Talk Outline

- Thank you!
- This Meeting…
- The Problem
- Our Progress
- Funding…
- Future Priorities…
Thank you!!!

- Institut Pasteur
  - Christiane Pacaud
  - Nathalie Aulner
  - Anne Danckaert
  - Sebastien Simard
  - Spencer Shorte

- University of Dundee
  - June Matthew
  - Wilma Woudenberg

- The OME Consortium
Thank you!!!
OME Consortium

- Dundee – Jason Swedlow, Colin Blackburn, Jean-Marie Burel, Mark Carroll, Gus Ferguson, Helen Flynn, Kenny Gillen, Roger Leigh, Simon Li, Dominik Lindner, Josh Moore, Will Moore, Balaji Ramalingam, Gabriella Rustici, Aleksandra Tarkowska, Petr Walczysko, Eleanor Williams and you?!?
- University of Wisconsin, Madison (LOCI) - Kevin Eliceiri, Curtis Rueden, Mark Hiner
- UT Southwestern – Gaudenz Danuser, Sebastian Besson
- Oxford – Ilan Davis, Douglas Russell
- Cambridge – Rafael Carazo-Salas, Bálint Antal
- CRS4 - Gianluigi Zanetti, Gianmauro Cucurru, Simone Leo, Luca Lianas
- Edinburgh – Richard Baldock, Bil Hill, Jianguo Rao
- Imperial – Paul French, Chris Dunsby, Ian Munro, Yuriy Alexandrov
- NIA, NIH – Ilya Goldberg, Chris Coletta
- Pasteur – Spencer Shorte, Sebastien Simard, Julien Jorde
- EMBL-EBI – Gerard Kleywegt, Ardan Patwardhan, Ingvar Lagerstedt, Alvis Brazma
- Glencoe Software – Chris Allan, Joshua Ballanco, Andreas Knab, Melissa Linkert, Chris MacLeod, Josh Moore, Mike Rossner, Emil Rozbicki, Liza Unson, Rebecca Walker, Wilma Woudenberg
THIS MEETING.....
Meeting Purpose

10th Annual User’s Mtg

• Attendees
  o OME Consortium
  o Invited Speakers
  o Broad cross-section of users

• Day 1: Presentations
  o Lightning Talks
  o Project Overview
  o Users & Guests

• Day 2: Workshops & Demos

• Progress Report
• Future development priorities & planning
THE PROBLEM
The Image Problem… is Ubiquitous

A pretty picture?
A measurement?
A resource?
...Towards Image Informatics

Digital Image Acquisition System

Raw Data

OME

Processed Data

Data Management, Tagging, Querying

Quantitative Analysis

Visualization
OME: What We Do

OMEDATA MODEL

OME-XML
OME-TIFF
BIO-FORMATS

Open, exchangeable file formats

OMERO
Open Image Management Software
Apps using Bio-Formats were started >1.5M times so far in 2015
openFLIM-HCA μManager Plugin

Welcome to the wiki for the openFLIM-HCA plugin for μManager. This is an open-source project that aims to allow experimenters to conduct their own HCA-FLIM studies.

This wiki is intended to be the main source of documentation both for users with access to an FLIM HCA platform, and for developers keen to implement their own FLIM HCA solutions.

- Getting started
- Software reference
- Hardware reference
- Experiment guide
- About FLIM-HCA
- Links
BIO-FORMATS:
Unique IPs: 2015 YTD
The OMERO Platform

Repositories
- images, scripts

Search Index

OMERO.server
- OMERO.scripts
- OMERO.grid

OMERO

LAN
- .insight
- .importer
- .scripts

WAN
- .web
- .insight
- .importer
- .scripts

INTERNET

FIREWALL

Data Processing/ Scripting
- C, C++, Python, Matlab

Clients

Relational Database
- PostgreSQL, Oracle, MySQL

HDF5-based tabular data

.tables

PyTables

Allan et al, 2012, Nature Methods
OMERO & BIO-FORMATS: OMERO.insight Java Client

Allan et al, 2012, Nature Methods
The Extensible OMERo Platform
OMERO:
EU Unique IPs: 2015YTD
OME : 2011-2016

- More data types (FLIM, LSFM, 3DEM, DigPath)
- Support complex, multi-dimensional, heterogeneous data (OME 5)
- Alternative image data storage methods (e.g., HDF5…)
- Validation of interfaces for analysis (esp. Matlab, Python, etc.)
- Integration of multi-parameter image-based search
- Data sharing & publication
- Shared Analysis Resources
OMERO-5.0 includes OMERO.fs, released Feb/2014 (Google: “OMERO 5.0”)
OMERO & BIO-FORMATS 5.0: Distributed Data Access

OMERO

Analysis Module
[Python, Java, C++, Matlab, Fiji, CellProfiler, ITK, VTK, OpenCV, etc.]

