EURO ✕ BIOIMAGING

ANNUAL REPORT 2023

eurobioimaging.eu

Image *life,*
discover the future

We are the European landmark Research Infrastructure for biological and biomedical imaging as recognized by the European Strategy Forum on Research Infrastructures (ESFRI). Euro-BioImaging is the gateway to 237 world-class imaging facilities across Europe.

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FOREWORD

John Eriksson
Director general

Antje Keppler
Bio-Hub Section Director

Linda Chaabane
Med-Hub Section Director

Annual reports provide a valuable opportunity to pause, reflect on the past year's joint achievements, and 2023 was truly extraordinary for Euro-BioImaging! Our success was possible thanks to the strong support and collaboration of our members, stakeholders, dedicated team, and our inspiring, ever-expanding community.

A significant highlight of 2023 was the strategic addition of two new members to our consortium. In December, we welcomed Belgium and Spain, further demonstrating and reinforcing European interest in joining our landmark research infrastructure. After just four years, Euro-BioImaging proudly counts 19 members. Adding new members is an intense and multifaceted process, but highly rewarding, resulting from high-level discussions, alignment of interests, and the development of trust-based relationships. We are delighted to witness the transformation of all the initial enthusiasm we have experienced into long-term strategic engagement to advance science and innovation.

In 2023, Euro-BioImaging built significant momentum, carefully laying the solid groundwork for our next development phase. Having spent four years building and strengthening our foundations, we are now well prepared and positioned to overcome future obstacles. One of the key reasons for this readiness is the finalisation of our next five-year financial plan, a testimony to the commitment of our membership and stakeholders to ensure the

economic stability of our research infrastructure. We are truly grateful for the commitment that we observed, as this plan sets the stage for our long-term operational capacity, a critical requirement for engagement and trust from stakeholders, team members, and our community. We also developed and finalised our Strategic Plan for 2024-2028, a significant milestone that captures our vision for the future of imaging in Europe. Our Strategic Plan, in particular, outlines a strategic path for advancing imaging in Europe. Its six goals are in perfect harmony with EVOLVE, an INFRA-DEV project funded by the European Commission, aimed at enhancing the ERIC implementation and operation. EVOLVE will significantly boost and amplify the role of Euro-BioImaging in the European Research Area, enhancing our scientific capacity, our visibility, stakeholder engagement, operational excellence, and impact as a key driver of research and innovation.

Throughout 2023, we accomplished numerous milestones, detailed in the following pages of the Annual Report. As we move forward, we carry the momentum and determination from 2023, ready to reach new heights in 2024 in close partnership with our members, stakeholders, and the entire imaging and scientific community.

We very much look forward to the continued and shared journey to shape the future of imaging and to advance the European research and innovation landscape.

ABOUT US

INFRASTRUCTURE AT A GLANCE

Euro-BioImaging ERIC is the European Research Infrastructure Consortium for biological and biomedical imaging, awarded the landmark status by ESFRI and thus recognized as the implemented reference infrastructure in the imaging field. Euro-BioImaging was established as an ERIC in the end of 2019.

The distributed Euro-BioImaging infrastructure builds on a set of already existing national and international facilities of excellence in imaging technologies, the Euro-BioImaging Nodes, which provide physical or remote access to imaging technologies, deliver training, and support the users at all stages of their research projects with their experienced staff.

Every researcher, both from academia and industry, can apply for Euro-BioImaging services whenever they have a project requiring imaging technologies and expertise but do not have the equipment or the skills to perform experiments at their home institute.

The Nodes are jointly coordinated by the Euro-BioImaging Hub, which provides general supporting services including the management of user access, policy and lobbying, community and skill building activities, and services for image data.
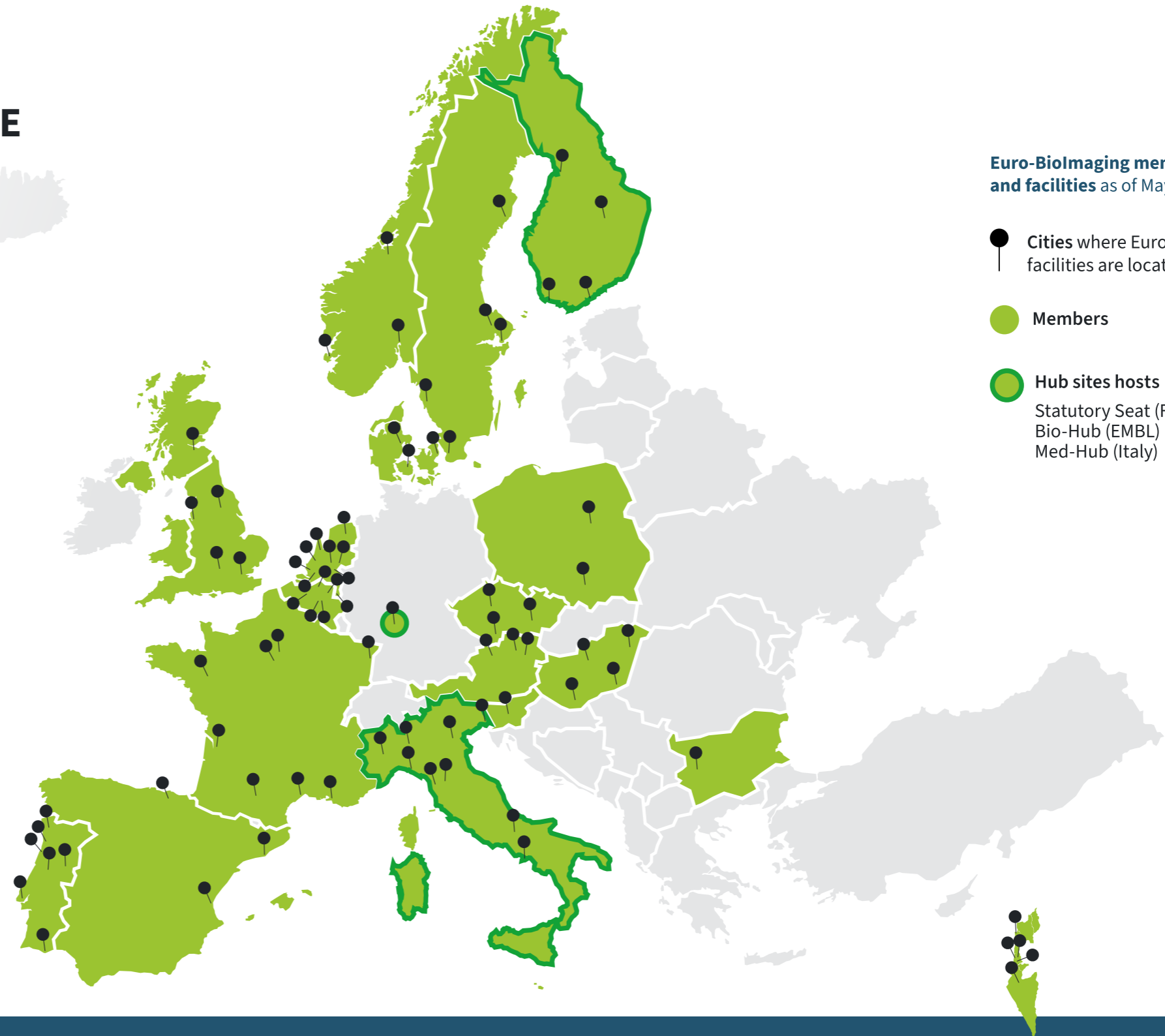
Euro-BioImaging members and facilities as of May 2024

Cities where Euro-BioImaging facilities are located

Members

Hub sites hosts
Statutory Seat (Finland)
Bio-Hub (EMBL)
Med-Hub (Italy)

19
MEMBERS
(COUNTRIES & EMBL)
As of May 2024

41
NODES
As of May 2024

237
IMAGING
FACILITIES
As of May 2024

120+
TECHNOLOGIES &
IMAGE DATA SERVICES
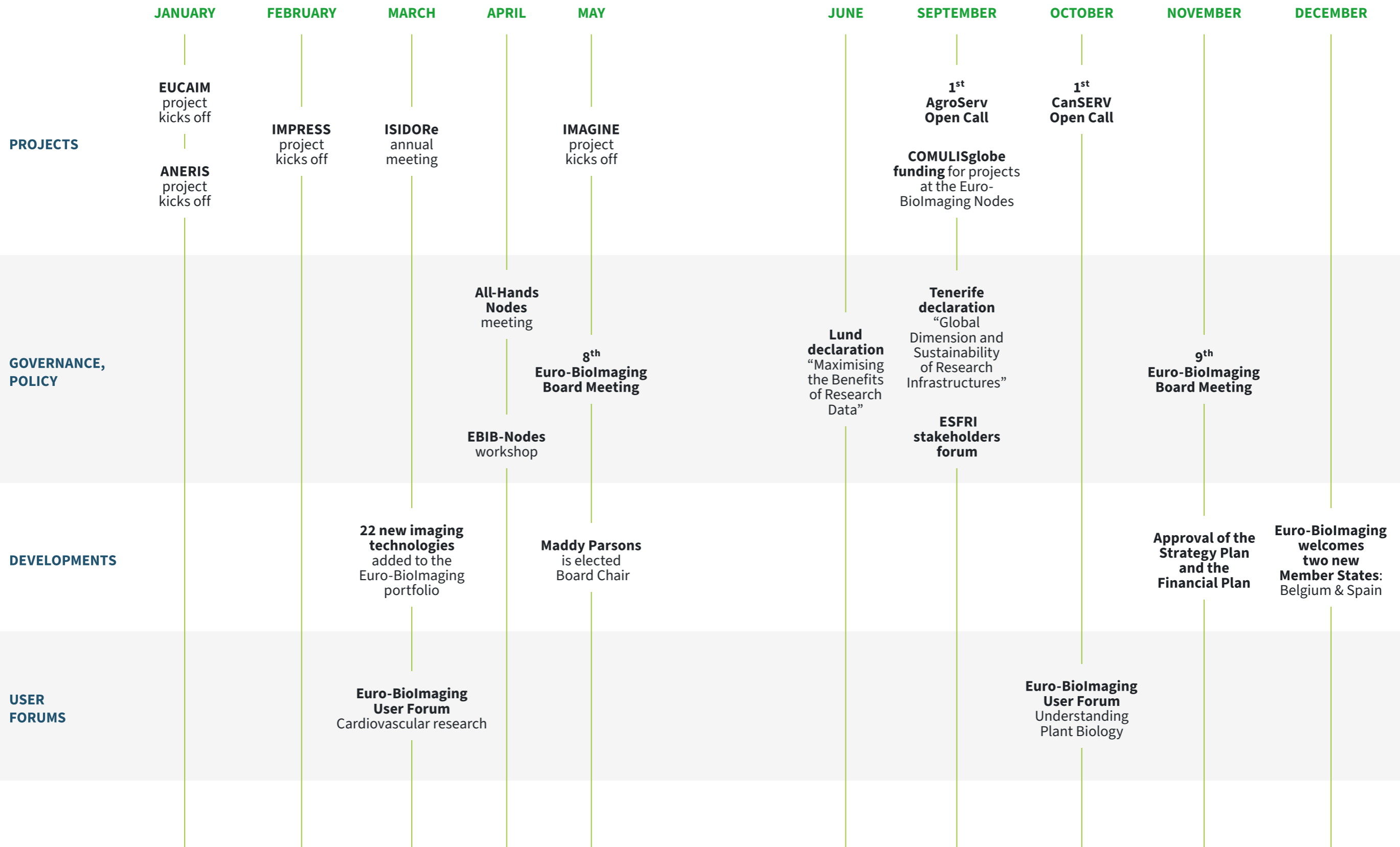As of May 2024

616
USER
PROJECTS
As of May 2024

19
EU-FUNDED
PROJECTS
As of May 2024

HIGHLIGHTS OF 2023

	JANUARY	FEBRUARY	MARCH	APRIL	MAY	JUNE	SEPTEMBER	OCTOBER	NOVEMBER	DECEMBER
PROJECTS	**EUCAIM** project kicks off **ANERIS** project kicks off	**IMPRESS** project kicks off	**ISIDORe** annual meeting		**IMAGINE** project kicks off		**1st AgroServ Open Call** **COMULISglobe funding** for projects at the Euro-BioImaging Nodes	**1st CanSERV Open Call**		
GOVERNANCE, POLICY			**All-Hands Nodes** meeting **EBIB-Nodes** workshop	**8th Euro-BioImaging Board Meeting**		**Lund declaration** "Maximising the Benefits of Research Data"	**Tenerife declaration** "Global Dimension and Sustainability of Research Infrastructures" **ESFRI stakeholders forum**		**9th Euro-BioImaging Board Meeting**	
DEVELOPMENTS			**22 new imaging technologies** added to the Euro-BioImaging portfolio	**Maddy Parsons** is elected Board Chair					**Approval of the Strategy Plan and the Financial Plan**	**Euro-BioImaging welcomes two new Member States**: Belgium & Spain
USER FORUMS			**Euro-BioImaging User Forum** Cardiovascular research					**Euro-BioImaging User Forum** Understanding Plant Biology		

