





*Glencoe Software and OME:  
Another Year, Another Collaboration*

OME Users Meeting 2018

Wednesday, 30<sup>th</sup> May 2018

# Welcome to Glencoe Software

Founded in 2005 10+ Years of success!

Powerful, Proven Image Data  
Management Solutions and Services

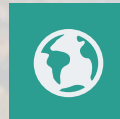
Dundee, UK and Seattle, WA, USA

Exclusive Commercial Partner of Open  
Microscopy Environment (OME)



## Our Team

10 Glencoe Software and 30+ OME employees



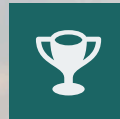
## Established Worldwide

Customers in Pharma, Biotech, Academia and  
Technology



## Expertise

65+ years of experience in life sciences, imaging  
and software engineering



## Award Winning

BBSRC Innovator of the Year 2011

# Outline

- Who is Glencoe Software?
- Last 12 Months
- *omero-ms* overview
- *Parade* overview
- Future directions

# Commerical & Community Synergy

A Powerful, **Exclusive** Partnership built on Open Source Foundations



## COMMERCIAL LICENSES

Warrantied, Indemnified  
Data Management  
Solutions



## CUSTOMIZATION

Integration,  
Consultation, Software  
Development....



## SERVICE & SUPPORT

Commercial Service,  
Support Agreements

# Bio-Formats

## An Image Translation Library

**ADDRESSES** the challenge of working with numerous proprietary file types

**UTILIZED by OMERO Plus & PathViewer** to access and integrate image data

**COMPATIBLE** with image data files from numerous imaging domains

**POWER** to combine images from any imaging domain in a single system

**ACCESSIBILITY** of image metadata with any type of analysis software

**WORK DIRECTLY with image analysis tools** such as ImageJ, MATLAB®, Imaris®, CellProfiler® and ...

**150+** image file formats  
currently supported



# OMERO Plus

Platform agnostic, enterprise-level data management software

**VIEW** your data anywhere... anytime

**MANAGE** your scientific images and associated metadata

**SHARE** your data securely and easily with anyone whom you chose to, globally

**ANALYZE** your data with all the tools you need from within one simple framework

**PUBLISH** your data with confidence

\* OMERO Plus offers full warranty and indemnification



# PathViewer

An intuitive, interactive, visualization, analysis and annotation tool

**BROWSER-BASED** OMERO client designed for **Digital Pathology** workflows; key features:

**FREE-HAND** annotation, drawing and measurement

**BRIGHTNESS** contrast and color level adjustment

**PARAMETRIC URLs** enabling precise sharing

**ROI** map annotations (more metadata)

**BRIGHTFIELD & FLOURESCENCE**

**ENABLES MULTI** views and users





# Imaging Domains & Applications

Our Areas of Expertise

## Digital Pathology

Tissue Samples  
WSI  
Histology



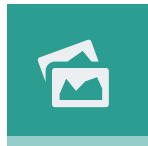
## Microscopy

Electron  
Fluorescence



## High Content Screening

High Content Screening  
3D Electron Tomography



## Medical Imaging

MRI  
CT



## Publishing

Video Injection  
DataViewer



## And more...

X-Ray Crystallography  
Light Sheet Microscopy  
Other data types  
... What's yours?