FILESYSTEM
(Filesystem (native files))

BIO-FORMATS

RDMS
Search
Tables

OME 5.0 – 5.1: 2014/2015

OME 5.1.x …

- **Performance**
- **Bio-Formats/C++**
- **Improved support for “new” imaging modalities (SRM, LSFM, OPT, …)**
- **API Updates**
  - Units
  - Map Annotations
  - New detectors
  - Rendering Settings
- **Extended Metadata support**
  - ROIs, Features, etc.
  - Graphs: (trajectories, provenance, …)
- **Data Sharing & Publication**
  - R-W groups
  - Lab, Institute, National/Worldwide Repositories
- **Substantial UX and UI Updates**
  - Consistent UX
  - Configurable Web UI
OME 5.1: Map Annotations

Ordered, non-unique, key-value pairs
OMERO & u-track

Sébastien Besson, Gaudenz Danuser, Dundee & UT Southwestern
OMERO & FLIMfit

Ian Munro, Yuri Alexandrov, Chris Dunsby, Paul French, Imperial College London
OMERO & Bio-Formats: LSFM MV Reconstruction

Emil Rozbicki & Chris Allan, Glencoe Software
OMERO.biobank: Enabling Meta-Compute

A daemon constantly watches for new events and updates the GraphDB

GraphDB used as index for the KnowledgeBase, no full data is stored, only the fields used to retrieve full data from the OMERO server

Messages engine used to propagate events to the GraphDB

Graph is used to quickly retrieve connections between the objects in the KnowledgeBase

Objects’ creations, deletions and updates generate events that are sent to the messages engine

Full data are stored (to) and retrieved (from) the OMERO server

Data Engine

Workflow Engine

Computational Engine

iRODS

OMERO

OMERO.biobank models

OMERO server
OMERO & Auto-Tagging
Fast figures from your OMERO images

Smart figures with metadata

OMERO is a server platform for managing biological images. See the Open Microscopy Site for more info. OMERO.figure combines OMERO's powerful image rendering and metadata to provide a tool for rapid figure creation. Each panel of the figure becomes a multi-dimensional image viewer allowing you to zoom and pan, adjust rendering.
OMERO & BIO-FORMATS: Pathology Instruction/Dundee VM

Paul Felts & Aleksandra Tarkowska, Dundee
OMERO Help

Getting Started with OMERO.insight v. 5.0.2

OMERO stores image data on a central server. You can use the OMERO.insight client to upload, view and download data from any personal computer.

Your institution’s OMERO server administrator will provide you with the server address to use when connecting from OMERO.insight. They may have set up a user name and password for you too. Alternatively your username and password may be your standard login for the institution’s networked computers.

Installing


OMERO 5.0.2 Downloads

- Clients
- Plugins
- Additional
- Servers
- Virtual Appliance
- API
- Code
- Artifacts
- Legacy

- Information on this release of OMERO is in the release announcement
- Full documentation is available as web documentation or PDF documentation and there are user guides for the clients on our help website
- A standard OMERO user just needs to download the client package with the same major version as their institutional server e.g. 5.0 clients and the 5.0 server

OMERO client downloads

<table>
<thead>
<tr>
<th>Clients</th>
<th>Size</th>
<th>File Name</th>
<th>Checksum</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows</td>
<td>76.29 MB</td>
<td>OMERO.clients-5.0.2-icc33-b21.wn.zip</td>
<td>3h1356 (MD5)</td>
</tr>
<tr>
<td>Mac OS X</td>
<td>205.68 MB</td>
<td>OMERO.clients-5.0.2-icc33-b21.mac.zip</td>
<td>25c177 (MD5)</td>
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<tr>
<td>Linux</td>
<td>68.44 MB</td>
<td>OMERO.clients-5.0.2-icc33-b21 linux.zip</td>
<td>a61f6a (MD5)</td>
</tr>
</tbody>
</table>

- Each client package includes OMERO.insight, OMERO.insight and OMERO.editing and requires Java Version 1.6 or higher. OMERO.web is part of the server package, so individual users do not need to install it locally.
OME-based Public Data Resources

• Public Data Resource
  • Harvard LINCS
  • JCB DataViewer
  • Stowers ODR
  • SSBD, Riken
  • EMDataBank—3D tomograms
  • SYSGRO—S. pombe phenotypic screens
  • Liverpool CCI
  • Imperial CISBIC FLIM
  • Dundee Virtual Microscope
  • ....
2015 Highlights

- Bio-Formats and OMERO 5.1
  - Model & API Updates
  - Performance
  - Extended Metadata
  - UI Improvements
  - Commercial contributions and participation
    - Specifications, suggestions from several industrial partners
    - Intelligent Imaging, Richard Myers, SlideBook Reader

- Bio-Formats/C++
  - Native OME-TIFF Reader & Writer

- Major releases of OMERO.figure and FLIMfit
- Security: SecVuln Patches and Process
- New modalities
  - LSFM: Multiview reconstruction
  - OPT: “Spinny Fish”
- Learning & Teaching
- Growing, Active Community
  - Feedback on Forums
  - Social Media: 2x jump in Twitter followers
“Super OMERO”
THE FUNDING
• Extension of Strategic Award, co-funded by Wellcome Trust & BBSRC
  • ~£600k
  • Funds Bio-Formats and OMERO through mid-2016

• BBSRC “Big Data” Award
  • £1.79M partnership between Dundee OME, Cambridge & EBI
    o Partnership with Elixir
  • Build & deploy a next generation image data repo
    o >50 TB of GW HCS datasets at start, growing to >100 TB
  • Includes virtual analysis resource
  • More info: “Euro-BioImaging Elixir Data”

• H2020
  • CORBEL, MULTIMOT, (INFRADEV-2)
2015/2016 PRIORITIES?
Some words to think about…

- New Modalities (MS, Raman, X-ray, etc.)
- Multi-modal/Correlative
- Federation:
  - SSO
  - Multiple server Auth
- Import/Export
- Ontologies
- Bio-Formats Decoupling
- OMERO Gateway
- REST API
- C++ API
- Client Architecture
- Archiving
- …
OME Consortium

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