OUR TEAM

Statutory Seat
Turku, Finland

Bio-Hub
EMBL, Germany

Med-Hub
Torino, Italy

JOHN ERIKSSON
Director General

ANTJE KEPPLER
Section Director
Bio-Hub

LINDA CHAABANE
Section Director
Med-Hub

AMARANTA AMADOR
Head of Legal Services and International Relations

DANIELA AVILES HUERTA
Scientific Project Manager

JOHANNA BISCHOF
Head of Bio-Hub Operations

ERIKA CERUTTI
Project Manager

MARIANNA CHILDRESS POLI
External Communications Officer

LAURENT CHMIEL
Communications Officer

SUDEEP DAS
Project Manager

RAFAEL DIAZ
Junior Scientific Officer

GIUSEPPE DIGILIO
Operations Advisor

DOROTHEA DÖRR
Scientific Project Manager

AYOUB EL GHADRAOUI
EU Project Manager

SOLVEIG ERIKSSON
Multimedia Producer

JIRI FUNDA
Project Manager

CAMILO GUZMÁN
Scientific Officer Quality Manager of Biological Imaging

ANNE-CHARLOTTE JOUBERT
EU Project Manager

PASI KANKAANPÄÄ
Senior Scientific Manager

ISABEL KEMMER
FAIR Image Data Steward

DALE LAWSON
Senior Scientific Project Manager

ANTING LI
Personal Assistant to the Management

DARIO LONGO
Scientific Project Manager

RAKESH MAHATO
Software Developer

AASTHA MATHUR
Head of Image Data Services
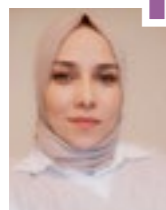
MARIA MIRZA
Scientific Project Manager

BUĞRA ÖZDEMIR
Image Data Specialist

CLAUDIA PFANDER
Industry Board Coordinator & External Relations Manager

ILARI PULLI
Head of Operations

FERIEL RAMDHANE
Image Data Scientist

MARCELA RIVERA
Junior Scientific Officer

ZORICA RUOHONEN
Finance and Administration Manager

ARINA RYBINA
Scientific Project Manager

JAANUS SAARNAK
Software Developer

BEATRIZ SERRANO-SOLANO
Scientific Project Manager

SUSANNE VAINIO
Scientific Officer Quality Manager of Medical Imaging

ALESSANDRA VIALE
Head of Med-Hub Operations

AMAN YADAV
Software Developer

OUR MISSION

We empower researchers with open access to innovative biological and biomedical imaging technologies, expertise, data services, and training.

We enable cutting-edge research and contribute to addressing pressing societal challenges. As an ERIC and an ESFRI Landmark Research Infrastructure, Euro-BioImaging contributes to the overall competitiveness of the European Research Area and participates in global imaging initiatives.
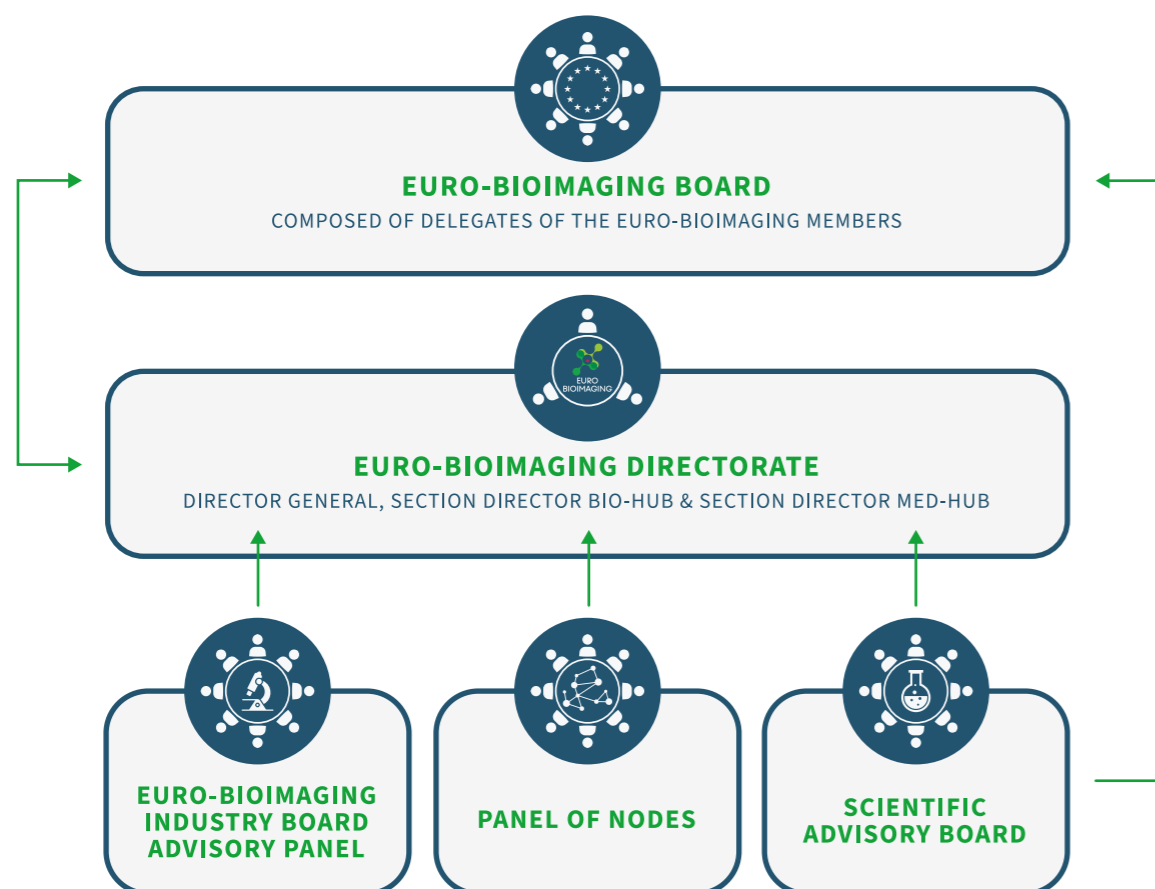
GOVERNANCE

Euro-BioImaging is managed by its Hub and governed by the Euro-BioImaging Board. Our governance also includes a Scientific Advisory Board (SAB), to oversee the scientific, ethical, technical and quality management of the Euro-BioImaging ERIC activities. The Panel of Nodes, representing the individual Nodes, advises the Euro-BioImaging Directorate on operational matters concerning the Nodes and service provision. In addition, the Industry Board Advisory Panel provides input for the Directorate on industry-relevant aspects. The governing bodies meet regularly and actively contribute to the operations and development of our infrastructure.

In 2023, the Scientific Advisory Board contributed to the evaluation of new technologies and helped us develop and implement a new procedure for the Call for Nodes and Node Upgrades.

We also collaborated closely with the Euro-BioImaging Industry Board (EBIB) Advisory Panel and our Industry Board. April 2023 saw the first in person edition of the Euro-BioImaging All-Hands Nodes meeting, followed by an Industry Board-organised workshop on "BioImaging and the European Open Science Cloud."

EURO-BIOIMAGING GOVERNANCE

EURO-BIOIMAGING BOARD
COMPOSED OF DELEGATES OF THE EURO-BIOIMAGING MEMBERS

EURO-BIOIMAGING DIRECTORATE
DIRECTOR GENERAL, SECTION DIRECTOR BIO-HUB & SECTION DIRECTOR MED-HUB

EURO-BIOIMAGING INDUSTRY BOARD ADVISORY PANEL

PANEL OF NODES

SCIENTIFIC ADVISORY BOARD

8th Board meeting, Turku, Finland

On May 23-24, 2023, Euro-BioImaging Board members met in Turku, Finland, to discuss the new Strategic and Finance Plan for Euro-BioImaging 2024-2028. At this meeting, the Board also elected Professor Maddy Parsons as the new Board Chair. She is Professor of Cell Biology, Director of the Microscopy Innovation Centre (which is part of our UK Node) and Vice Dean for Impact and Innovation at King's College London. She joins Jan Buriánek, the Board's Co-Chair, in leading the Euro-BioImaging Board. This meeting also gave us the opportunity to recognise the extraordinary service and support of Professor Benjamin Geiger, Board Chair since 2015. His remarkable commitment has contributed to the development of the infrastructure and ensured the seamless transition from interim phase to operations, a critical phase in the Euro-BioImaging growth and development.
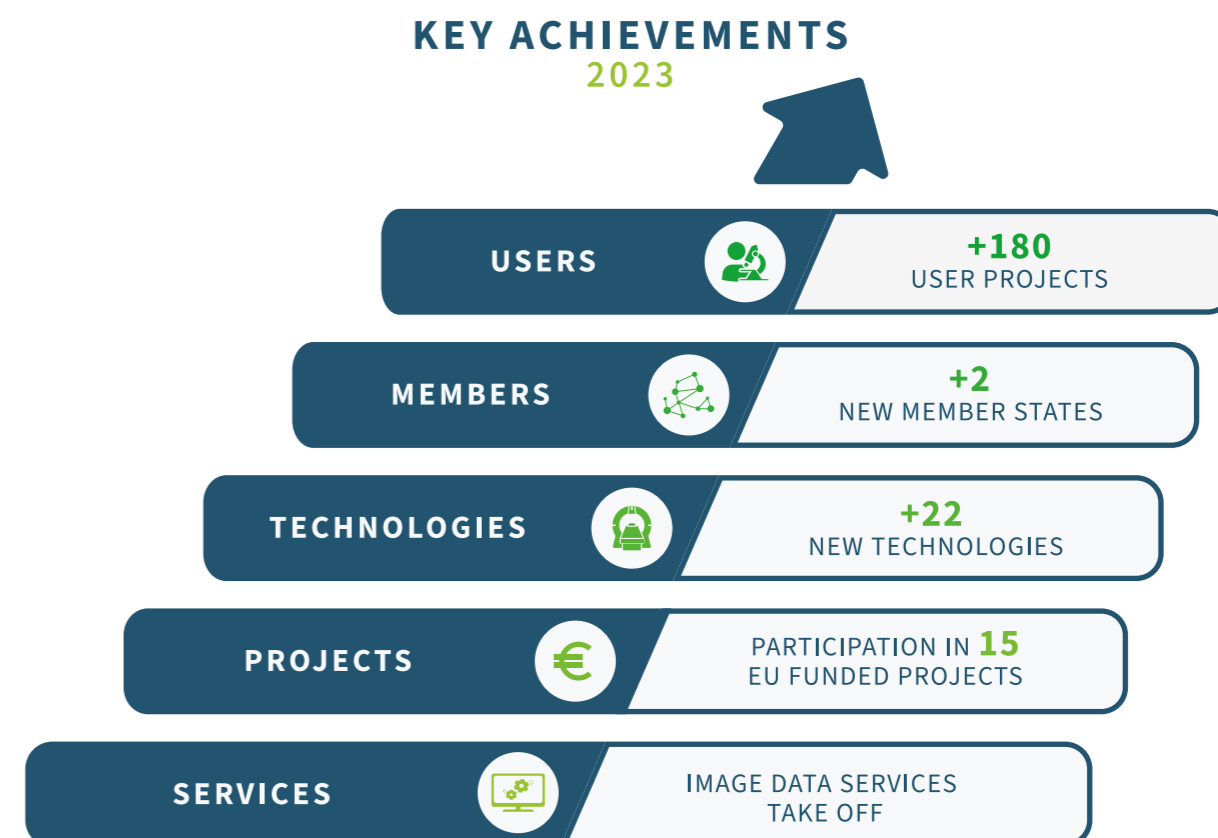
All-Hands Nodes Meeting, EMBL

The Panel of Nodes (PoN) comprises an official representative from each of the 41 Euro-BioImaging Nodes. In 2023, Marc van Zandvoort and Julia Fernandez-Rodriguez, co-chairs, of the PoN held monthly meetings with the Euro-BioImaging Directorate to advise on matters concerning the Nodes. In addition, they contributed to organising and chairing of the All-Hands Nodes Meeting, from April 17-20, 2023, at EMBL Heidelberg, with Node staff and industry partners, pictured above.

ACHIEVEMENTS IN 2023

OVERVIEW

We continued to surpass the goals set in our first strategic plan while setting the stage for our second strategic plan. Below we highlight our operational achievements in 2023 and set the stage for the future.