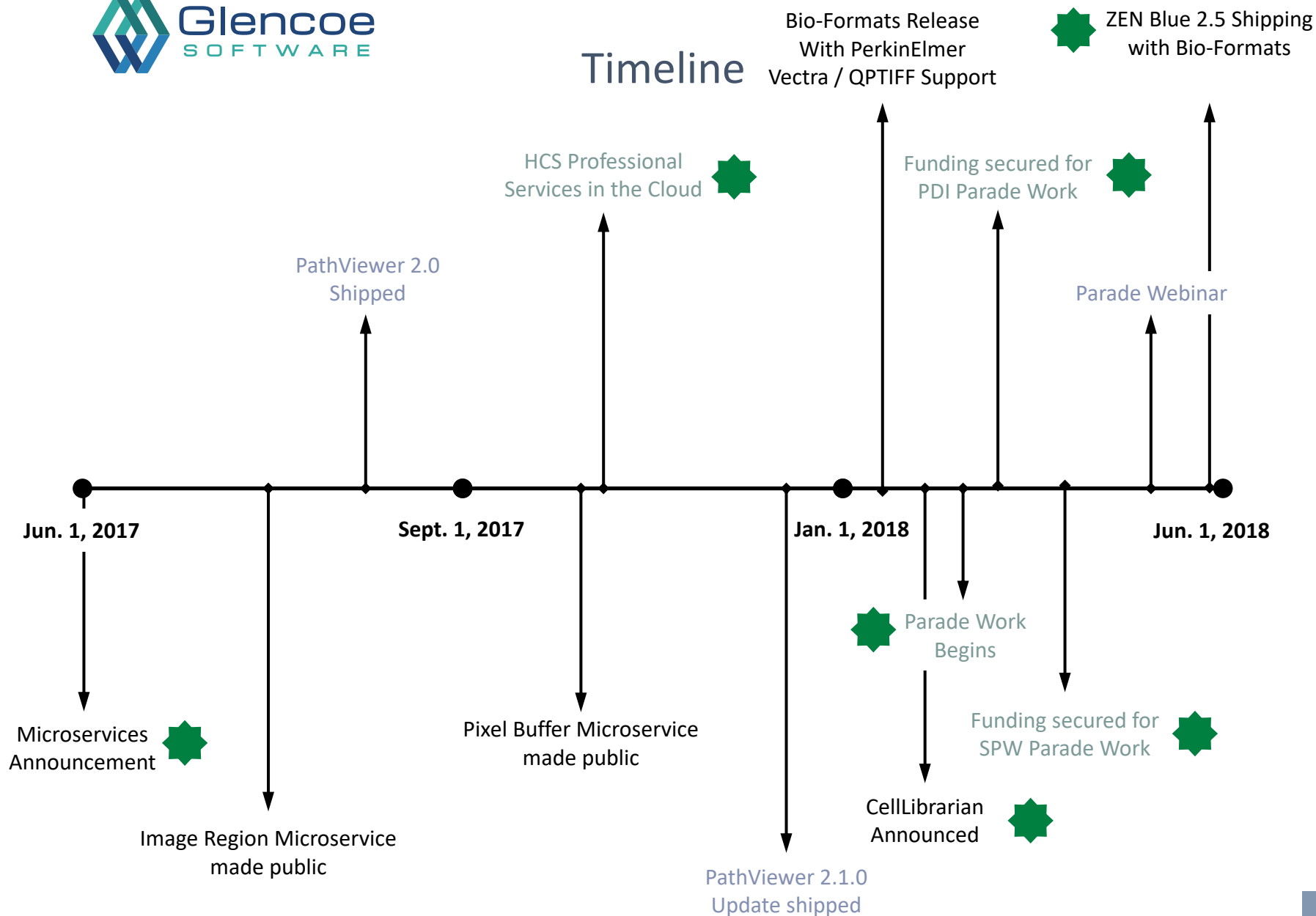
# The Last 12 Months



# What we said a year ago

- More work on both horizontal and vertical scalability for HCS and WSI
- Better Cloud computing compatibility
- A file format for 2017 and beyond
- Better and more thorough portfolio of integrations
- Regular webinars showcasing Bio-Formats and OMERO
- Development projects with major instrumentation vendors ensuring PFF support

