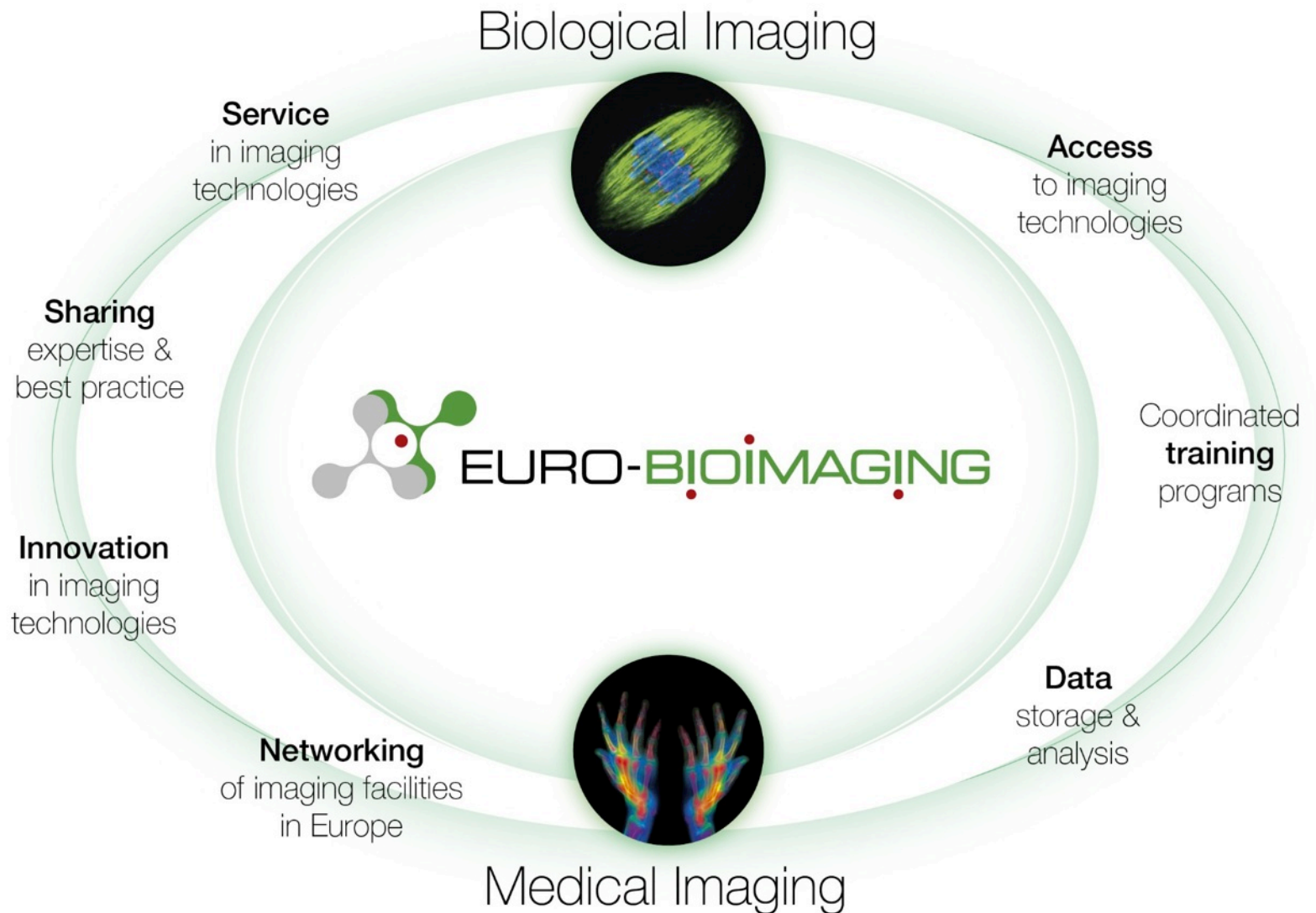
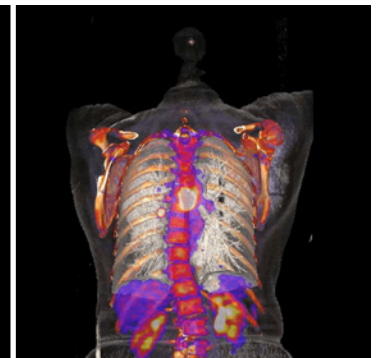
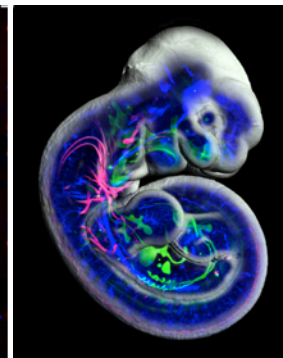
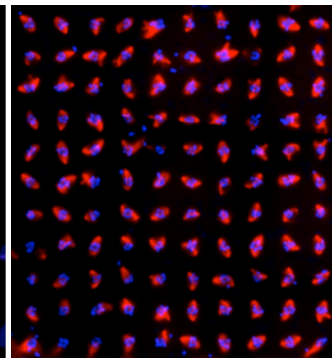
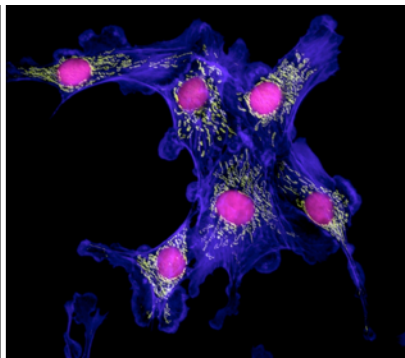
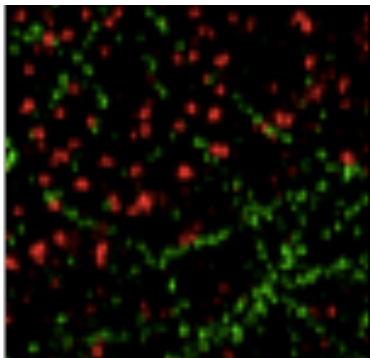
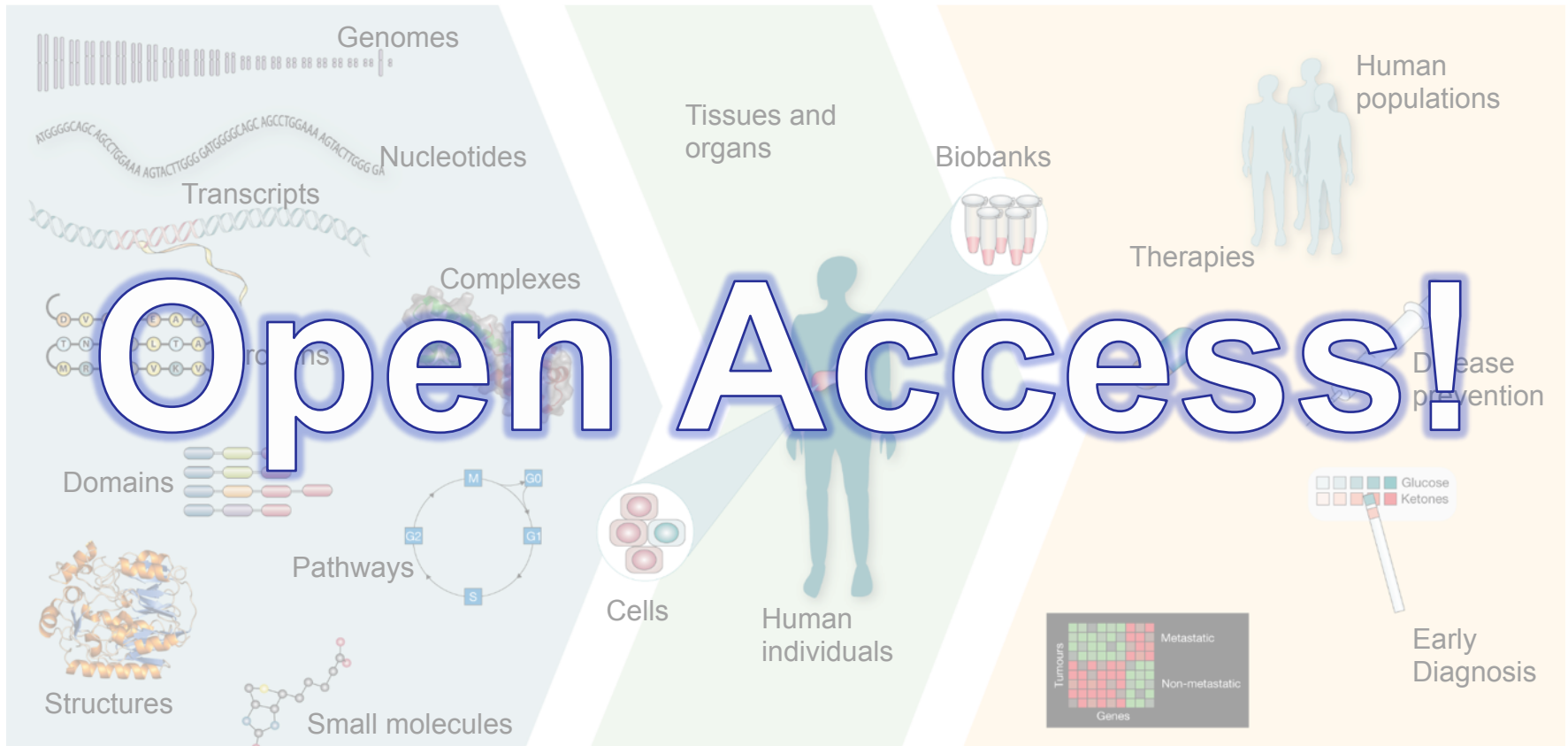