KEY ACHIEVEMENTS 2023

USERS		+180 USER PROJECTS
MEMBERS		+2 NEW MEMBER STATES
TECHNOLOGIES		+22 NEW TECHNOLOGIES
PROJECTS		PARTICIPATION IN 15 EU FUNDED PROJECTS
SERVICES		IMAGE DATA SERVICES TAKE OFF

In our fourth year of operations, expansion continued to be our key word. The number of user projects increased rapidly, in part thanks to funding from the ISIDORe project (see IMPACT section for some examples).

Furthermore, we added two new member states, Spain and Belgium, to bring us to a membership of 19 countries and EMBL in December 2023. In parallel, we continued to influence the future of imaging through technological developments at our Nodes, participating in three Horizon Europe funded INFRA-TECH projects which launched in 2023, and by reaching over 120 imaging technologies in our portfolio.

Image data analysis services continued to thrive at our Nodes and we were awarded European funding for the foundingGIDE project, to drive the development of a global image data ecosystem.

Strategic achievements in 2023 include the finalisation and approval by our Board of our next strategic plan for 2024-2028 and the aligned Financial Plan. This commitment by our member states, along with our successful EU funding application for the EVOLVE project, means that our infrastructure has the funding it needs to strengthen our foundations and shape the future of imaging over the next five years.

Thanks to the great support and engagement from our Board members, it is clear that Euro-BioImaging is prepared for the challenges of a dynamic world, and we are confident that the strengths and assets built in our first operational phase will allow us to contribute significantly to the European Research Area and support the European and global imaging community, as we embark on our next phase of development.

NEW MEMBER STATES

NEW PROJECTS

Funded by
the European Union

On December 13, 2023, Euro-BioImaging welcomed Spain and Belgium as its newest member countries, significantly expanding imaging horizons in Europe. With these new members, six new Nodes representing seventeen imaging facilities joined Euro-BioImaging in January 2024.

To supplement our core funding and reach our ambitious objectives, Euro-BioImaging sought and was awarded two important Horizon Europe-funded projects in 2023 (HE-INFRA-2023-DEV-01).

Spain's membership to Euro-BioImaging ERIC has been achieved during the Spanish presidency of the European Union. "It has been a long process," says Inmaculada Figueroa on behalf of the Ministry of Science, Innovation and Universities, Kingdom of Spain. "All the Spanish partners congratulate us for this and are eager to start the year engaged actively in Euro-BioImaging ERIC activities."

Belgium's membership in Euro-BioImaging ERIC has received strong support from the Flemish Department of Economy, Science and Innovation and the Belgian Science Policy Office, responsible for Belgium's participation in the ESFRI Roadmap.

Michele Oleo, Department of Economy, Science and Innovation Flanders, has been actively involved in Euro-BioImaging since

the preparatory phase. She commented that "Euro-BioImaging ERIC is undoubtedly one of the strongholds in the European Research Infrastructure landscape. I am delighted that our Node will be part of this scientific community."

Laurent Ghys, of the Belgian Science Policy Office (BELSPO), who has also been following the membership process for many years, explained, "It was a long and difficult process, but we are very happy to finally achieve full member status."

Belgium has been active in Euro-BioImaging as an observer for a very long time, and full membership now gives access to Euro-BioImaging to the whole Belgian science community - opening the way to new collaborations and possible future Nodes.

The EVOLVE project (Grant Agreement #101130986) is a substantial advance in improving Euro-BioImaging's operability, capacity, and impact. EVOLVE will profoundly enhance Euro-BioImaging as a Research Infrastructure, both internally and externally. Spanning over three and a half years, the EVOLVE project perfectly aligns with Euro-BioImaging's Strategic Plan for 2024-2028. It will significantly strengthen our operation, administration, capacities for strategic partnering and capacity to facilitate innovation and excellent science. Furthermore, it will foster the family of Euro-BioImaging Nodes and Hub at the personal, institutional, national and European level.

eurobioimaging.eu/projects/evolve
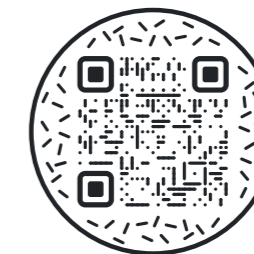
The acceptance of the foundingGIDE project (Grant Agreement #101130216) proposal by the European Commission is a significant milestone that validates the strategic importance of image data as a resource in the European and global scientific stages. This project will lay the foundation for a Global Image Data Ecosystem (GIDE) that connects different biological and biomedical image data resources across the globe to allow metadata and data sharing. GIDE will bring European research infrastructure and image data resource owners together with their counterparts from Australia (Universities of Queensland and Sydney) and Japan (RIKEN institute) to develop the basis of image data sharing, as well as engaging the global imaging community in the process.

founding-gide.eurobioimaging.eu

> " The addition of Spain and Belgium to Euro-BioImaging, bringing our total membership to 19, was a remarkable milestone to conclude the year. Their strong commitment and expertise in bioimaging align with our goals and also promise to enrich our community with invaluable insights and contributions to facilitate excellent science and innovation.
>
> **John Eriksson**
> Euro-BioImaging Director General

Scan to learn more about the **EVOLVE** project.

Scan to learn more about the **foundingGIDE** project.
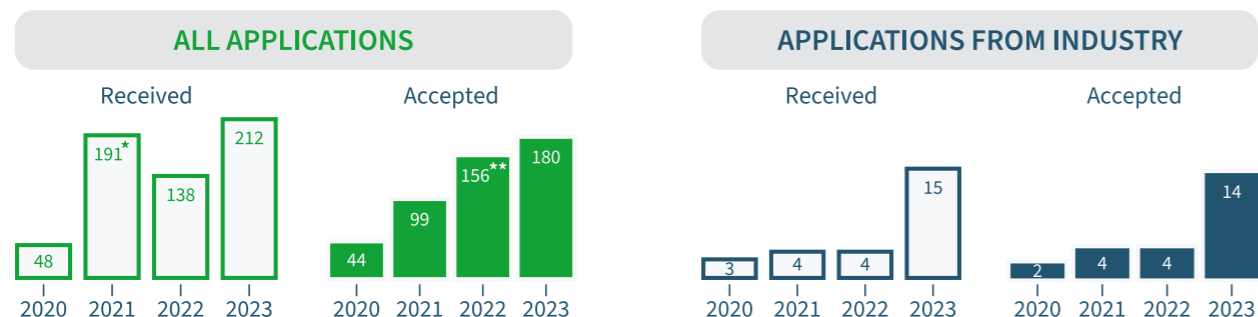
IMPACT

USER ACCESS

Euro-BioImaging creates impact by offering open access to biological and biomedical imaging technologies, expertise, data analysis services, and training. Every researcher, both from academia and industry, can apply for Euro-BioImaging services whenever they have a project requiring imaging technologies and expertise but do not have the equipment or skills to perform the experiments at their home institute. Here is how it works:

Initial consult
Potential users visit the Euro-BioImaging web portal to select a technology and a Node, or contact Euro-BioImaging directly to discuss their project and receive advice on technology and Node selection.

Access request
After the technology and Node are selected, the user fills in the request form via the Euro-BioImaging web portal: **eurobioimaging-access.eu**

Scientific advice
Applications receive scientific advice from external experts to support project development. In certain cases, no scientific check is necessary and the proposal can be fast-tracked to the technical check.

FAST TRACK

Technical advice
The selected Node confirms the technical feasibility of the planned work. Once the access request is granted, the Node contacts the users regarding practicalities.

Service provision
A successful Euro-BioImaging access request unlocks the power of imaging technologies and provides the expertise that users need to apply state-of-the-art imaging equipment to their project and analyze their results.

ABOUT OUR USERS

Euro-BioImaging is open to researchers from all backgrounds and career stages, and any country in the world. The diversity of Euro-BioImaging's growing user base is highlighted in this two-page spread. To cover our first operational period, we feature data from 2020-2023, collected in the Euro-BioImaging Web Portal (EWP).
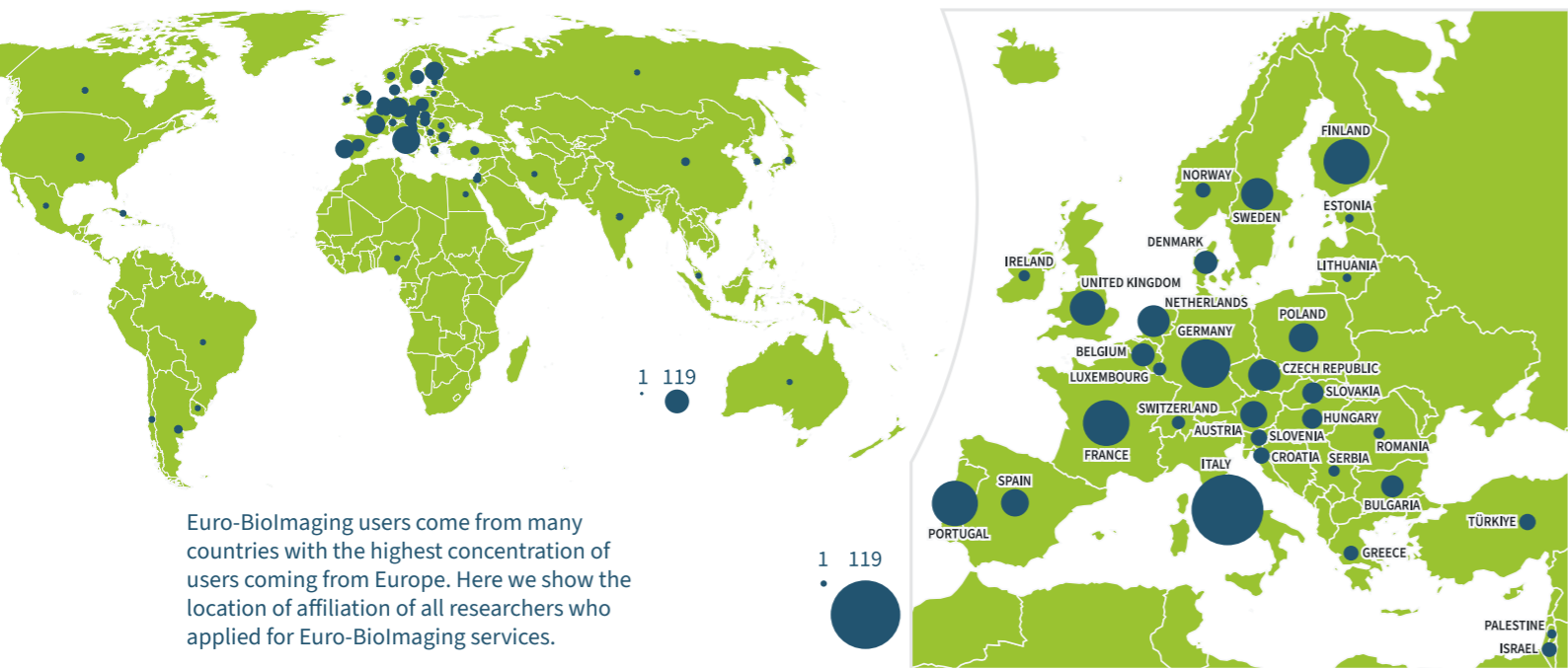
Applications for user access

ALL APPLICATIONS

Received

2020	2021	2022	2023
48	191*	138	212

Accepted

2020	2021	2022	2023
44	99	156**	180

APPLICATIONS FROM INDUSTRY

Received

2020	2021	2022	2023
3	4	4	15

Accepted

2020	2021	2022	2023
2	4	4	14

This Key Performance Indicator quantifies the total number of applications for Euro-BioImaging services that have been received in our web access portal during a given period of time, as well as all that have been accepted for access provision, respectively. The date of submission and date of approval for each application are taken into account for this KPI, resulting in some proposals being counted as received in one year and approved in the follow year. It provides clear information on the demand for our services.

(*) In 2021, the Pilot User Access Fund led to an increase in the number of submitted applications.
(**) Some of the submitted applications from the Pilot User Access Fund became accepted projects in 2022, explaining why there are more accepted applications than submitted applications in 2022.

We measure the number of applications received each year from industry users. Industry users self-identify as such during the application process and include both users from SMEs as well as large companies. It is our goal to see this type of applications increase further in the coming years.

User country of origin

1 119

1 119

Euro-BioImaging users come from many countries with the highest concentration of users coming from Europe. Here we show the location of affiliation of all researchers who applied for Euro-BioImaging services.