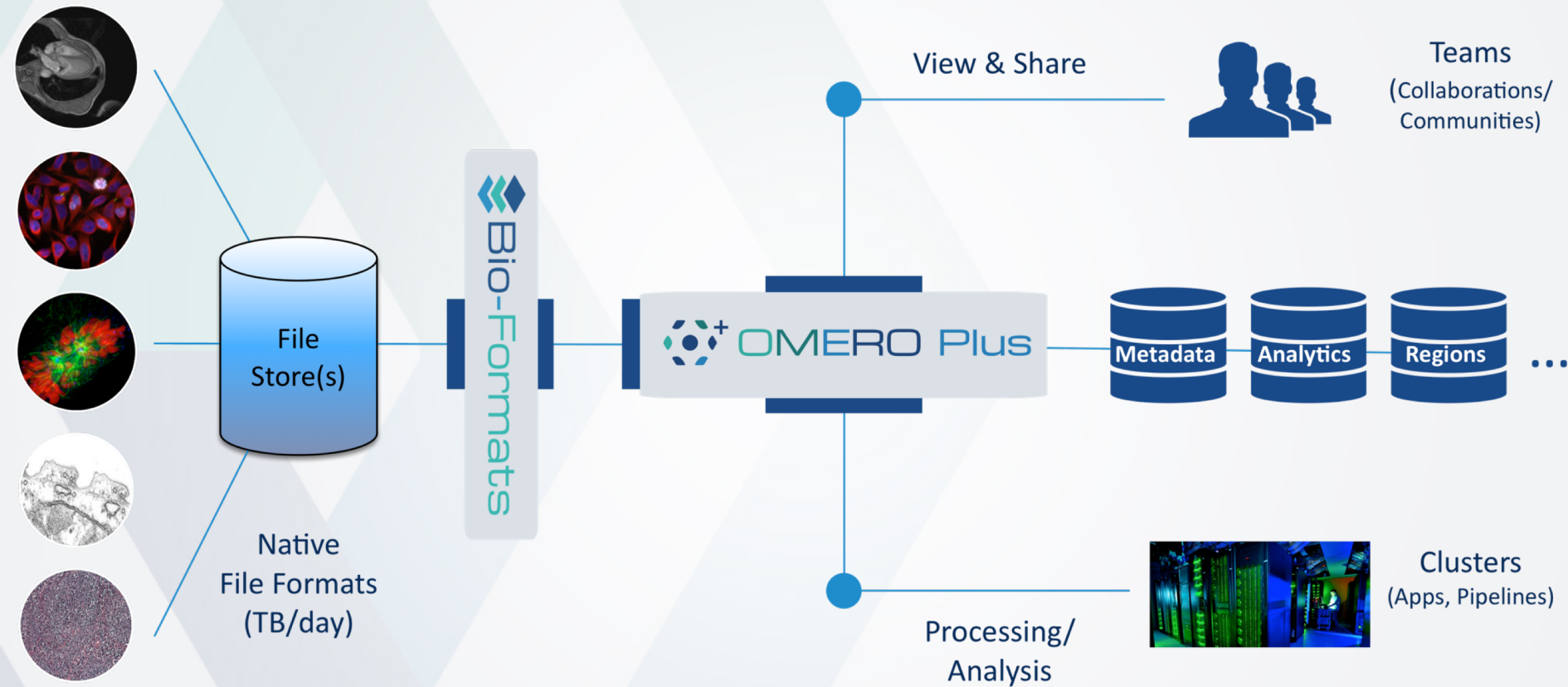
# Timeline



# Technology – Microservices



# Bio-Formats and OMERO Plus 5 model

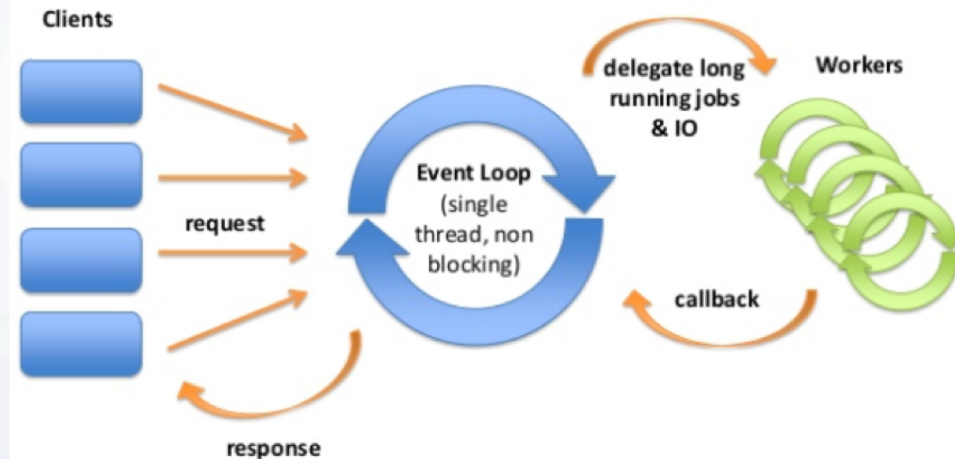


**Separate, modular data storage & interfaces —> Scalable, Flexible, Future Proof informatics**

# Introducing OMERO HTTP microservices

- Build upon the ElasticSearch prototyping work [1] from Nov 2016
- Long running tasks in a task queue do not block the worker
- Long running data retrieval does not block the worker
- Allows us to make better use of server resources
- Allows us to scale computationally expensive tasks horizontally
- Integrates seamlessly with the OMERO.web platform
- Is **NOT** a panacea