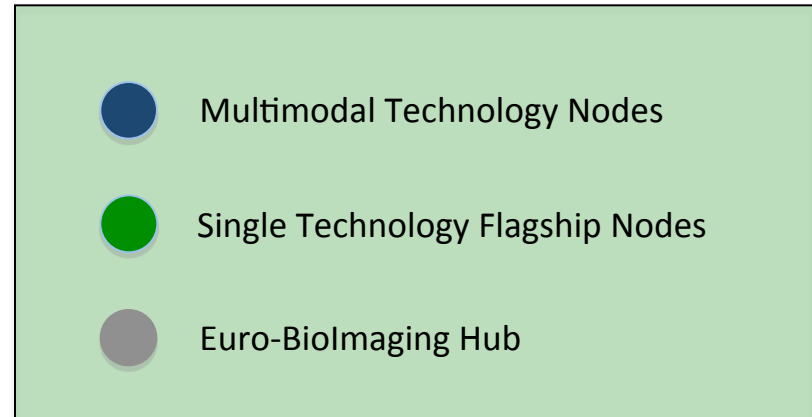
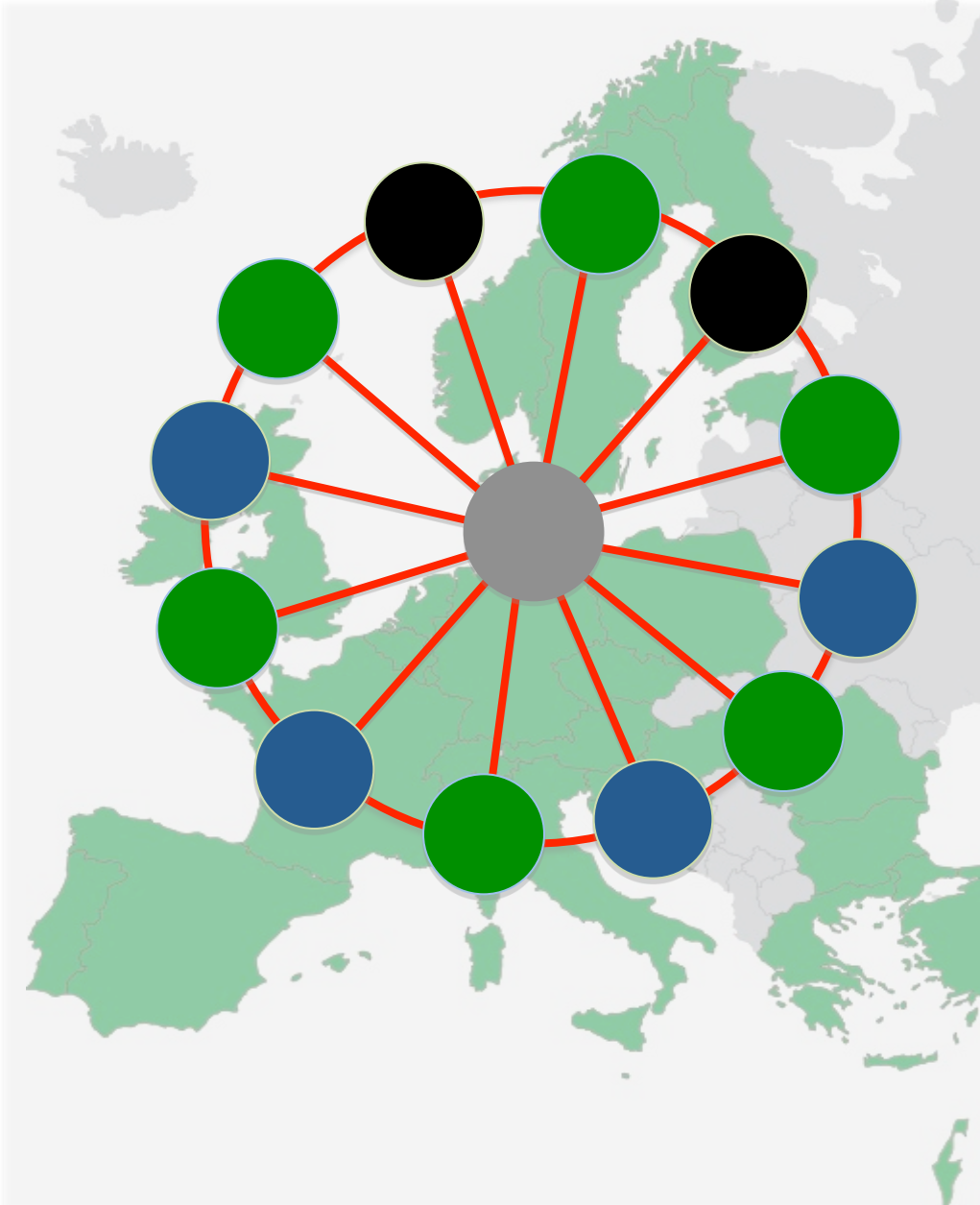
Euro-BioImaging Data Infrastructures

