

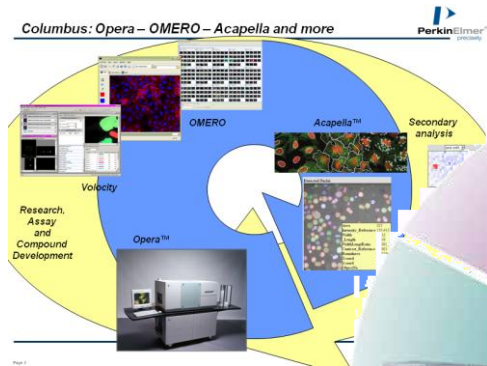


15. May 2010

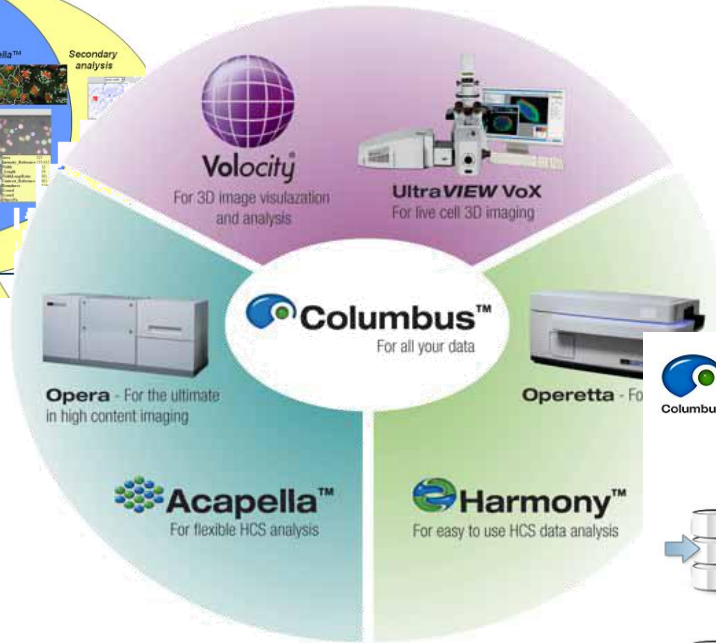
Columbus HCS solution based on OMERO

Karsten Kottig, Martin Daffertshofer

Starting Point – OME User Meeting 2008



OME User Meeting 2009



Now



Acapella Connect | Columbus Connect



Import
[Import](#) screening data of imaging plate reader like Opera, Operetta and 3rd party reader.



Export
 Browse the database and display results for [Export](#).



Open Microscopy Environment
 Webbased tools for image visualization [Web Client](#) and for account administration [Web Admin](#)



Settings
[Job Status](#)
[Software Update](#)
[License Management](#)
[Server Administration](#)



Image Analysis
 Browse the database and select images for [Image Analysis](#)



Batch Analysis
 Process multiple measurements as [Batch Analysis](#) and write back results.



Secondary Analysis
 Visualize [results](#) as heatmaps and tables and calculate basic plate statistic.

News:

09 Jun 2010 09:52:32 +0200 Background job 2 succeeded (Test Speed)

Status:

Acapella Server name	lashami011:8282
Acapella Server version	2.3.4.51419
Number of connected users	1
Number of running jobs	0
Number of queued jobs	0
Processor load	0%
Total physical memory	8 GB
Total swap	2 GB
Physical memory usage	18%
Swap file usage	32%
Columbus Server name	lashami011:4063
Columbus Server version	Omero V4.1.1
Columbus database disk space usage	76%



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⏪ ⏩ ⏴ ⏵

Import most popular HCS images + meta-data + results
Opera, Operetta, Arrayscan, InCell, Biostation, Pathway, Discovery-1, ScanR,...



Image Analysis using flexible scripting solutions and interactive assay analysis sequences

Export images (various formats incl. OME-TIF) + analysis + results incl. single cell results



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Includes **OME Community Tools**
WebAdmin, WebClient, Insight, Importer,...



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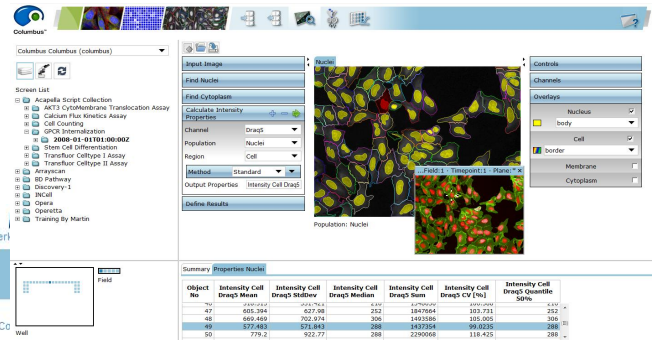
Secondary Analysis displays results and plate statistics as heatmaps, scatter plots, fingerprints, tables,...