## Different Programming Model



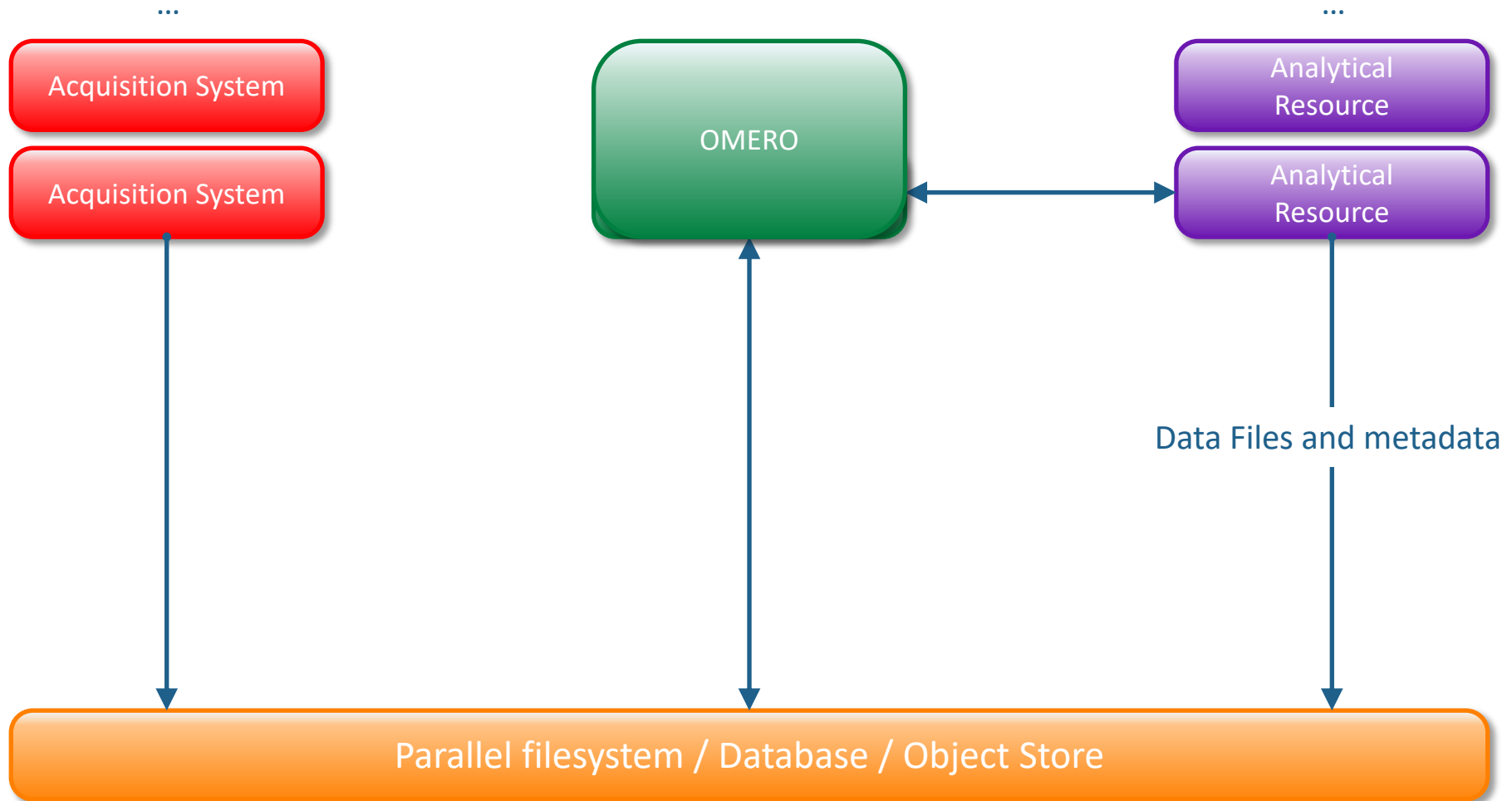
Rafael Salerno (<http://salerno-rafael.blogspot.co.uk>)