Variety of disciplines served

DISCIPLINES	USERS PER YEAR	%TOTAL

About half of the users' research concentrates around four disciplines

Discipline	%TOTAL
Neuroscience	17
Cell biology	15
Cancer	9
Plant biology	9

50

Discipline	%TOTAL
Method Development	8
Disease understanding and treatment development	7
Immunology	5
Developmental Biology	4
Regenerative Medicine	4
Genome Biology	3
Microbiology	3
Metabolism	3
Material Science	3

40

Discipline	%
Marine Biology	2
Stem cell	1
Cardiovascular	1
Organoid	1
Physiology	1
Biophysics	0.7
Infectious Diseases	0.7
Parasitology	0.7
Archaeology	0.4
Environmental biology	0.2
Food science	0.2
Zoology	0.2

10

%

ISIDORe USER STORIES

ISIDORe

**Funded by
the European Union**

Euro-BioImaging participates in three EU-funded INFRA-SERV projects that bring together a number of Research Infrastructures to provide services free of charge to researchers working on specific research topics. ISIDORe (GA #101046133) provides funding for research on Infectious Diseases and pandemic preparedness, canSERV (GA #101058620) provides support for cancer research, and AgroServ (GA #101058020) aims at research in agroecology. As a project launched in response to the COVID-19 pandemic, ISIDORe has already supported a large range of research projects, including at Euro-BioImaging Nodes, some of which we highlight here:

Understanding enterovirus replication in ultrastructural detail using cryo-Electron Tomography

Enteroviruses cause a range of diverse diseases in humans, including polio. Researchers from the Carlson Lab at University of Umeå in Sweden are studying how the virus forms inside human cells and how virus particles escape from infected cells. To identify the proteins involved in virus particle release, researchers Marie Sorin and Bina Kumari Singh, visited the Imaging Centre at EMBL, part of the EMBL Node, and used cryo-ET and FIB-milling.

From left to right: Marie Sorin, Zhengyi Yang, and Bina Kumari Singh examine their data in front of the cryo-ET machine at the EMBL Imaging Centre.
Photo: EMBL / PhotoLab, Massimo Del Prete

Structure of malaria pathogen identified using volumeEM

Pablo Suárez Cortés is a Postdoctoral researcher at the Max Planck Institute for Infection Biology, Berlin (Germany), working on how *Plasmodium falciparum*, the pathogen behind malaria, undergoes intricate transformations during its infection of *Anopheles* mosquitoes. In particular, Pablo aims to study secretory organelles of *Plasmodium* in its different transmission stages, but these are difficult to access and identify in vivo.

Pablo worked with the experts at the Electron Microscopy facility in České Budějovice, part of the Advanced Light & Electron Microscopy Prague Node, and combined advanced volumeEM technologies, including CLEM, Serial Blockface SEM, and Array Tomography.
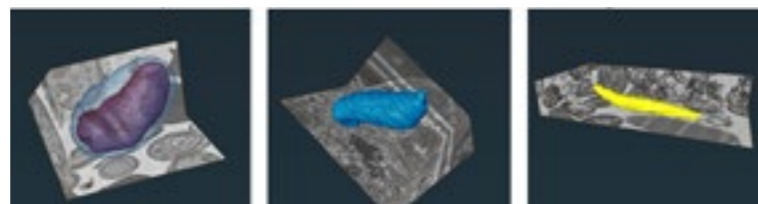
3D models of WT *P. falciparum* parasites at different transmission stages generated using SBF-SEM.

Developing image analysis tools for studying neuroinflammation linked to COVID-19

COVID-19 infection has been associated with many neurological manifestations, from neuroinflammation to impaired brain energy metabolism. In the Turku PET Centre, which is part of Euro-BioImaging's Finnish Biomedical Imaging Node, autoradiography (ARG) is used to study brain inflammation linked to COVID-19. While ARG provides high resolution images of brain tissue, analysis of the obtained data can be very laborious. With support from the ISIDORe project, an open source analysis pipeline was developed for aligning and processing ARG images of mouse brains.

The Mouse Brain Alignment Tool (MBAT) helps to increase efficiency, accuracy and reproducibility in image registration and analysis. It was co-developed by Zuzana Čočková, a neuroscientist working at Charles University, Prague, and Junel Solis, an image analyst at Turku BioImaging, part of our Finnish Advanced Microscopy Node. The Mouse Brain Alignment Tool is open-source and available on GitHub: **github.com/Turku-BioImaging/mouse-brain-alignment-tool**


User interface depicting generated ROIs overlaid on the ARG section.

Multiscale multimodal 3D analysis through Phase Contrast imaging of cardiovascular alterations in a rhesus macaque monkey model for COVID-19

The direct and indirect effects of a COVID-19 infection on cardiac function are still poorly understood, especially when it comes to their interactions with pre-existing cardiac conditions, such as hypertension and heart failure.
In order to understand at which scale the virus affects the cardiac tissues, PhD student Angelika Svetlove from the Max Planck Institute for Multidiscipinary Sciences in Göttingen, Germany, wanted to perform multiscale imaging of whole rhesus macaque hearts following SARS-CoV-2 infection.

The bright coherent X-Ray beam and a high propagation distance available at the SYRMEP beamline at the Elettra Synchrotron (Phase Contrast Imaging Flagship Node Trieste), allowed them to perform phase contrast tomography on the samples at different scales.
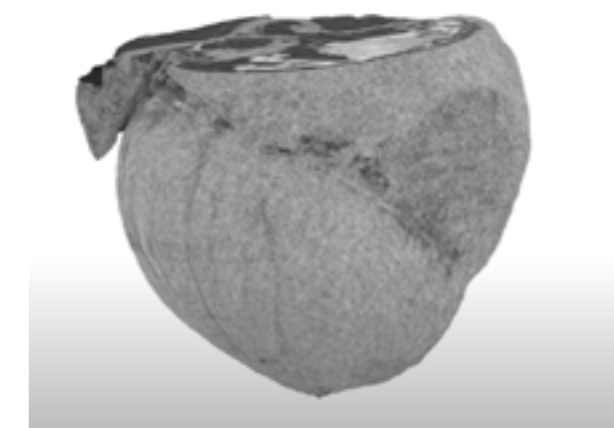
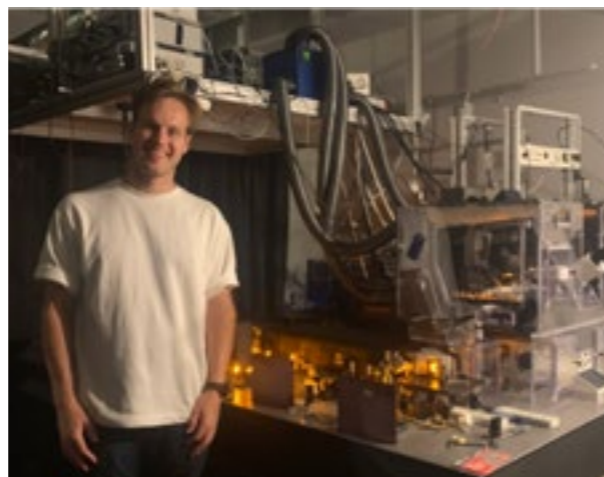
Ventral cardiac view in the overview scan.

PUBLICATIONS

Access to imaging services through Euro-BioImaging enables our users to collect high-quality data, which contributes to their scientific publications. Imaging core facilities, such as those that make up the Euro-BioImaging Nodes, as well as Euro-BioImaging itself, rely on researchers acknowledging the vital contributions of the experts in the imaging core facilities in their publications. We are delighted to highlight some publications from our users that were released in 2023.

In 2023, Euro-BioImaging Nodes supported **2086 publications**

SorCS2 binds progranulin to regulate motor neuron development

Dr. Alena Salasova, from the Danish Research Institute of Translational Neuroscience at Aarhus University, Denmark, worked with our Advanced Light Microscopy and Medical Imaging Node in Brno, Czech Republic, on this publication in Cell Reports. The beautiful full mouse embryos images were featured on the cover.

3D reconstruction of a full mouse embryo, taken from Thomasen, Pernille Bogetofte, et al., 2023. https://doi.org/10.1016/j.celrep.2023.113333. CC BY-NC-4.0.

Shadow imaging for panoptical visualization of brain tissue in vivo

Dr. Andrew Boyce, University of Calgary, Canada, contributed to a paper in Nature Communications (see caption), based on a project conducted at the French BioImaging Node funded by the Euro-BioImaging Pilot Access Fund.

Andrew Boyce with the SUSHI machine at the Bordeaux Imaging Centre (France-BioImaging). Dembitskaya, Y., Boyce, A.K.J., Idziak, A. et al., 2023. https://doi.org/10.1038/s41467-023-42055-2

Osteoporosis and COVID-19: Detected similarities in bone lacunar-level alterations via combined AI and advanced synchrotron testing

Dr. Laura Vergani, from Politecnico of Milan, Italy, contributed to this publication in Materials & Design, based on a collaboration with our Phase Contrast Imaging Node in Trieste.

Localization of the bone failure band, in the proximity of the maximum principal stresses region. Image from Buccino et al., 2023. https://doi.org/10.1016/j.matdes.2023.112087. CC BY-NC-ND 4.0.

Subcutaneous Administration of a Zwitterionic Chitosan-Based Hydrogel for Controlled Spatiotemporal Release of Monoclonal Antibodies

Francois Lux, from the University of Lyon, France, worked with the Molecular Imaging Italian Node on a study on the biodistribution, tumor uptake and excretion of a zwitterionic chitosan-based hydrogel, recently published in Advanced Materials.

Representative fluorescence images of the degradation kinetics. Gréa et al., 2023. https://doi.org/10.1002/adma.202308738. CC BY-NC-4.0.

Spatiotemporal monitoring of hard tissue development reveals unknown features of tooth and bone development
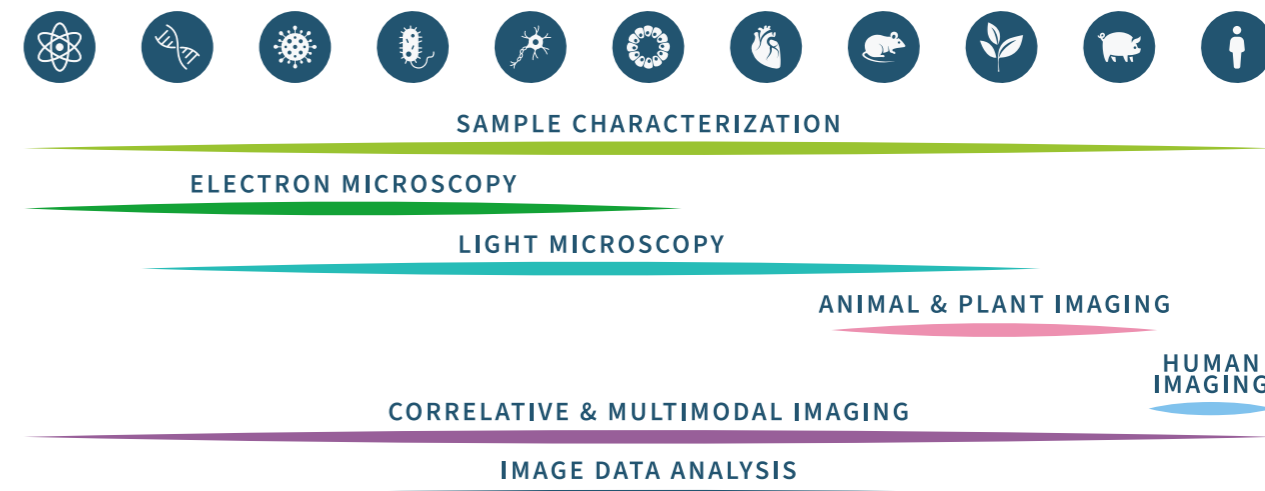
Marcos Gonzalez Lopez came to visit the Advanced Light Microscopy and Medical Imaging Node in Brno, Czech Republic, as a Master student and his now pursuing his PhD in Brno. His work supported by the imaging facility has been published in Science Advances.

3D imaging of mandibles taken from Gonzalez-Lopez et al, 2023. https://www.science.org/doi/10.1126/sciadv.adi0482. CC BY 4.0.