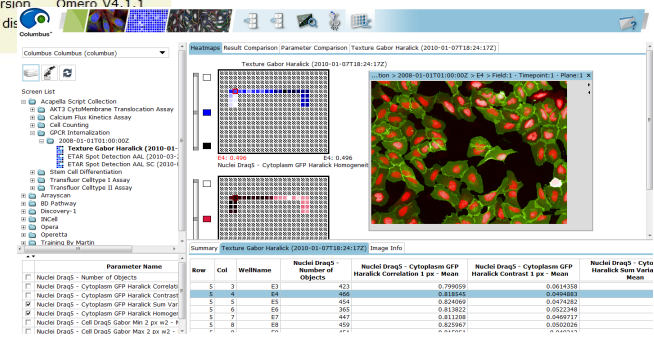
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Status:

Acapella Server name lashami011:8282
Acapella Server version 2.3.4.51419
Number of connected users 1
Number of running jobs 0
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Processor load 0%
Total physical memory 8 GB
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Columbus database disk space usage



Batch Analysis applies image analysis solution to multiple measurements



Scientific analysis with **Visual Feedback** for illustration and optimization



Columbus Columbus (columbus)

Screen List

- Acapella Script Collection
 - AKT3 CytoMembrane Translocation Assay
 - Calcium Flux Kinetics Assay
 - Cell Counting
 - GPCR Internalization
 - 2008-01-01T01:00:00Z**
 - Stem Cell Differentiation
 - Transfluor Celltype I Assay
 - Transfluor Celltype II Assay
- Arrayscan
- BD Pathway
- Discovery-1
- INCell
- Opera
- Operetta
- Training By Martin

Input Image

Find Nuclei

Find Cytoplasm

Calculate Intensity Properties

Channel: Draq5

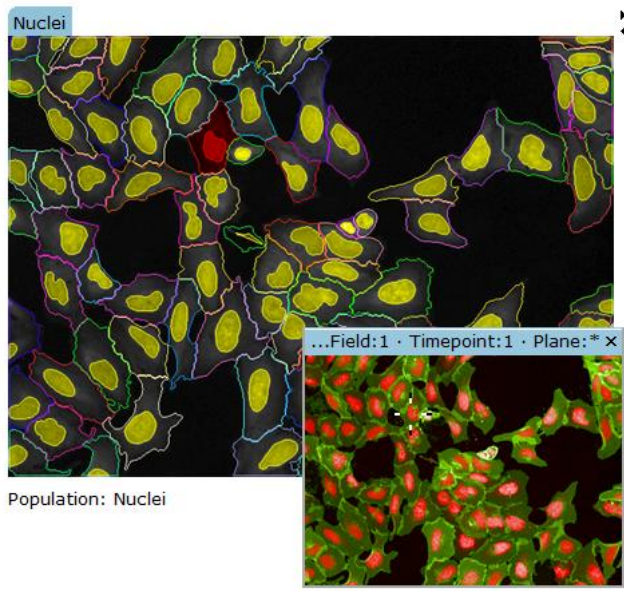
Population: Nuclei

Region: Cell

Method: Standard

Output Properties: Intensity Cell Draq5

Define Results



Controls

Channels

Overlays

- Nucleus
 - body
- Cell
 - border
- Membrane
- Cytoplasm

Field

Well

Summary Properties Nuclei

Object No	Intensity Cell Draq5 Mean	Intensity Cell Draq5 StdDev	Intensity Cell Draq5 Median	Intensity Cell Draq5 Sum	Intensity Cell Draq5 CV [%]	Intensity Cell Draq5 Quantile 50%
47	605.394	627.98	252	1847664	103.731	252
48	669.469	702.974	306	1493586	105.005	306
49	577.483	571.843	288	1437354	99.0235	288
50	779.2	922.77	288	2290068	118.425	288

Easy access to **Single Cell** information

Scientific analysis with Visual Feedback for illustration and optimization

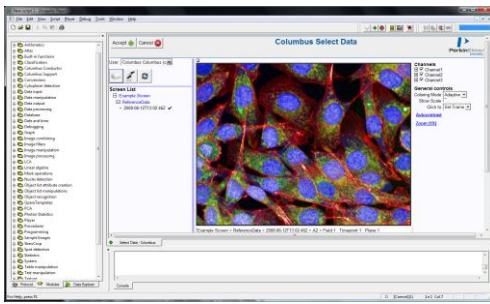
The screenshot displays the Columbus 2.1 software interface. On the left is a 'Screen List' with a tree view of assays, including 'Texture Gabor Haralick (2010-01-07T18:24:17Z)'. The main workspace is divided into several panels:

- Heatmaps:** Shows a grid of wells with color-coded values. Two wells are highlighted with red and blue squares, corresponding to E4 in the table below.
- Image:** A fluorescence image of cells with red nuclei and green cytoplasm. A red box highlights a region of interest.
- Scatter Plot:** A plot titled 'Texture Gabor Haralick (2010-01-07T18:24:17Z)' showing the relationship between 'Nuclei Draq5 - Cytoplasm GFP Haralick Homogeneity 1 px - Mean' (x-axis) and 'Nuclei Draq5 - Cytoplasm GFP Haralick Sum Variance 1 px - Mean' (y-axis). Blue circles represent data points.
- Table:** A data table with columns for Row, Col, WellName, and various Haralick texture metrics.