# Microservices - Why do this in the first place?

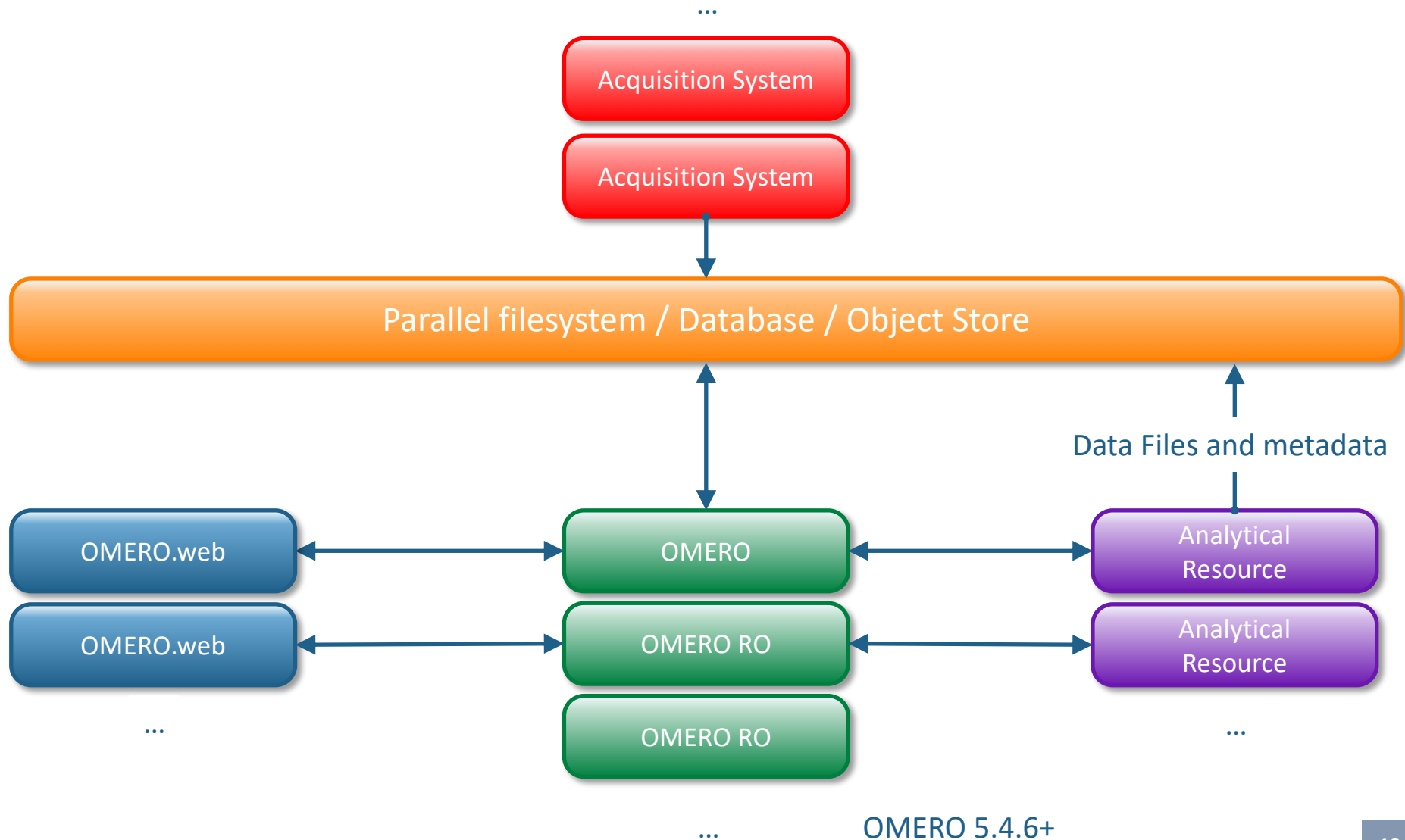
- HCS and Digital Pathology domains
- 10s of TBs of data, some made available publicly (IDR like)
- 10s of GBs high channel count big images
- Offset for Bio-Formats memo file creation
- **Stop** blocking workers
- Achieve better hardware resource utilization
- Explore different ways of engineering our software