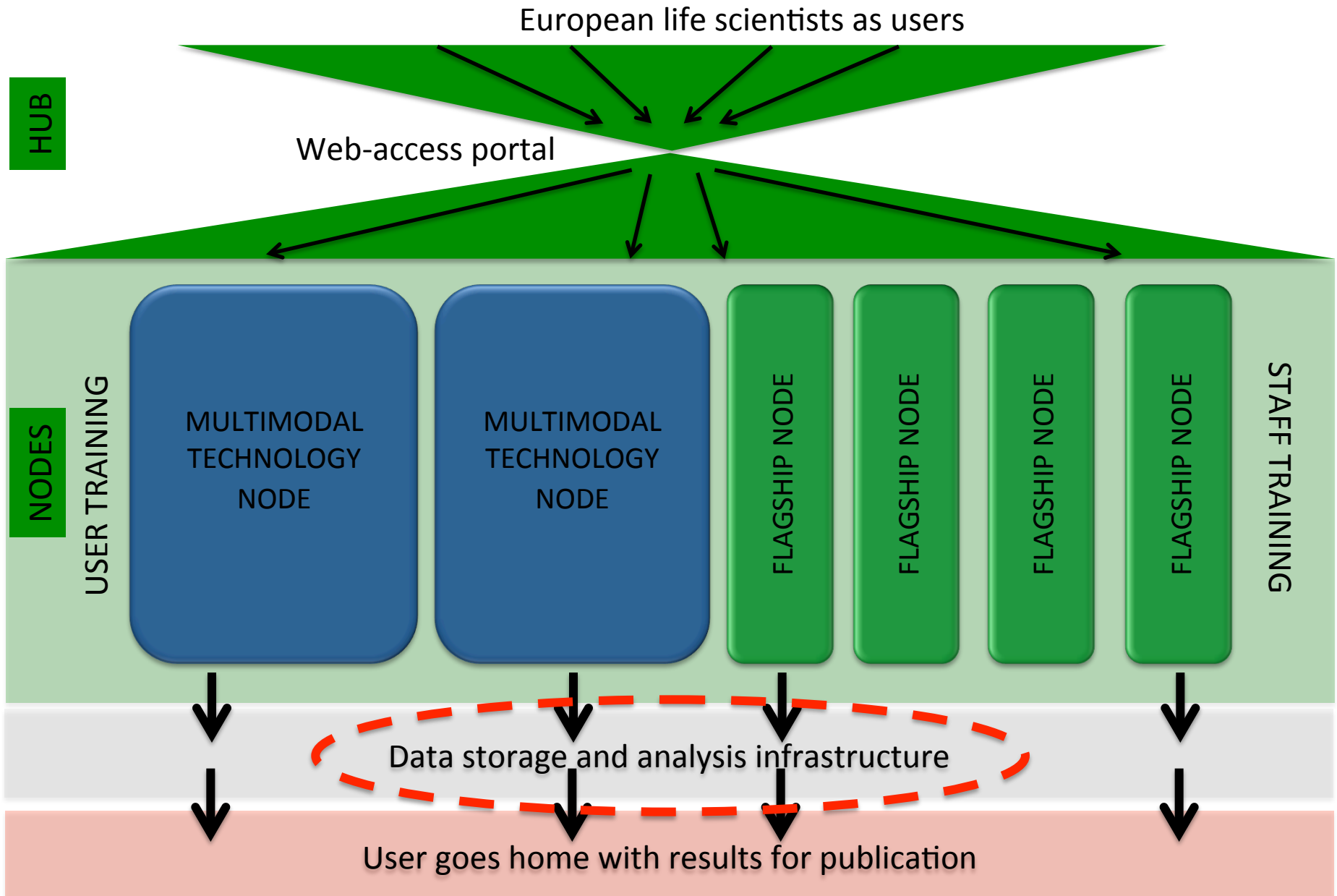
Jason Swedlow
University of Dundee
WP11 Euro-BioImaging











