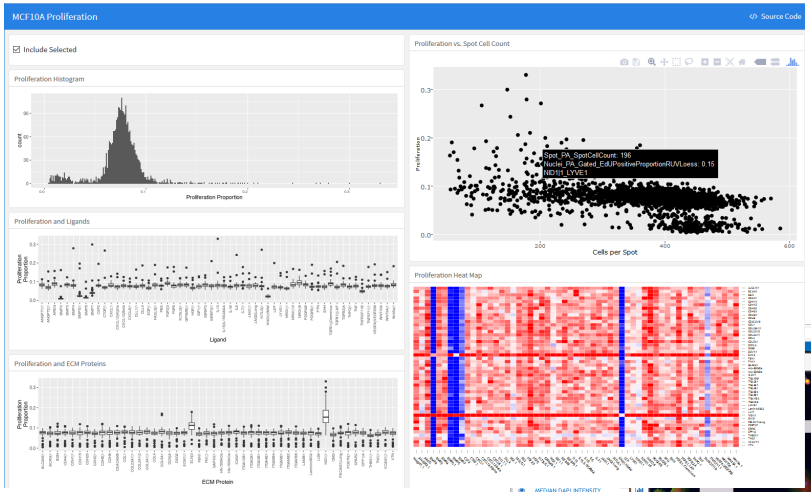


Scatter Graph Pages

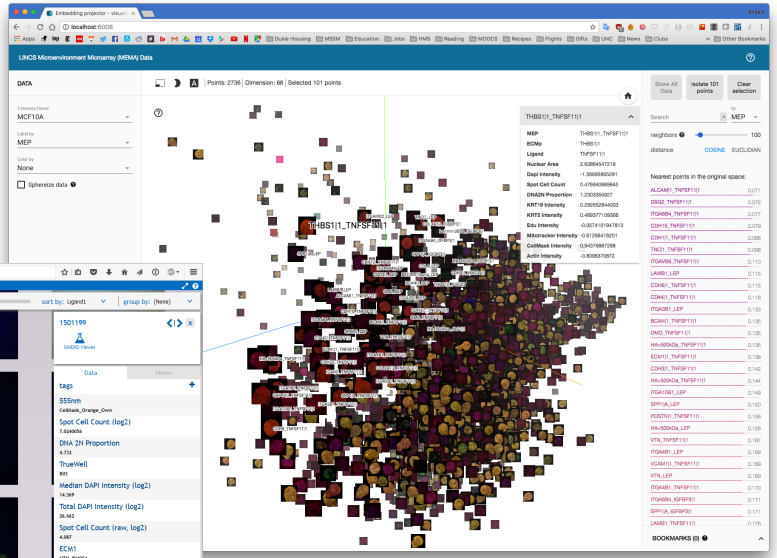
Gating drives dynamic image collection

Multiple Scatter Gather Image Viewers

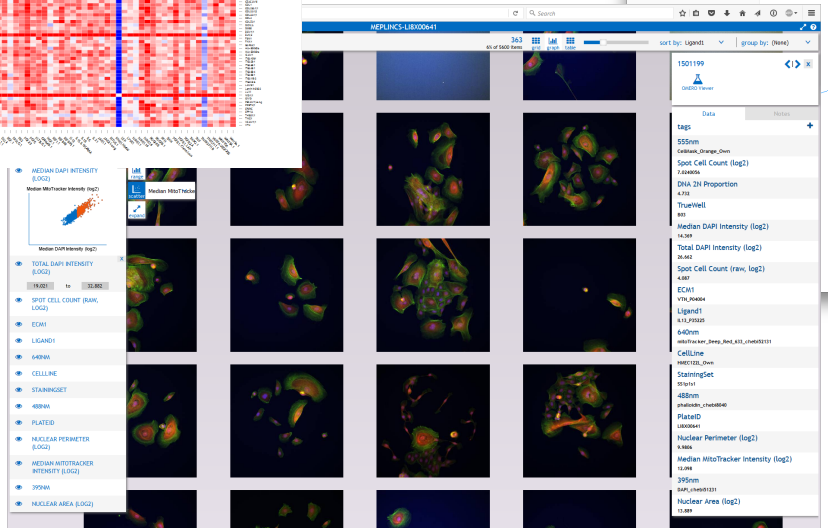
Imaging visualization and analytics



R/Shiny apps – custom data-specific analysis and interaction
https://www.synapse.org/#!Synapse:syn2862345



MEMAboard - PCA, t-SNE, heatmap, clustering
https://maayanlab.github.io/MEMAboard/



Zegami – highly interactive image displays w/ analytics