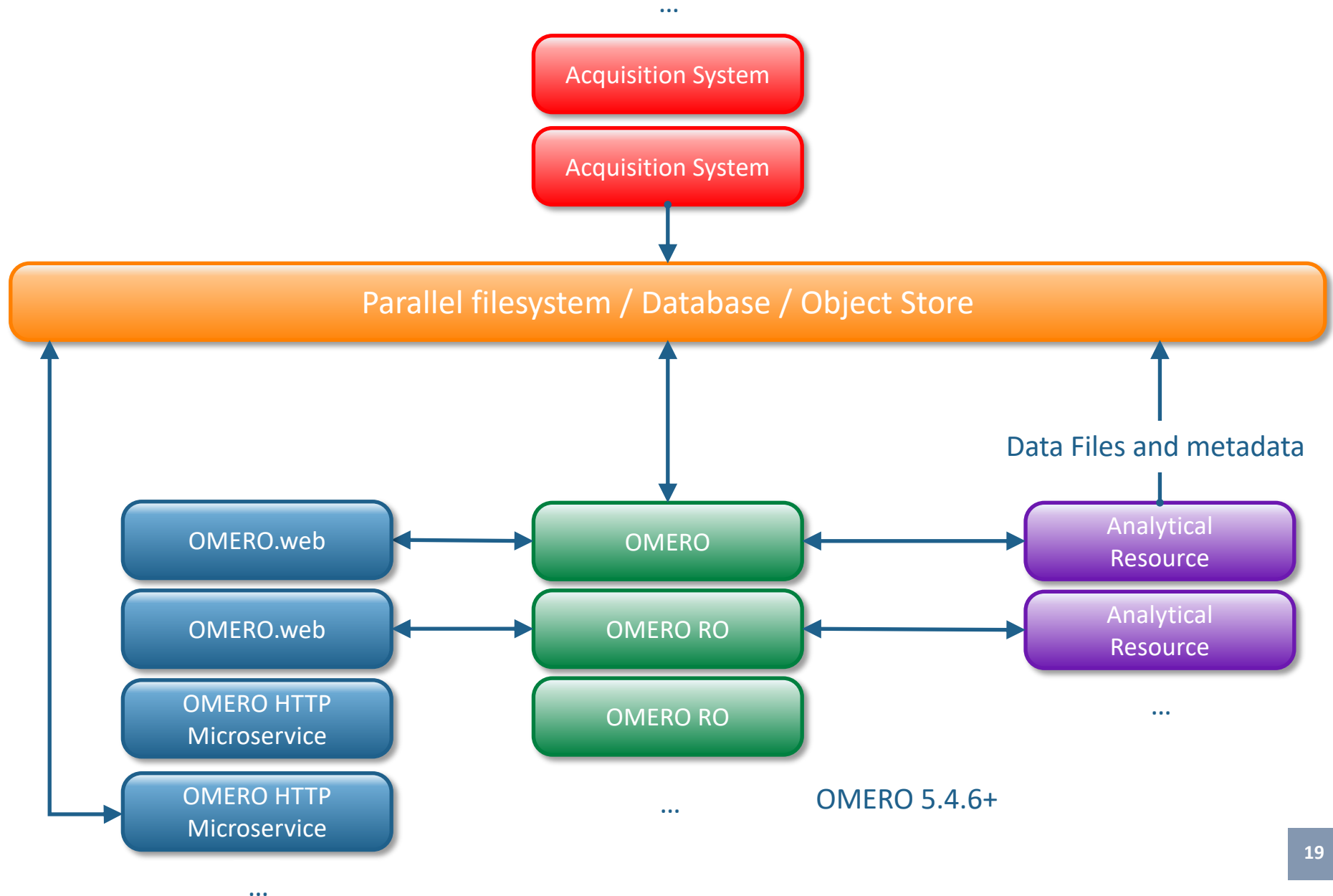
# Logical Architecture



# Logical Architecture – Horizontal