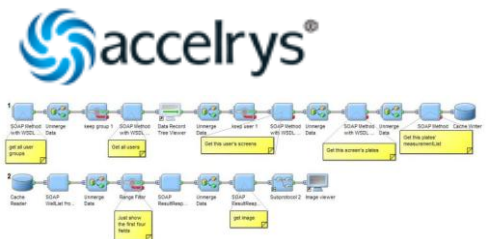
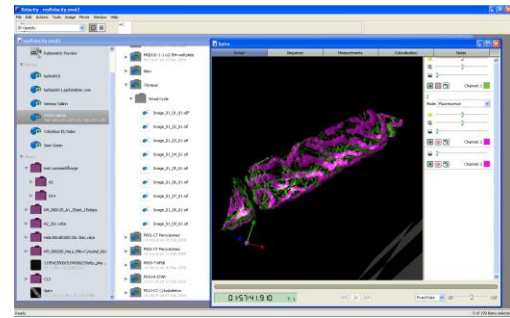
Row	Col	WellName	Nuclei Draq5 - Number of Objects	Nuclei Draq5 - Cytoplasm GFP Haralick Correlation 1 px - Mean	Nuclei Draq5 - Cytoplasm GFP Haralick Contrast 1 px - Mean	Nuclei Draq5 - Cyto Haralick Sum Varia Mean
5	3	E3	423	0.799059	0.0614358	
5	4	E4	466	0.818545	0.0494883	
5	5	E5	454	0.824069	0.0474282	
5	6	E6	365	0.813822	0.0522348	
5	7	E7	447	0.811208	0.0469717	
5	8	E8	459	0.825967	0.0502026	

Link between Results and Images

Acapella



Velocity



Open Interface by SOAP/wsdli webservice technology allows integration by open source and closed source components



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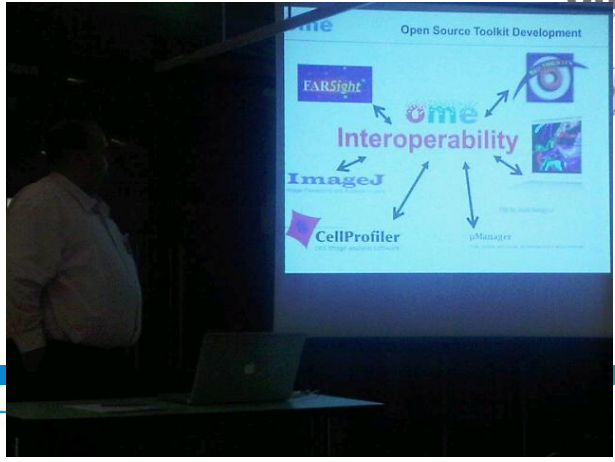
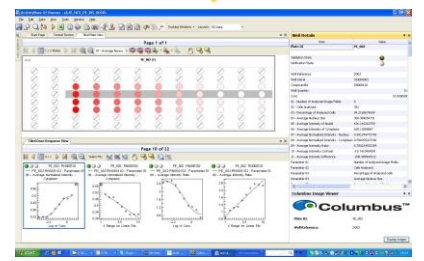
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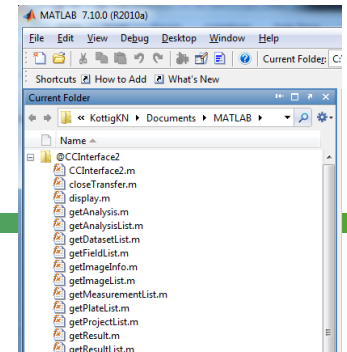
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Matlab



Stability / Speed

- Scalability of image retrieval (Memory leaks, Table query overhead. Change pixels concept?)
- Better utilization of multi-core system

OME-TIF/XML/Schema

- clean up content from “reader point of view” (use cases)
- integrate orientation matrix
- support multidimensional data (FLIM, Spectral, Non-Imaging,...)
- More/flexible levels (User-Project-Screen-Plate-Measurement-Wells)

Beta/Release?

- remove partly working parts before “release” a “beta”

Covered in OMERO 4.2?

- Results (Well, Field, Frame as Table, Functional, Overlays-ROI)
- Plate Definition prepared for Assay Layout and Analysis Layout
- Replace Screen Acquisition by Plate Acquisition
- More granularity on and manageable user rights

Many Thanks To...

PerkinElmer | For the Better

Jason Swedlow
...and the full OME Team



IP Paris
Anne Danckaert
Nathalie Aulner
Spencer Shorte

Novartis
Monash

Intel

Andrea Cato
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Michael Klemm

PerkinElmer

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Bernhard Holländer
Paavo Helde
Kaupo Palo
Heiki Sonajalg
Michael Heitmann
Mike Randell
Steve Baxter

...and a lot more ...

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