TECHNOLOGY PORTFOLIO

SAMPLE CHARACTERIZATION

ELECTRON MICROSCOPY

LIGHT MICROSCOPY

ANIMAL & PLANT IMAGING

HUMAN IMAGING

CORRELATIVE & MULTIMODAL IMAGING

IMAGE DATA ANALYSIS
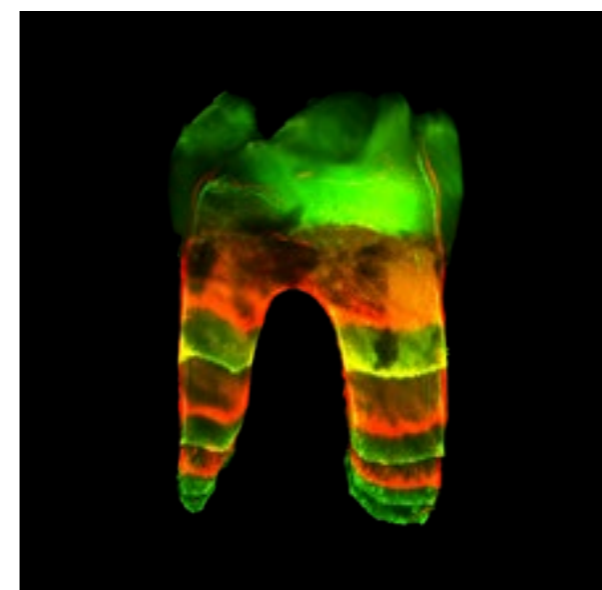
Euro-BioImaging provides a large and inclusive portfolio of imaging technologies.

INNOVATION

Innovation in imaging technologies in life sciences is continuous, fast, and exciting. To remain at the technological forefront, Euro-BioImaging has established a work flow to ensure that new technologies are continuously integrated into our portfolio. The expert imaging facility staff at the Euro-BioImaging Nodes are developing many new imaging methods and are making the latest developments available in open access. We make sure that these new technologies are quality-controlled and work appropriately in open access through our Proof-of-Concept study (PCS) process. Through this process, the latest cutting-edge imaging technologies - such as MINFLUC, spatial transcriptomics and Magnetic Particle Imaging, become available to all researchers.

Technology portfolio evolution over time

NUMBER OF TECHNOLOGIES

○ PROOF-OF-CONCEPT

✓ ACCEPTED

Today the Euro-BioImaging technology portfolio includes 120 biological & biomedical imaging technologies and image data analysis services.

2020   2021   2022   2023
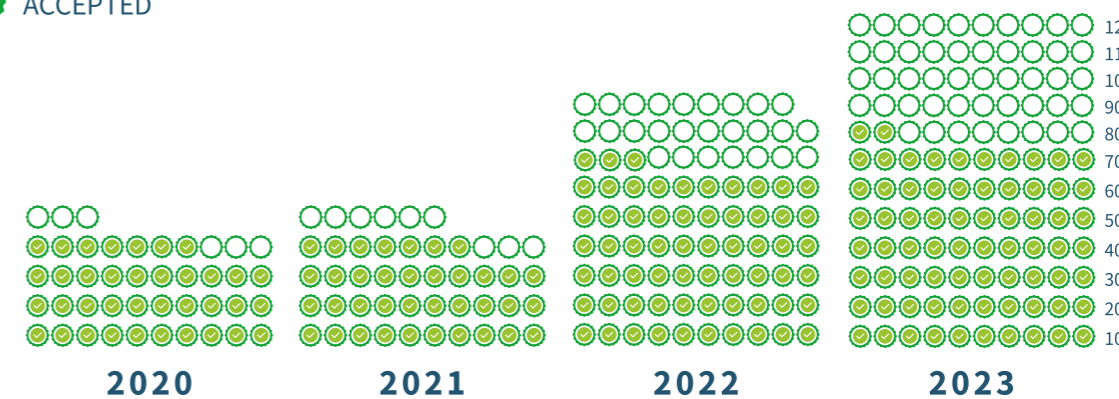
EXPANDING OUR PORTFOLIO

During 2023, three technologies have concluded the PCS process and were evaluated by our Scientific Advisory Board, before being submitted to the Euro-BioImaging Board for approval in May 2024. These technologies are in vivo Photoacoustic Imaging (PAI), Magnetoencephalography (MEG), and bimodal Optical Coherence / PhotoAcoustic Tomography (OCT/PAT).

In addition to the 22 technologies already undergoing Proof-of-Concept studies (PCS) during 2023, several new technologies joined their rank in 2023. These new PCS technologies are accessible at the Euro-BioImaging Nodes in open access and are being tested for their suitability for open access, technology readiness and user interest. We here highlight some of these new technologies, including two new technologies specifically answering to the increasing interest in plant imaging.

Photoacoustic imaging (PAI)

Photoacoustic imaging is an emerging and powerful technology combining the high-contrast and the spectroscopic features of optical imaging in the near infrared region (NIR) with the high spatial-resolution and tissue penetration capability of ultrasound imaging. It is mainly used to assess vascular volume and oxygenation levels, with applications in oncology, cardiology, neurology and others. It has increased spatial resolution and penetration depth compared to optical imaging. **Now available at six Euro-BioImaging Nodes.**
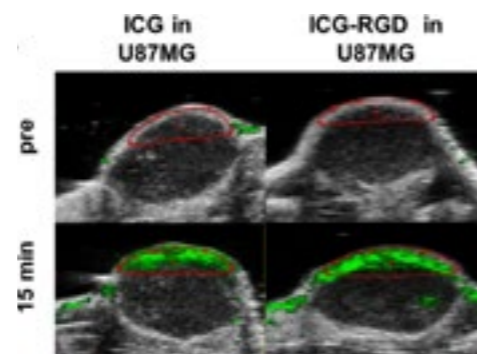
PAI images of a mouse tumor region, Molecular Imaging Italian Node.

Magnetoencephalography (MEG)

Magnetoencephalography measures minute magnetic fields produced by neuronal currents of the brain. It is optimal for detecting neuronal currents at the fissural cortex of the brain offering a direct, non-invasive measure, e.g., of the primary sensory signals and epileptic discharges. **Now available at one Euro-BioImaging Node.**

MEG at the Finnish Biomedical Imaging Node, Aalto Neuroimaging.

Bimodal PAT/OCT

Optical Coherence Tomography (OCT) uses scattering contrast for the reconstruction of inner structures of biological samples in vivo. It can be combined with PhotoAcoustic Tomography (PAT) or PhotoAcoustic Microscopy (PAM), giving access to complementary information. Bimodal OCT/PAT(PAM) finds application in small animal imaging and skin imaging. **Now available at one Euro-BioImaging Node.**

OCT/PAM of Zebrafish at the Austrian BioImaging Node.

Magnetic Particle Imaging at CAPI Node.

Magnetic Particle Imaging

For tracking cells and/or nanoparticles in animals and ex-vivo specimens, the CAPI Node in Prague now offers Magnetic Particle Imaging, a tomographic method based on detection of nonlinear response of superparamagnetic tracers to alternating magnetic fields.

Portable THz imaging, Molecular Imaging Italian Node.

TeraHertz Imaging

TeraHertz Imaging consists in illuminating an object with a pulsed terahertz radiation and capturing the response through sensors in the same spectral region. The radiation is better absorbed by some molecules, like water. This technology is ideal to observe dry and very thin objects, such as leaves, dried fruits and nuts. This mobile field setup is available at the Molecular Imaging Italian Node.

View from inside the PHENOPlant facility at the Vienna BioCenter Core Facilities.

Plant Phenotyping

Plant Phenotyping is designed for non-invasive, morphometric and physiological high-throughput phenotyping of small to mid-size crop plants. The PHENOPlant system at the Austria BioImaging Node is loaded with sensors: multi-excitation PAM kinetic chlorophyll fluorescence imaging, RGB, hyperspectral imaging, thermal imaging, and 3D scanning. Plants can be imaged under abiotic and biotic stress responses or treatments.

TECHNOLOGY DEVELOPMENT AT NODES

Random Illumination Microscopy at French BioImaging Node

The basic idea of Random Illumination Microscopy (RIM) is to use the speckle of the illumination laser in wide field to create a structured illumination pattern at the diffraction limit. By varying the pattern from image to image using a diffracting element, stacks of images can be acquired on a camera which corresponds to a cumulative homogeneous illumination.

From this we are able to reconstruct a super-resolved image at the focal plane with unprecedented optical sectioning. Marc Tramier, scientific director of MRic (Microscopy Rennes Imaging Centre), part of the Bretagne-Loire sub-Node of the French BioImaging Node, transferred the prototype from the developer lab in Toulouse to his facility and offers it as a user-friendly open access system.

RIM allows researchers to acquire super-resolved images in depth with very low amount of light at high speed, making the method very gentle for live imaging.

Comparison between confocal microscopy (bottom), airyscan (center), and RIM (top) shows a *C.elegans* with a depth > 50µm and a spatial resolution of around 100 nm.
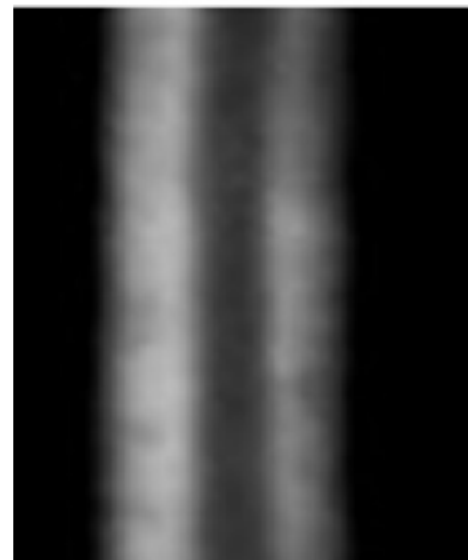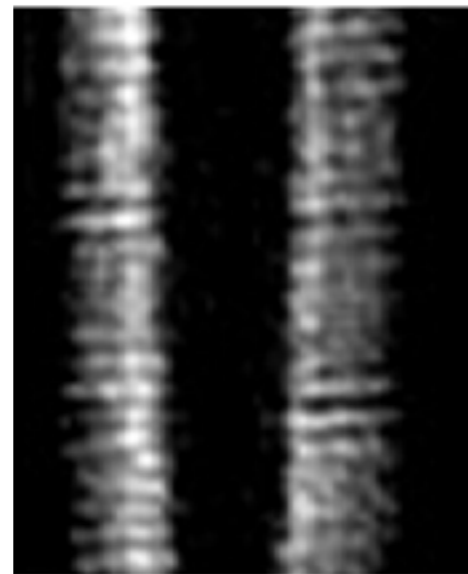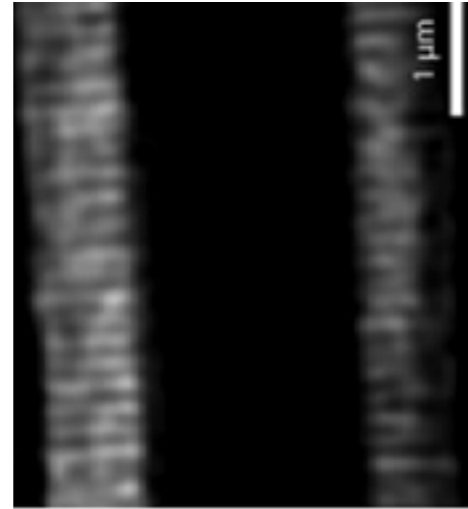
Portable PET Imaging for Plants at the DIMP NEUROMED Node

While you may be more familiar with positron emission tomography (PET) from medical research or hospitals, applying this nuclear imaging technology to plants allows researchers to track many aspects of plant physiology. For instance, you can quantify the fluid flow dynamics in the plants' vascular system, follow changes of CO_2 metabolism, or drought stress responses.

These kinds of observations made live and in intact plants can be very useful in understanding plant development and how they respond to the environment, particularly environmental stress factors. Nicola D'Ascenzo and his team at the DIMP NEUROMED Node are working on developing new PET systems adapted to plants - with a particular focus on portable PET machine that can be used in the field to track short term responses of plants to environmental circumstances or treatments.

At the same time, they are also pushing the boundaries of signal processing method, with the unique capability to directly detect the dynamic evolution of noise correlations between estimated and measured variables in the PET measurements.

Nicola d'Ascenzo, DIMP NEUROMED Node, with the portable PET system prototype.

Preclinical MR Elastography at the NORMOLIM Node

In about half of patients with heart failure, the contraction of the heart chamber is relatively normal, while the filling of the heart with blood is inhibited due to stiffness of the left heart chamber. To develop improved treatments for patients with such heart stiffness, understanding how it occurs and changes is essential. The cutting-edge technique which is capable to quantify heart stiffness is MR Elastography (MRE). The University of Oslo, part of the NORMOLIM Node, demonstrates for the first time the feasibility and repeatability of cardiac MRE in rats by using a specialized cardiac MRE sequence. The results show that dynamic cardiac stiffness increases from early systole to end systole and decreases in diastole. NORMOLIM will apply MRE to rat models of various cardiac diseases to understand the mechanisms of these diseases. Simultaneously, the technique will be translated to clinical patients for disease prognosis and diagnosis.