Scalability



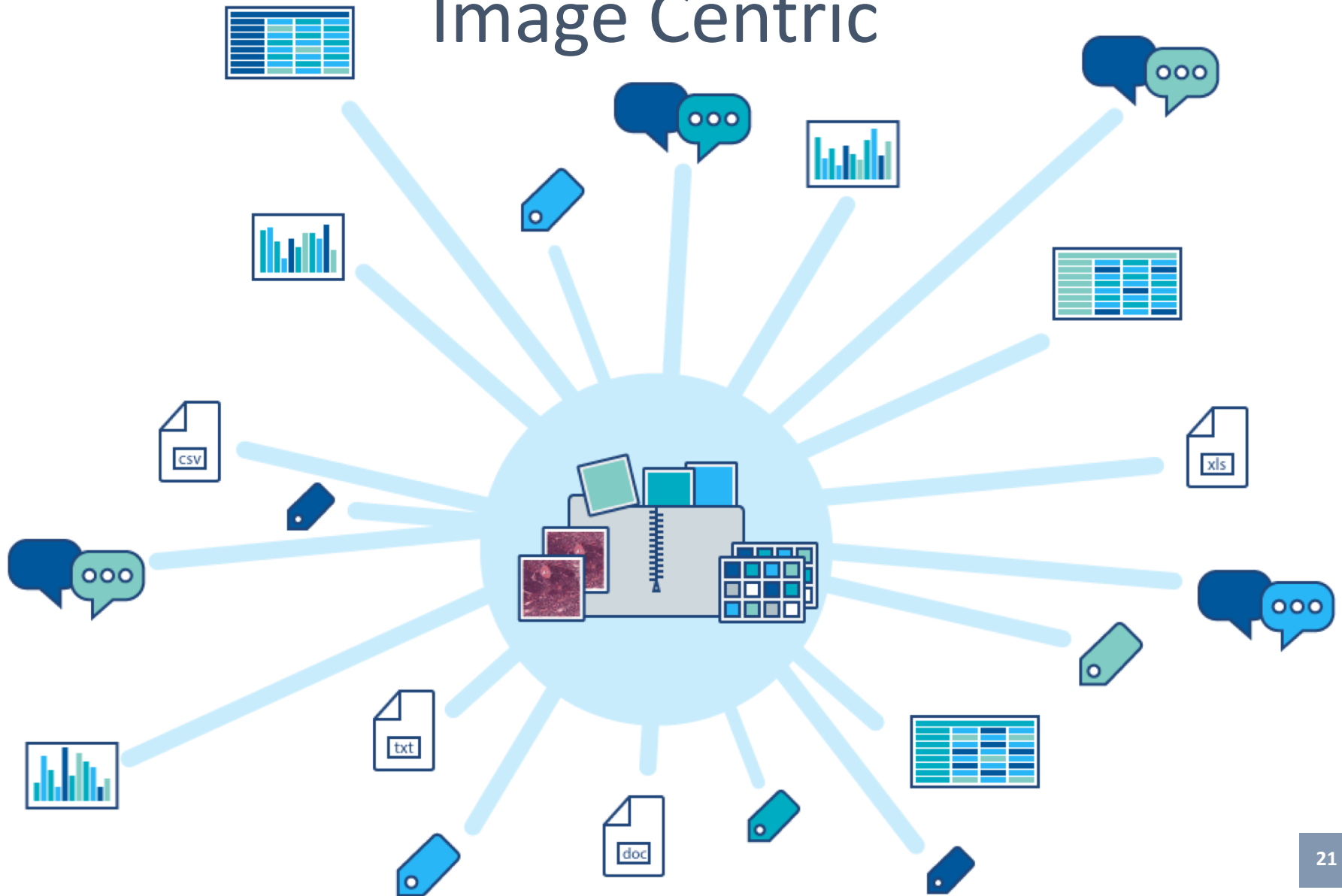
# Logical Architecture – Horizontal Scalability