Data Infrastructure Model: Evidence Basis



**228 User applications in
four weeks**

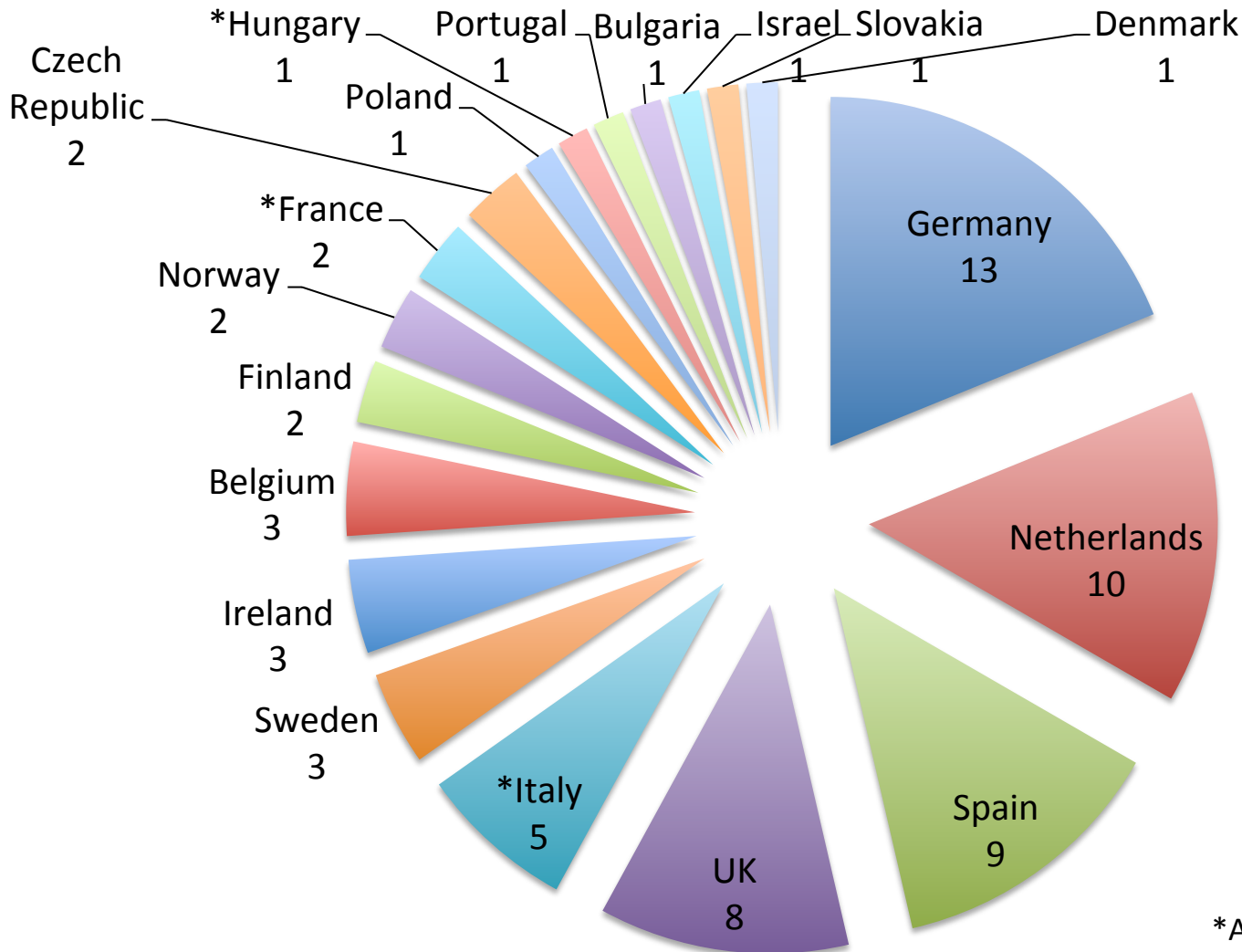
**110 User visits in 14
countries in 6 months**