Brillouin microscopy at Austria BioImaging

The physical properties of cells impact a broad range of cellular processes, including metastatic potential, but measuring cellular mechanics without disrupting the cells is a complex task. Kareem Elsayad and his team at the Center for Anatomy and Cell Biology, a part of the Medical Imaging Cluster at MedUni Vienna within the Austrian BioImaging Node, are applying Brillouin Light Scattering to image intricate mechanical features within the cell nucleus, all in real-time and within living cells. This method relies on the scattering of light from thermal vibrations in the sample and can allow the scientists to calculate the sample's elasticity and viscosity.

As the method uses the interaction of light directly with the sample, the cells to be measure do not have to be specifically prepared, labelled or placed on specific substrates.
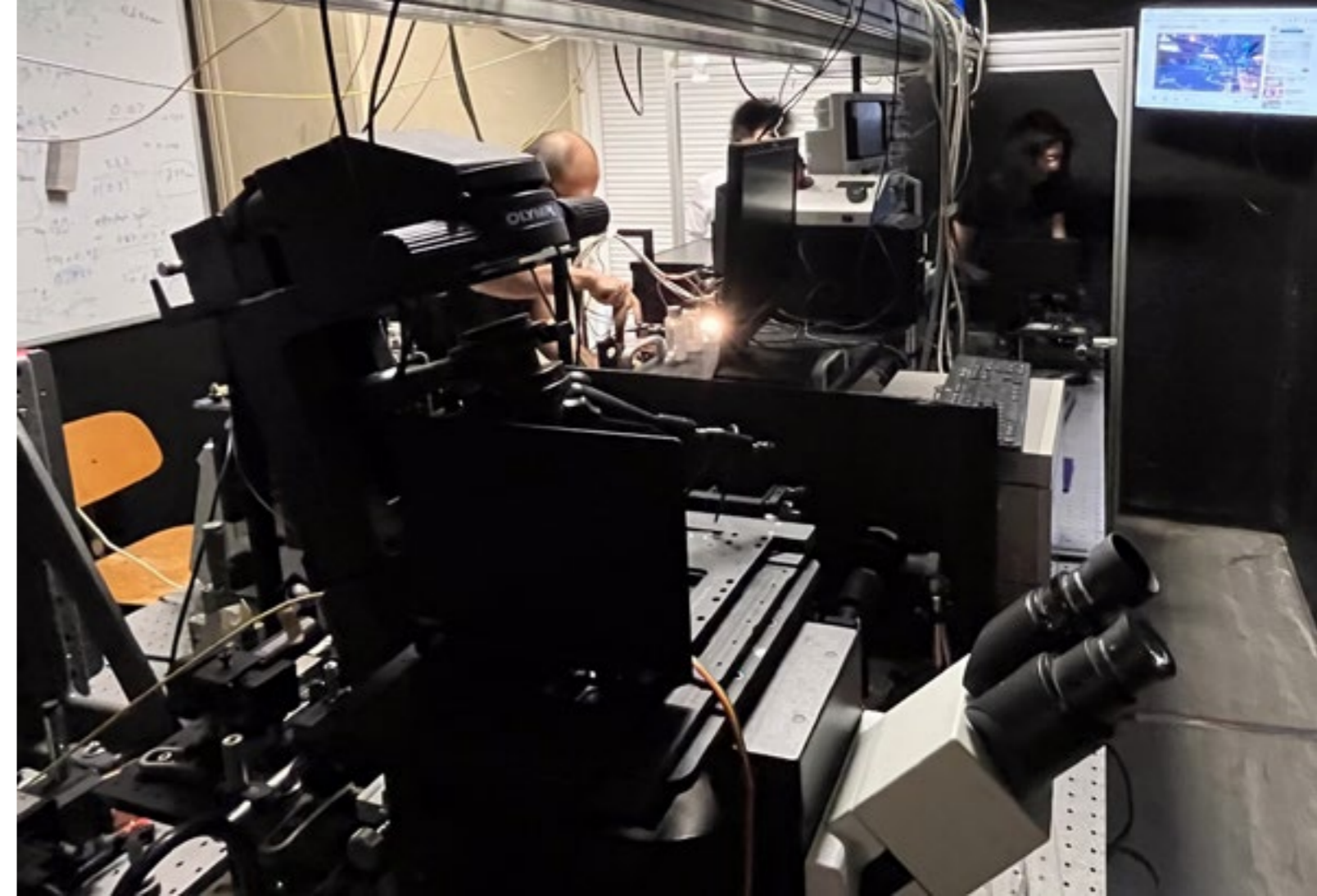
The Brillouin Light Scattering Microscopy setup at the Center for Anatomy and Cell Biology, MedUni Vienna (Austrian BioImaging/CMI Node)
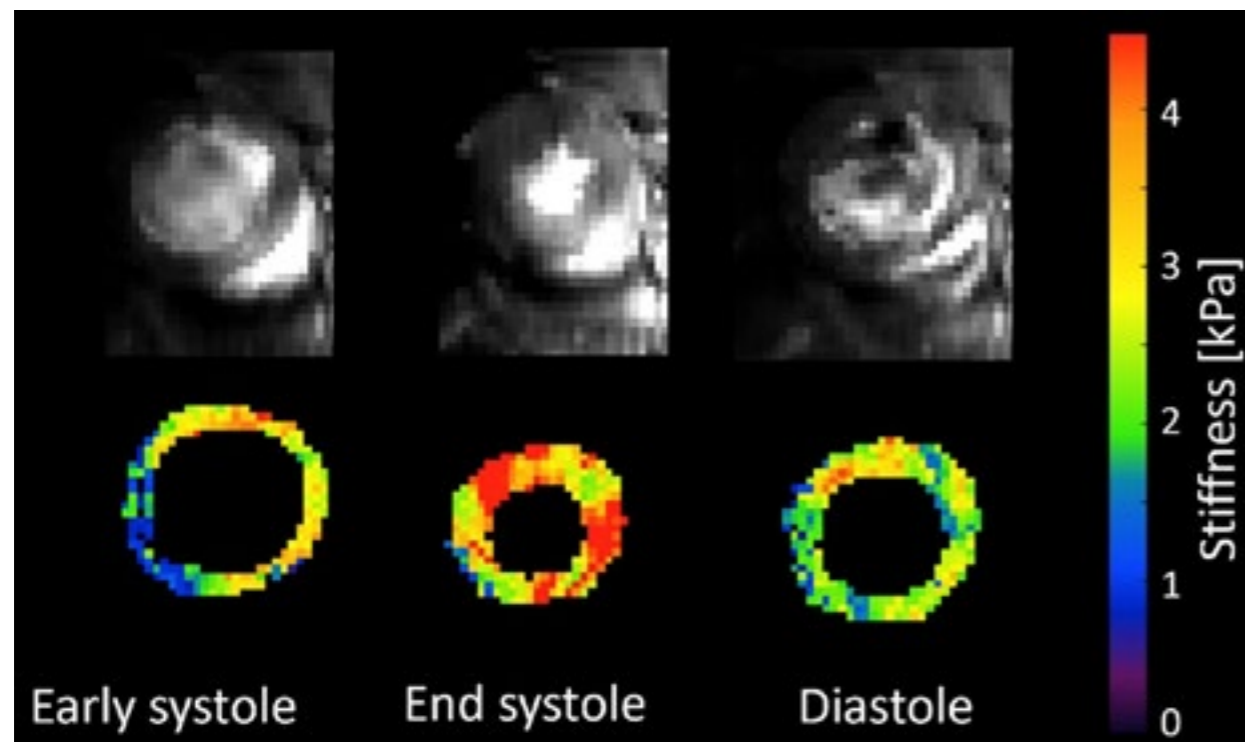
Magnitude images and stiffness maps from a representative rat (Unpublished data from Lisa Smith, IEMF, OUS, Norway).

Micro-PIXE at SiMBION Node

In-air PIXE developments by the imaging facility at Jožef Stefan Institute, part of our SiMBION Node. To learn more, read the paper: Isaković et al, A parallel-beam wavelength-dispersive X-ray emission spectrometer for high energy resolution in-air micro-PIXE analysis, Journal of Analytical Atomic Spectrometry, Volume 38, Issue 5, Pages 1164 - 117213 April 2023. Above image is Figure 2 from Isaković et al, 2023. https://doi.org/10.1039/D3JA00019B. CC BY-NC 3.0.

CT Imaging at the Phase Contrast Flagship Node Trieste

Imaging organs inside patients with the aim of detecting developing diseases faces many challenges. "Synchrotron radiation-based phase contrast imaging (SRCT) is capable of very high spatial and temporal resolutions. It is therefore extremely useful for studying lesions, cancer nodules or fibrosis," explains Giuliana Tromba, from our Phase Contrast Imaging Flagship Node at the Elettra Synchrotron in Trieste.

The unique properties of SRCT make it an interesting target to use in medical imaging applications. Christian Dullin, an expert in preclinical studies at the University Medical Center Göttingen, has been collaborating with Giuliana Tromba for over 5 years, to push the resolution limit in phase contrast imaging on phantom lung models. Their newest setup results in high-resolution tomographic images with 7x better details and 2-3 times less exposure than traditional CT. This means that the setup allows for ex vivo imaging of intact human organs, such as the lung, at clinical relevant X-Ray dose levels that would allow to further translate the technology to patients.

The set-up is based on a novel custom-made human-size chest based on a pig lung phantom model to test and develop these imaging applications further. A specific example of where this setup could be a game-changer is in detecting the early formation of lung fibrosis, not visible in conventional CT.
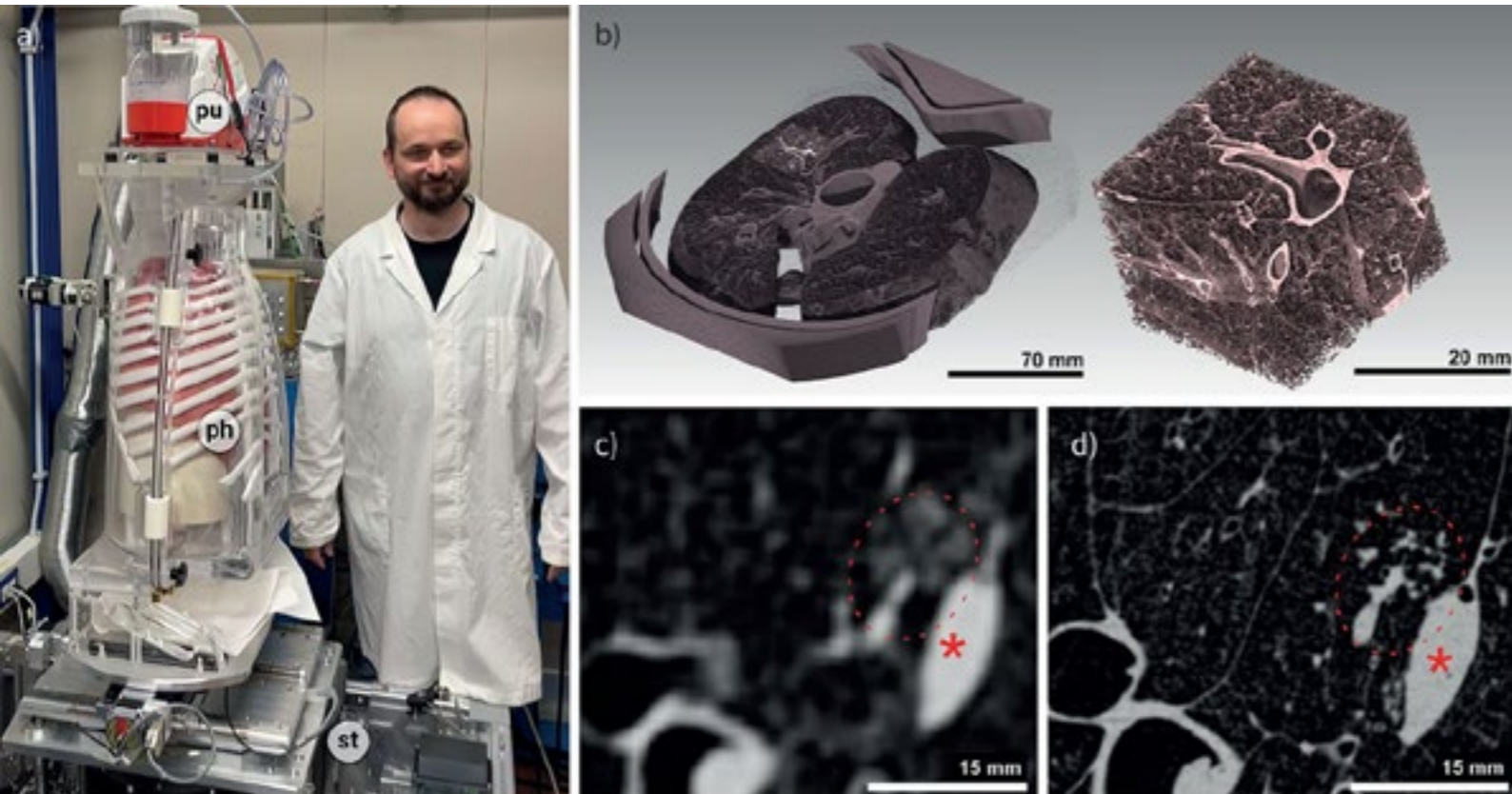
Lung imaging setup at the beam line, including the specially-designed positioning stage and resulting higher resolution. Figure from Dullin et al., European Respiratory Journal, 2024. https://erj.ersjournals.com/content/63/3/2301604. CC BY 4.0.