# Technology – Parade



# Image Centric



# OMERO Parade

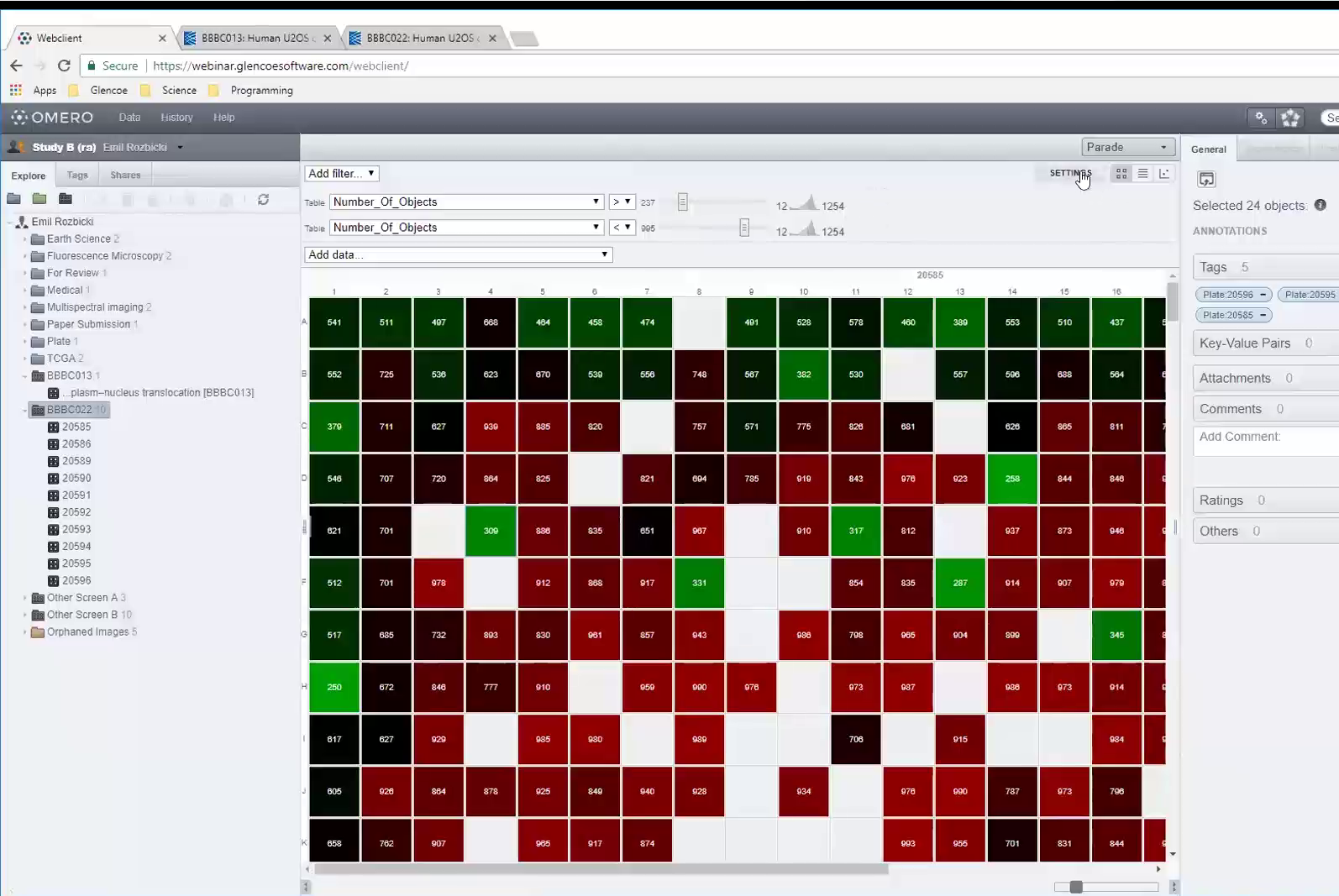
## History

- November, 2016
  - Initially devised by Will Moore, OME Dundee
- January, 2018
  - Development reactivated
- February 20<sup>th</sup>, 2018
  - Design presentation by Will Moore to OME developers
- March 10<sup>th</sup>, 2018
  - First contributions by Glencoe Software

# OMERO Parade

At a glance

- Open source OMERO.web center panel plugin
- Usable by both biologists **AND** computational team members
- Visualization Project-wide or Screen-wide
- Filtering of Images based on Boolean logic
  - Image metadata
  - Annotations
  - OMERO.tables data
- Display of Analytical and Experimental data associated with Images
  - Table
  - Heatmap
  - Charting
- Expanding on the plugin concept
  - Filter
  - Data provider



General

Selected 24 objects: ⓘ

ANNOTATIONS

Tags 5

Plate:20596 | Plate:20595 | Plate:20589 | Plate:20586 | Plate:20585

Key-Value Pairs 0

Attachments 0

Comments 0

Add Comment:

Ratings 0

Others 0



# Summary



# Where to from here?

- *More work on both horizontal and vertical scalability for HCS and WSI*
- *A file format for 2017 and beyond*
- *Regular webinars showcasing Bio-Formats and OMERO*
- *Development projects with major instrumentation vendors ensuring PFF support*
- Expansion of the informatics capabilities of OMERO
  - OMERO.tables and metadata
  - Masks and Regions of Interest
- New directions and domains for PathViewer

# The Development Team

## Leadership



Chris Allan

## File Formats and Plumbing



Melissa Linkert

## Systems



Chris MacLeod

## Backend Development



Joshua Ballanco

## Design and User Experience



Liza Unson

## Frontend Development



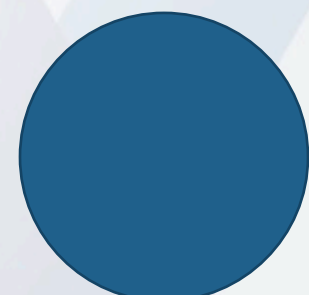
Andreas Knab

## Applications



Emil Rozbicki

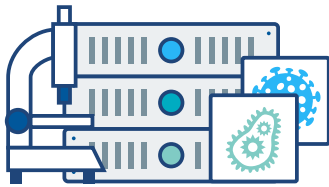
## Full Stack Development



Kevin Kozlowski

# Our Solutions

Let's work together



Terabyte Scale Imaging  
(LM, EM, HCS, DP, MI) \*



Image Informatics Solutions



Images as Knowledge

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## Expertise

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## Solutions

\* (light microscopy, electron microscopy, high content screening, digital pathology, medical imaging)

# Thank you!

Visit us at [www.glencoesoftware.com](http://www.glencoesoftware.com) for more info, or follow us on Twitter [@glencoesoftware](https://twitter.com/glencoesoftware)