**22 publications, 20
manuscripts submitted**

WP11 Work summary- Preparatory Phase

- Euro-Biolmaging Survey: WP11-Specific Questions
- ISBI 2012 workshops on BioImage Analysis, Barcelona 2012
 - ✓ Michael Unser (EPFL) & Jean-Christophe Olivo-Marin (Institut Pasteur)
 - ✓ Wiro Niessen (Rotterdam)
 - ✓ Report on status of Biolmaging Management & Analysis Tools
- Challenges
 - ✓ Deconvolution & Cell Tracking challenges, ISBI Meetings
- Common ROI Specification, Barcelona & Dundee 2012
 - ✓ Initial proposal & Hackathon
 - ✓ Proof-of-Concept Software on *scijava.org*
- Euro-Biolmaging Data-Related Infrastructure Activities (DRIAs)
- EUBIAS2013
 - ✓ BioImage Anaysis Community Update
 - ✓ Image Analyst Network
 - ✓ “Taggathon”: <http://biii.info> Proof of Concept





Independent Evaluation	# Eols
Highly Recommended	25
Recommended	20
Minor improvements	9
Major improvements	13
Not suitable	4

Node Eols per country*

*Actual number of facilities varies. From some countries multi-sited Nodes/national networks Eols were received

- EM Resources**
- Home
 - Statistics
 - EMDataBank
- EMDB**
- Recent entries
 - EMDB search
 - Ftp archive
 - Deposit EM map/model
 - EMDB format

EMD-1053 - Untangling desmosomal knots with electron tomography.
Sample: mouse skin
Resolution: 20 Å
PDB model: [1q5b](#)




Image details

Z-slice: 28 of 50
 Width: 512 px 4787 Å
 Height: 512 px 4787 Å

Viewing options

Normal

Max intensity

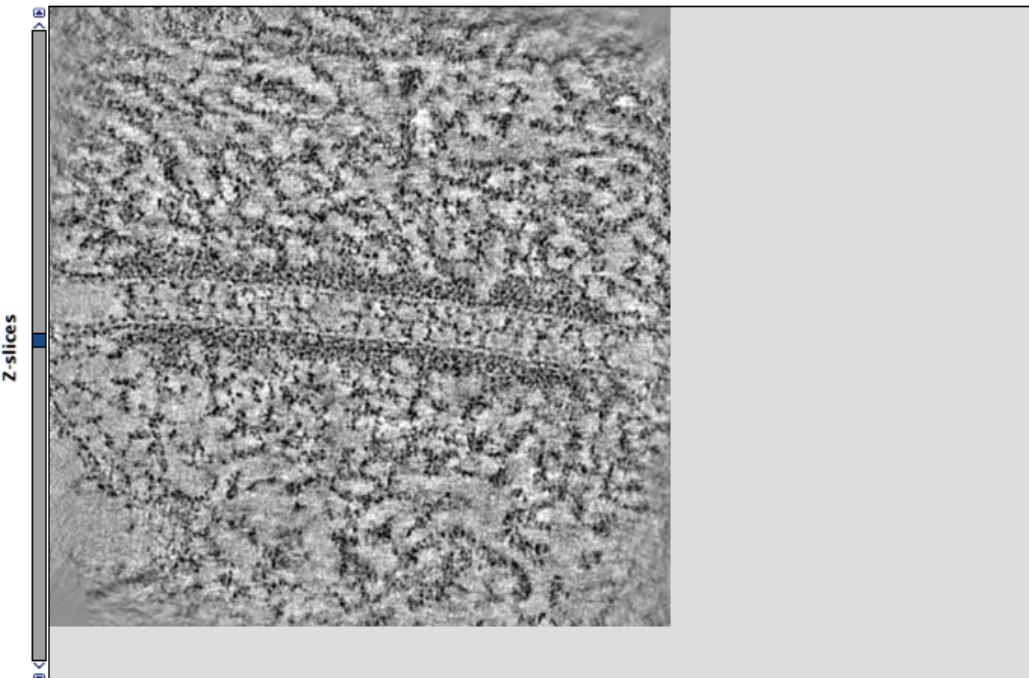
Zoom


100

Line plot

[Select density range](#)

[Image information](#)



Built with OMEMO technology from 

JCB Dataviewer: Original HCS Data

Screen 1: *Drosophila* :: 58 plates

Chart

Plates

Search Screen

Colored boxes indicate hits for the specified phenotype. Use the mouse scroll to zoom. Click on a colored box to select or deselect.