TECHNOLOGIES OF THE YEAR

In the graphic below, we are pleased to report on the most requested technologies at Euro-BioImaging between 2022 and 2023. Data source is the Euro-BIoImaging Web Portal (EWP).

TOP 4 MOST REQUESTED TECHNOLOGIES

BIOLOGICAL IMAGING

1 Confocal Microscopy
2 Volume Electron Microscopy
3 cryo-Electron Tomography
4 Single Molecule Localisation Microscopy

BIOMEDICAL IMAGING

1 Magnetic Resonance Imaging
2 PET/CT
3 Phase Contrast Imaging
4 in vivo Optical Imaging

Volume EM - Spotlight Technology 2023

Selected by Nature as one of seven "Technologies to watch in 2023" volume Electron Microscopy (vEM) in its various implementations has been growing as an increasingly widely requested and available imaging technology. The interest is understandable, as it provides the ultrastructural resolution of Electron Microscopy in larger volumes, including entire cells and beyond.

Through Euro-BioImaging six different types of vEM are accessible to researchers at 14 Euro-BioImaging Nodes.

Image by Ilya Belevich, University of Helsinki, FiAM Node
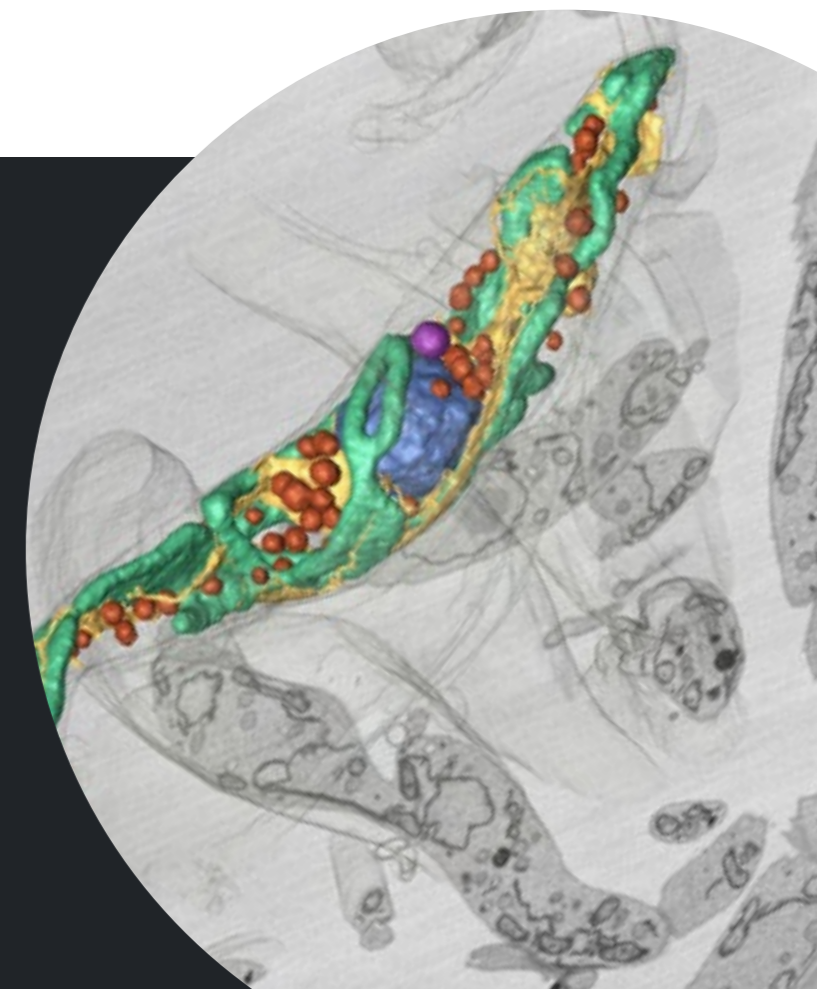
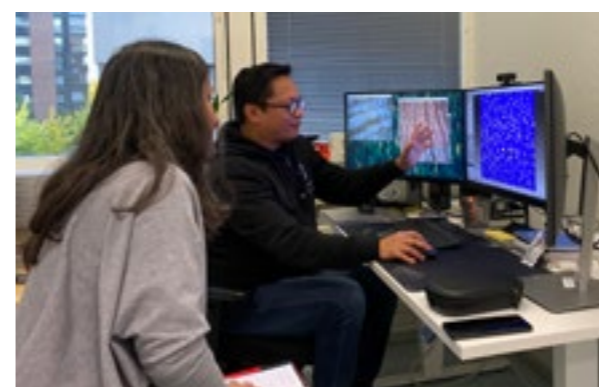# DATA SERVICES

IMAGE DATA ANALYSIS AT NODES

To support production of quality data, analysis methods and an extended data life cycle, Euro-BioImaging offers Image Data Services for the benefit of the whole imaging community. Together with our expert Nodes staff, we support adoption of practices that yield FAIR (Findable, Accessible, Interoperable and Reusable) image data and analysis workflows. In addition to directly supporting users with analysis of their data, many of the Bioimage Analysists at our Nodes are involved in developing and actively maintaining Open image analysis tools and libraries, which serve Euro-BioImaging users as well as the global scientific community.
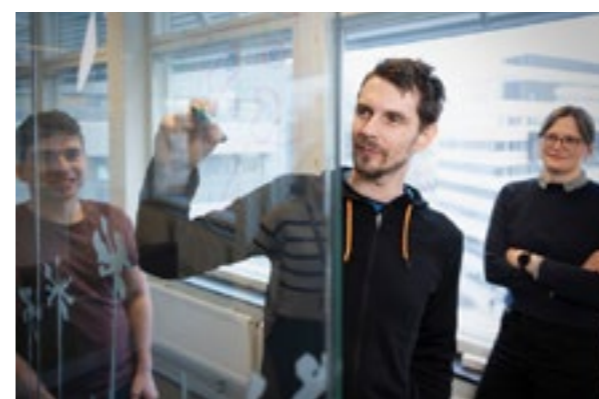
227

staff members provide image analysis and image data management services at Euro-BioImaging Nodes.

Christophe Avenel in discussion with the BIIF team (NMI Sweden).

17

requests for biological and biomedical image data analysis as a stand-alone service in 2023.

Image Data Analyst Junel Solis, Turku BioImaging, consults with a user (FiAM Node).

10+

Nodes provided Image Data Analysis services as part of our PCS in 2023.

Brainstorm session. Photo courtesy of Population Imaging Node, Rotterdam.

IMAGE DATA SERVICES FOR USERS

Since 2022, Euro-BioImaging offers its users Image Data Analysis (IDA) as a standalone service for image data irrespective of where it was acquired. Below is a compelling example of how Euro-BioImaging Nodes offer Image Data Analysis as a service.

Case study: Image Data Analysis Service

Michaela Blažíková is a Bioimage Analyst at the Institute of Molecular Genetics of the Czech Academy of Sciences, part of Euro-BioImaging's Advanced Light & Electron Microscopy Node in Prague.

In September 2022, Michaela took up an IDA project to support the research of Shiladitya Mitra from the Max Planck Institute for Psychiatry in Germany who was working on mice stress and behavior analysis. Shiladitya had a big collection of mouse brain images from his home institute acquired with a light-sheet microscope that they wanted to share on the Allen Brain Atlas. When he contacted Michaela, the data acquisition and pre-processing had already been accomplished: the clearing of mice brains and imaging was done at MPI and the data were already stitched and fused. The problem was that for final analysis and annotation, Shiladitya and his team planned to use an already published analysis pipeline based

on specific tools, know-how and hardware they didn't have ready access to.
At our Prague Node, Michaela had the right computational skills, software licenses, know-how, and access to high performance computing power needed to finalize the project.
The project was completed in October 2023. Michaela and Shiladitya presented their results at the Euro-BioImaging User Forum on "Image Data". Their presentation underscored the benefits of outsourcing part of a complex project.

◀ Scan to watch the presentation of the Image Data Analysis Service case study

What is image data analysis as a stand-alone service?

Our Euro-BioImaging Nodes can provide users a variety of biological and biomedical image data analysis services including:
• Image denoising, registration, segmentation, tracking, and many other image analysis procedures applied to a wide variety of image datasets
• Data workflows, bespoke analysis tools including implementation of machine learning methods
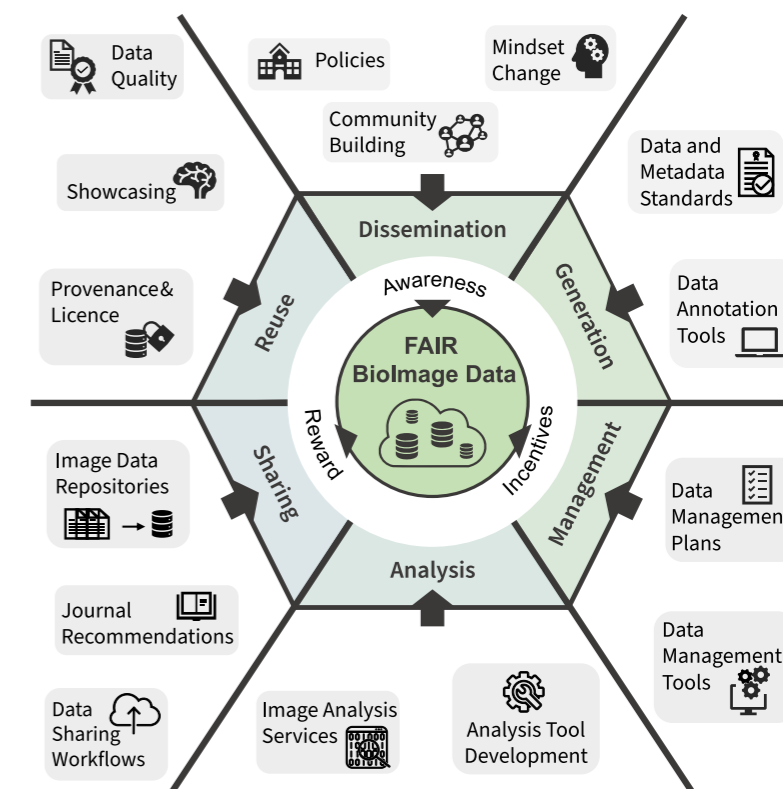• Access to high performance computing and specialised software

FAIR IMAGE DATA

Euro-BioImaging supports the development of a FAIR bioimage data ecosystem. We offer guidelines, training and direct support for producing open, FAIR Image data. Scientific data needs to be created with longevity in mind to follow the digital transition. The FAIR principles accelerate scientific progress by enabling data to be more readily incorporated into research projects, improving transparency and boosting scientific collaborations.

BioImaging Communities' Path to FAIR

Euro-BioImaging has published a review article on "Building a FAIR image data ecosystem for microscopy communities" in the journal Histochemistry and Cell Biology. It highlights the many efforts and solutions to address the challenges on the road to FAIR bioimage data that are currently being developed by the microscopy community and summarises how different stakeholders, including Research Infrastructures, are shaping the FAIR data ecosystem. **https://doi.org/10.1007/s00418-023-02203-7**

This figure represents the six facets of FAIR bioimaging data coupled with the approaches and tools under active development by the community. Further improving all of these areas still requires awareness, incentives, and rewards to move toward the ultimate goal of FAIR bioimaging data. (Kemmer et al., 2023. https://doi.org/10.1007/s00418-023-02203-7. CC BY)

Establishing Image Data Stewardship

Within the BY-COVID project (Grant Agreement # 101046203), our FAIR Image Data Steward drives the mobilisation of infectious disease datasets from our Nodes to the bioimaging repositories. Our Data Steward provides one-on-one guidance in all stages of the data lifecycle, from project planning to data deposition. In this way we reduce the barriers and streamline the deposition process, resulting in more datasets for potential reuse.

Providing training on FAIR data

In March 2023, we held our first online training on FAIR data. This open workshop provided over 100 participants easy steps towards FAIR bioimage data and highlighted user success stories. We showcased various bioimage data repositories and gave an outlook on latest community developments supported by Euro-BioImaging such as AI-ready datasets and next-generation file formats.