FlyBase ID: **FBgn0005411**

Gene ID: **U2af50**

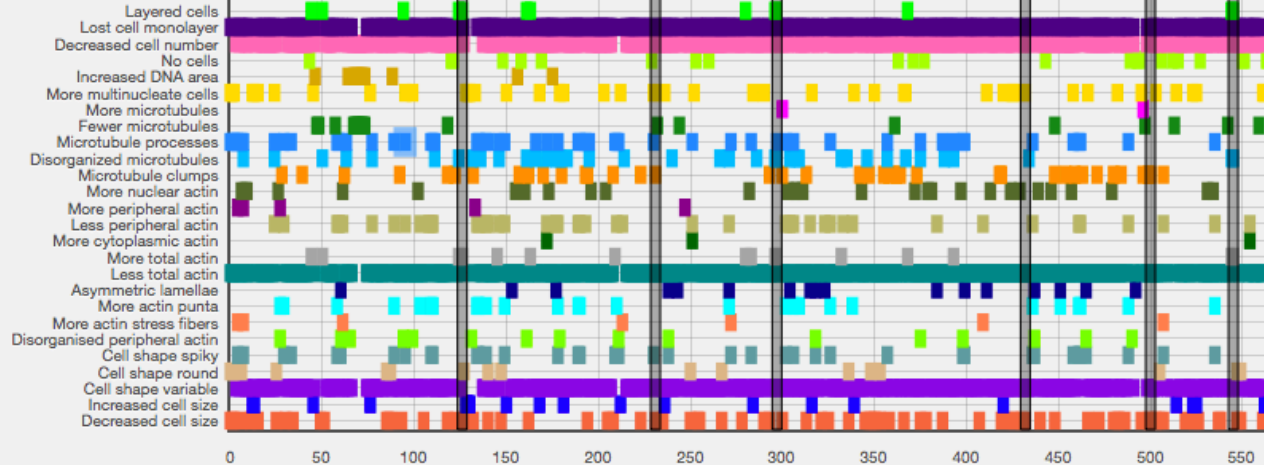
Plate: **011B30_S2R**

Well: **P12**

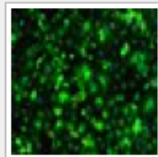
Reset

Phenotype: **Microtubule processes**

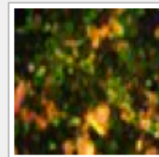
Click this row to select column



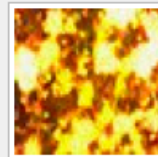
cpb



eIF-1A



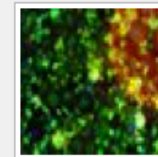
mRpL11



Tao-1



PMCA



CG31291

Cell Phenotype Database @ EBI

EMBL-EBI



Cellular Phenotype Database



Home

[Phenotypes browsing](#)

[Submit your study](#)

[About the Project](#)

Gene

Reagent ID

Gene attribute

Phenotype

Study

Search

gene name or Ensembl ID

e.g. **AURKC** or **ENSG00000105146**

Choose multiple phenotypes set from different studies to retrieve a list of gene/reagent pairs showing all selected phenotypes:

Phenotypes by Study and Screen type

Screen type

intersection

- BZH_SH4-mCherry-GFP (B1_SyM_1)
- BZH_SH4-mCherry-GFP (B1_SyM_2)
- CGSR DNA damage (C2_SyM_1)
- CGSR DNA damage (C2_SyM_2)
- CellMorph (C1_SyM_1)
- EMBL-secretion screen (E1_SyM_1)
- EMBL-secretion screen (E1_SyM_2)
- GFP-RNF168 (G1_SyM_1)
- JCB Metazoan actinome (J1_SyM_1)
- JCB Metazoan actinome (J1_SyM_2)
- Mitocheck (M1_SyM_1)
- Mitocheck (M1_SyM_2)
- NF-kB oscillation screen (N1_SyM_1)
- PP2A-B55a (P1_SyM_1)
- Phagokinetic track (P2_SyM_1)

Ontology Lookup Service

- OLS Home
- Documentation
 - Project
 - Publications
- Developer Resources
 - Download
 - Implementation Overview
 - Javadoc
 - Webservice documentation
- Contact Us
 - Acknowledgements

CMPO Ontology Browser

- [-] phenotype
 - [-] cell population phenotype
 - [-] cell process phenotype
 - [-] cellular component phenotype
 - [-] cell component morphology phenotype
 - [-] cell component shape phenotype
 - [-] cell component size phenotype
 - [-] cell component structure phenotype
 - [-] apoptotic nucleus phenotype
 - [-] **disorganised cortical actin cytoskeleton phenotype**
 - [-] disorganized microtubules phenotype
 - [-] fragmented endoplasmic reticulum phenotype
 - [-] fragmented golgi phenotype
 - [-] fragmented mitochondria phenotype
 - [-] fragmented nucleus phenotype
 - [-] graped micronucleus phenotype
 - [-] cilium morphology phenotype
 - [-] golgi morphology phenotype
 - [-] nuclear morphology phenotype
 - [-] cell component position phenotype
 - [-] cell projection phenotype
 - [-] phenotypes by organelle
 - [-] cellular development phenotype
 - [-] molecular component phenotype
 - [-] single cell phenotype

Legend:

- is a
- part of

- develops from
- other

Help (hide)

Double-click a term to see its children. The ontology browser is populated dynamically. If there are many children for a given term, there may be a small delay while the browser fetches. Click to highlight a term to see any information associated with it. Hover over a term to see its relation with its immediate parent. Root terms will not display any relational information.

Relations

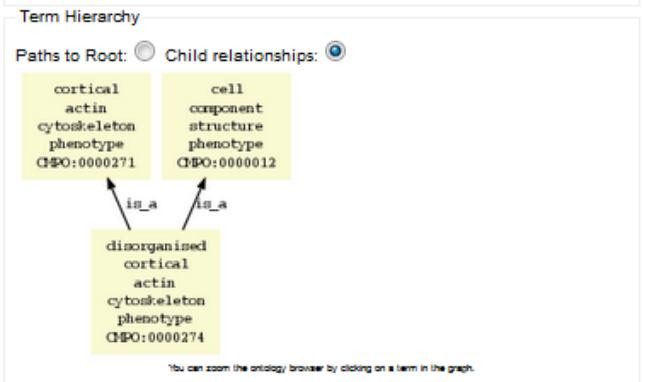
Term Information

ID: [CMPO:0000274](#) Zoom

Name: disorganised cortical actin cytoskeleton phenotype

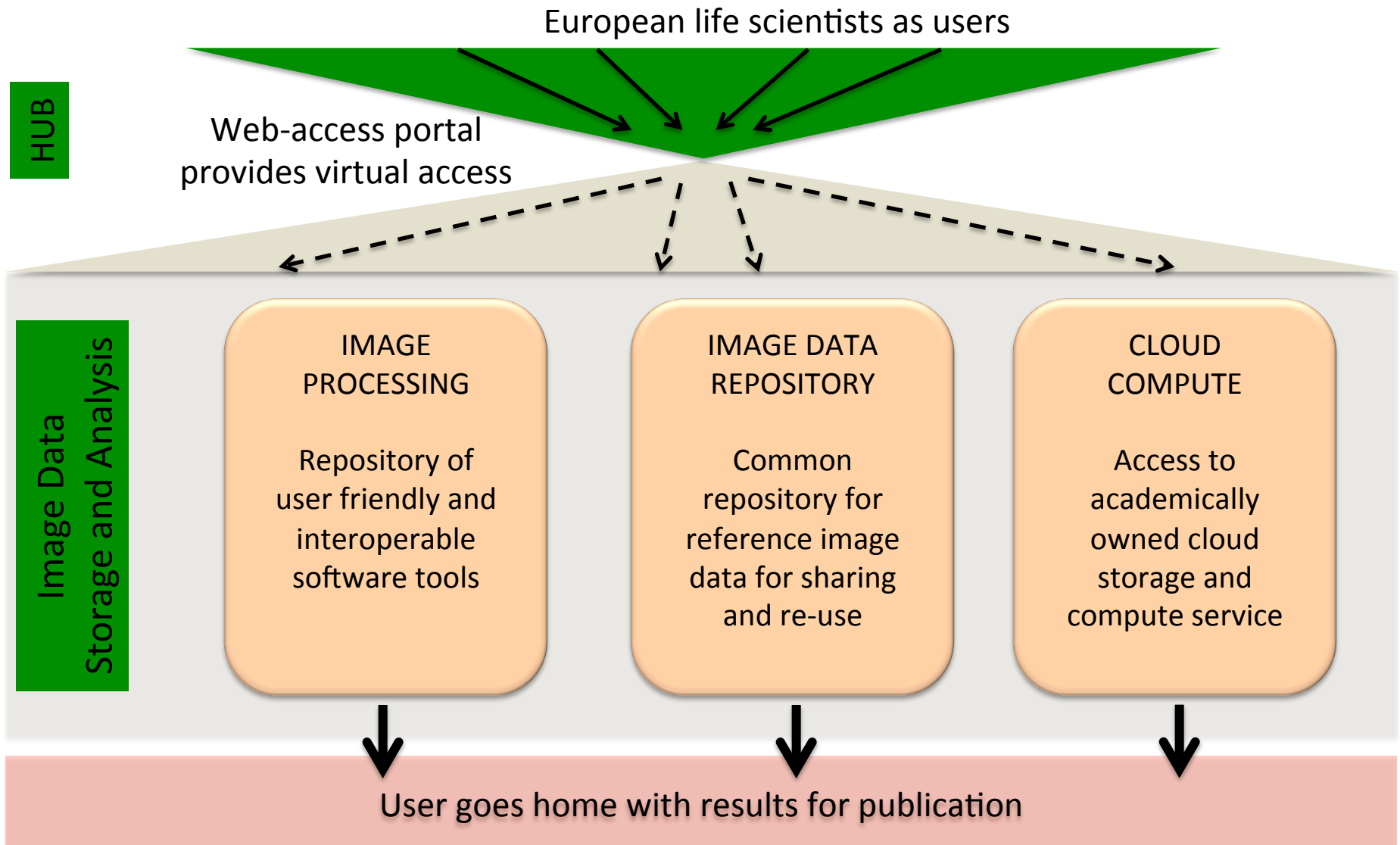
Associated information

definition	A phenotype observation at the level of the cortical actin cytoskeleton where the component shows an irregular organization
preferred name	disorganised cortical actin cytoskeleton phenotype
exact synonym	disorganised peripheral actin phenotype
subset_cmpo	CMPO subset
IAO:0000119	PMID:21893601
prefLabel	disorganised cortical actin cytoskeleton



Data Infrastructure Model: Design





Community Demand:

Community-annotated repository of image processing & analysis tools

Facilitated and coordinated access to:

- Community-developed open source desktop image processing platforms (e.g. ImageJ, Fiji, Icy, BioImageXD, OME,...)
- Open access to commercial platforms (e.g. Zeiss, Bitplane, Leica, Nikon, ...)
- Community wiki-style annotations
- Proof of Concept: <http://biii.info>

Community annotation of Euro-BioImaging Software tools:

- User-friendliness
- Use of standardised data access, formats, and APIs.
- Pluggable architecture, support and documentation, interoperability
- Platform-based and commercial software to have open interfaces

Community Demand: *Open, accessible image data management and repository*

Storage of User image data at producing Node (30 User/year, avg. ~20 TB)

- Reqs based on PCS feedback: 80% of Users need <200 GB; 20% need 0.2-20 TB
- Data initially stored at Node for quality control and initial processing;
 - afterwards “data belongs to the user”.
- Data transfer methods determined by dataset size
 - e.g. web-based transfer, or shipment of external hard drives, ...)

Community Image Data Resource (~1000 TB in yrs 1-2)

Open access to standardized, annotated data repositor(ies) of reference image data

- Phenotypic datasets linked to molecular resources (e.g., GW phenotypic screens)
 - close collaboration with ELIXIR
- Datasets with clear linkage to structural resources (e.g., super-resolution, correlative)
- Common annotation framework (with ELIXIR)
- Public resource for image data directly related to publication
- Benchmark datasets, for development, validation and training
- Resources for community reference (genome wide studies, atlases etc.)

	Years 1-2 (15 Nodes)	Years 3-4 (25 Nodes)	Years 5-6 (40 Nodes)
Users/Yr	525*	875*	1500*
Users/Node/Yr	30	30	30
Nodes	15	25	40
Data Size Split (Fraction of 'Normal')	0.8	0.7	0.6
No. 'Normal' Nodes (Dataset = 1 TB/user, scale over time)	12	17.5	24
No. 'Big' Nodes (Dataset = 10TB/user, scale over time)	3	7.5	16
Total Data Stored @ 'Normal' Node/Yr (TB)	35	35	37,5
Total Data Stored @ 'Big' Node/Yr (TB)	350	350	375
Total Data all Users/all Nodes/Yr (TB)	1470	3238	6900
Steady state cloud provision at EB-IDR (ca. 50% of reference dataset storage capacity)***	111	515	1723
Storage capacity for reference dataset, published data, data for benchmarking etc. at EB-IDR**	221	(221 + 809) = 1030	(1030 + 2415) = 3445

* Assumes 1.3 Users/two weeks, excluding holiday, downtime, etc.

** Assume ca. 15%/25%/35% of total data recorded at Nodes is published/committed to IDR.

*** The steady-state cloud provision will need to be reviewed in the future, and the actual implementation will depend on emerging technologies and capabilities.

Community Demand: *Compute Resource for data mining and new tool development*

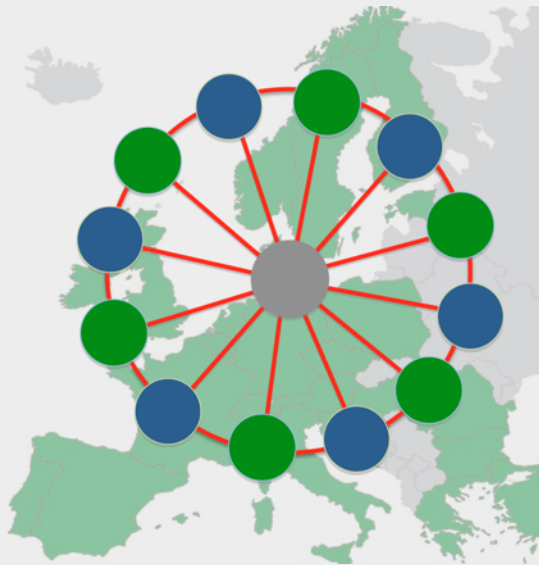
Cloud-based resource to spur the development of new tools and re-use of repository and benchmark datasets.

- Academically owned cloud storage and compute capacity
- Data security policies in line with user and member state requirements.
- Hosted algorithms/tools, linked to repository/benchmark data, bypassing need for data download by user.
- Pilot: Helix Nebula project is testing academically operated science cloud computing for Europe (www.helix-nebula.org). EMBL provides the first use case of the life sciences.

Services to be provided

- Access to cutting-edge biological & medical imaging technologies with high-level user support by expert technical staff
- Image data repositories and analysis tools
- Advanced training for users and providers of imaging technologies

by Hub and Nodes



Euro-BioImaging HUB

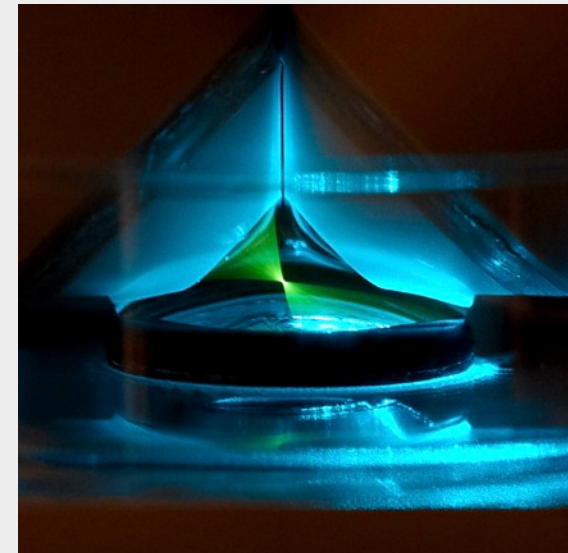
Coordination & support of access, data, training
European infrastructure management

Flagship Technology NODES

Access to unique imaging technology in Europe

Multimodal Technology NODES

Integrated access to multiple imaging technologies



71 interested Node / 2200 future Users
(IEB: 67 Nodes recommended for construction)

Nodes are already being built
(€ 202 Million committed in 13 countries)



- Highly recommended Expression of Interest
- Recommended Expression of Interest



- Countries that committed investment into imaging facilities
- Countries involved in Euro-Bioimaging activities

2013

2014

Nov

END PPP

Dec

Jan

Feb

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

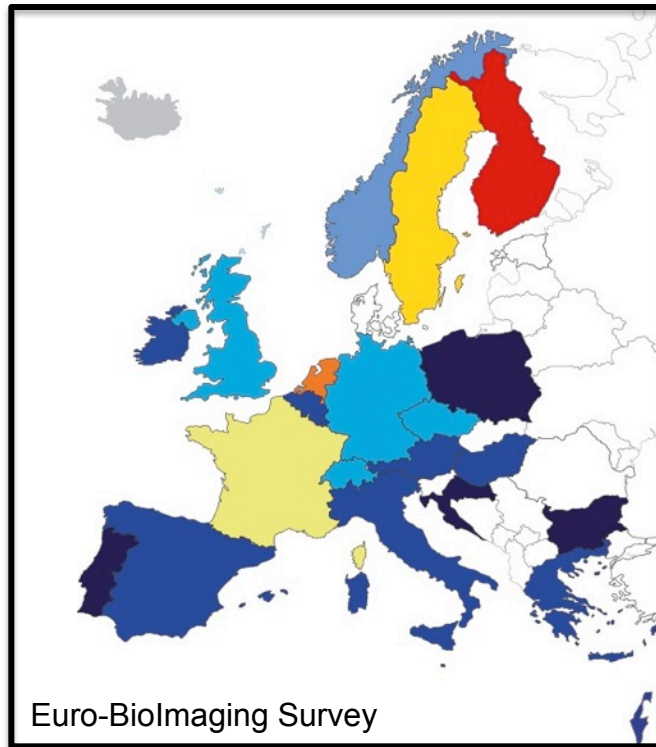
Tasks:

- Selection & Construction of Nodes (Countries)
- Legal framework for European Hub (Interim Board)
- Identification of Hub hosting country (Countries)

Prep P. ✓

Interim Phase

Without Euro-BioImaging



With Euro-BioImaging



- From closed national to open European imaging facilities
- From heterogenous national infrastructure capacity to European excellence