BIOIMAGE DATA REPOSITORIES

As one cornerstone of FAIR data, Euro-BioImaging strongly encourages data sharing through dedicated bioimage repositories. To this end, we are supporting and shaping the existing ecosystem of open archives and developing solutions in areas of need.

Support for Open Bioimage Repositories

Euro-BioImaging works closely with various dedicated bioimage data repositories, mediating user interaction and influx of quality data. In particular our data steward works towards improving data deposition pathways which allows for a more seamless and straightforward uptake of data from the community. At Euro-BioImaging's initiative, the BioImage Archive has made it possible to credit data stewards involved in supporting dataset submission. This is an important step towards recognizing the time and effort that goes into ensuring high data quality.

BioImage Archive

IDR

EMPIAR

Developing a repository for preclinical metadata - PIDAR

The Preclinical Image DAtaset Repository (PIDAR) is a public repository of metadata information describing preclinical image datasets from any imaging modality. Hosted by the University of Turin, it catalogs pre-clinical datasets associated with peer-reviewed publications. PIDAR aims to improve the FAIRness of preclinical image datasets through improved discoverability and curation. The imaging metadata are organized as "collections" defined by a common disease, image modality or sub type (MRI, CT, PET, etc) or research focus, through structured metadata models curated with selected ontologies.
https://pidar.hpc4ai.unito.it/

Data sharing showcase: Making SARS-CoV-2 imaging data openly available

Using imaging on reconstituted bronchial epithelia from adult and child donors, performed at the Bordeaux Imaging Center, French BioImaging Node, Guillaume Beucher from Harald Wodrich's team described a unique mechanism of spread of SARS-CoV-2 infection. Through a collaboration of our data steward with the group's engineer, Nicolas Landrein, the full dataset comprising widefield, confocal and electron microscopy of SARS-CoV-2 infected lung tissue was deposited to the BioImage Archive. Using the community-developed metadata standard REMBI, the dataset is now reusable for future research on SARS-CoV-2 and similar diseases.
https://www.ebi.ac.uk/biostudies/BioImages/studies/S-BIAD677
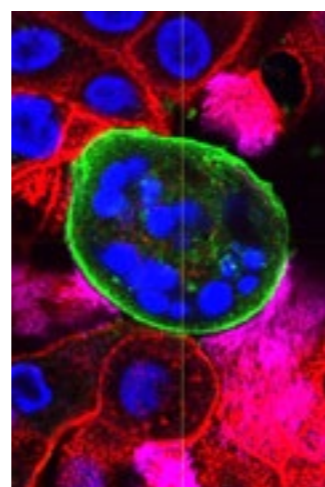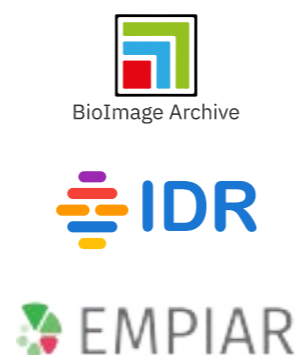
SARS-CoV-2 dataset shared in the BioImage Archive.

HIGHLIGHT: IMAGE DATA IN THE CLOUD

For efficient image data management and analysis, large and complex datasets require specialised solutions, including those supported by cloud resources. Euro-BioImaging, supported by European projects, provides technical solutions for cloud compatible image data formats and workflows for the global community.

BatchConvert: A versatile solution for high-throughput parallelized conversion of image data to open formats.

BatchConvert is a performant command line tool that facilitates conversion of image data collections to either of the standard open formats OME-TIFF or OME-Zarr. Built upon the workflow orchestrator Nextflow, BatchConvert commands trigger concurrent workflows that couple the conversion process to data transfer.

BatchConvert readily runs on Slurm-managed HPC clusters, which requires the user to specify only a single command line argument. Other features of BatchConvert include support for multiple modes of conversion and extensive options for input data filtering.

As such, local and remote data storage can be specified as the input source or the output destination, saving the user the upload/download processes. This also allows the user to submit the output datasets automatically to the BioImage Archive.
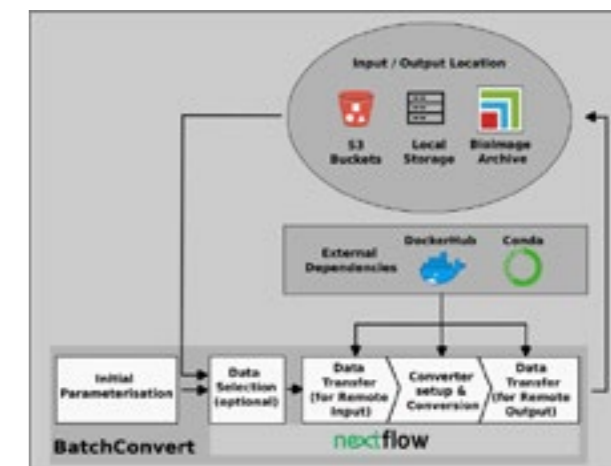
The architecture of BatchConvert. BatchConvert was developed by Euro-BioImaging Image Data Specialist Bugra Özdemir, as part of our work in the EOSC Future project (GA #101017536).

The user can parameterize the conversion workflow by either passing arguments directly to the command line or using a separate interactive configuration step. Once the command is run, Nextflow consumes the parameters to generate and execute the workflow, which handles the data conversion and, optionally, the data transfer to and from the remote storage.

🌐	**BatchConvert**	https://github.com/Euro-BioImaging/BatchConvert https://anaconda.org/Euro-BioImaging/batchconvert
📄	**BatchConvert**	https://doi.org/10.3897/arphapreprints.e116669
	NGFF community	https://doi.org/10.1007/s00418-023-02209-1

OUTREACH

COMMUNITY

Euro-BioImaging works closely with an extensive and varied network of stakeholders. This puts us in a unique position to foster a strong, interdisciplinary collaboration environment striving towards open science. Through our actions with different stakeholders, we are involved in a number of activities that bring added-value for research, innovation, and technology and strengthen the overall competitiveness of the European Research Area - and beyond. In the next pages, discover some of the ways in which we interact with our stakeholders.

STAKEHOLDERS OF EURO-BIOIMAGING
AN OVERVIEW

SCIENTIFIC COMMUNITY

COMMUNITY OF NODES

INDUSTRY PARTNERS

RESEARCH INSTITUTIONS & UNIVERSITIES

PARTNER RESEARCH INFRASTRUCTURES & NETWORKS

EUROPEAN COMMISSION & MEMBER STATES

GOVERNMENTAL & FUNDING AGENCIES

GENERAL PUBLIC

In 2023, we engaged with the scientific community at a record number of conferences & community events. We also visited our Nodes and presented Euro-BioImaging at Node events. We participated in Hackathons and contributed to training courses with potential users. We met with policy makers and European stakeholders at high-level policy events and engaged with our Research Infrastructure partners at EU-funded project meetings. In addition, Euro-BioImaging organized a number of online events for key stakeholders, namely Nodes, users,

researchers, and members of the biological and biomedical imaging communities. We also engaged with Node staff, researchers and industry colleagues via our Expert Groups. In addition, we contributed to events organized by the Euro-BioImaging Industry Board and developed our international relations by working with stakeholders in Latin America, Australia, and in Africa via Global BioImaging. In these pages of the Annual Report, we present some highlights of the year.

John Eriksson presents the Euro-BioImaging technology portfolio at the Bridging Cancer Frontiers event in Turku, Finland.

Rafael Diaz and Marcela Rivera talk about Euro-BioImaging with students at the Organ on a Chip conference in Helsinki, Finland.

Johanna Bischof and UK Node manager Georgina Fletcher at mmc2023 in Manchester, UK.

Susanne Vainio and Alessandra Viale at WMIC in Prague.

EMIM 2023 in Salzburg, Austria.

Austrian BioImaging Director, Baubak Bajoghli, hosted Euro-BioImaging Med-Hub & Bio-Hub Section directors and Med-Hub colleagues in Vienna in March 2023.

Johanna Bischof presents Euro-BioImaging at the Congress of the Brazilian Society of Microscopy and Microanalysis in Brazil.

Euro-BioImaging Hub team, France-BioImaging and Israel BioImaging Node staff at the ANERIS meeting in Barcelona, Spain.

Euro-BioImaging had a booth with NL–BioImaging at ELMI 2023 in Noordwijkerhout, The Netherlands, complete with a visit from Antonie van Leeuwenhoek.

OUR EVENTS

Euro-BioImaging organises a number of online events that are free and open to the community. In 2023, attendance at our online events soared, as you will see on p.53 in our Digital Communications overview.

Virtual Pub

In 2023, Euro-BioImaging continued to organize the online Virtual Pub events, a free weekly lecture series, open to the entire imaging community. Topics include new biological and biomedical imaging technologies, image analysis, and other topics of interest to the imaging community. In 2023, we organised Virtual Pubs once a month in collaboration with the volumeEM community and the COMULISglobe community. We also organised five Special Edition Virtual Pubs on topics like Open Hardware, Infectious Diseases, and Image Data Analysis.

User Forum

Designed to highlight the importance of imaging to different research areas, the Euro-BioImaging User Forum takes place twice a year and features keynote presentations from prominent scientists as well as presentations from users at our Nodes. In 2023, we explored how imaging supports cardiovascular research and plant biology. Both events attracted researchers, students, core facility staff, policy makers and industry representatives. We were pleased that the 'Understanding Plant Biology' event also attracted members of the AgroServ project consortium.

▶ Scan to watch the Virtual Pub and User Forum recordings.

Conferences & Meetings

37
Community conferences & events

12
Policy events

8
Node visits & events

4
Training events

20
EU project meetings
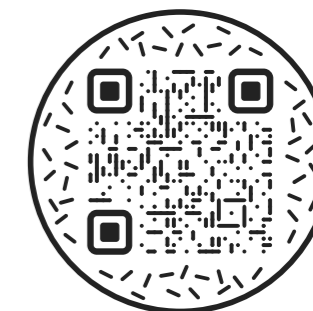
The Virtual Pub in 2023

14
Presentations from the Nodes (incl. Special Editions)

5
Special Edition of the Virtual Pub

5
Correlative Imaging series talks with COMULISglobe

5
Volume EM series talks with the vEM community

39
Events during 2023

INDUSTRY RELATIONS

EURO BIOIMAGING INDUSTRY BOARD

The Euro-BioImaging Industry Board (EBIB) continued and intensified its close collaboration with Euro-BioImaging throughout 2023. Companies in the field of imaging that are represented on the Board are joined together by their recognition of the importance that coordinated open access imaging platforms play in strengthening research in Europe. Through the EBIB, companies gain facilitated access to information about the latest trends in imaging, international imaging communities including other technology developers and providers, and imaging-associated opportunities. Facilities find a single entry point to showcase their own developments to industry, express their imaging needs, and find partners for different types of collaborations. And the EBIB keeps on growing - with Telight, which joined as the 16th member this year. Below are just a few highlights of EBIB's interactions with the Euro-BioImaging community this year.

Tech Exchange

In our webinar series for latest technology developments in industry, we saw 14 presentations from innovative companies in the imaging field, including 5 EBIB members, on a range of topics and across scales from super-resolution to preclinical application of hyperpolarized MRI. Presentations were well appreciated by our audience, with on average 57 attendees per session.

Smart Microscopy Working Group

Following the success of the thematic workshop in autumn 2022, a working group was set up to address microscopy workflow challenges with a team of experts from facilities and industry. The group now meets monthly to present new developments and discuss innovative solutions. The work of the group was presented at ELMI 2023, leading to an influx of new members, and resulted in a joint funding application for future developments.

Industry and European projects

Collaborations with industry provide substantial mutual benefits – and through regular exchange during EBIB meetings, we were able to inform our partners of opportunities to participate and collaborate in various EU projects: pre-commercial procurement opportunities for the development of Transmission Electron Microscopy technology in IMPRESS; participation in expert groups and trainings for remote access and operations of imaging instruments in eRImote; consultation on beta-testing and technology validation with facilities in IMAGINE or accessing ML and AI models for image analysis for integration into proprietary software via AI4Life.

In a collaboration that was facilitated by the Euro-BioImaging Industry Board, AI4Life project (coordinated by Euro-BioImaging) and Leica Microsystems have joined forces to help researchers leverage AI methods for analysis of complex image data. Models curated by the BioImage Model Zoo are recognized directly in AIVIA image analysis software.

Meeting the imaging community at eye-level

April 2023 saw the first in-person Euro-BioImaging All-hands Nodes meeting, followed by a back-to-back Industry Board-organised workshop on "BioImaging and the European Open Science Cloud." The Industry Board Coordinator successfully applied for financial support for this event through the EOSC-Life project, which supported this mutual exchange. The well-defined workshop concept and the high interest in the topic, demonstrated by the participation of more than 85 participants from academia, industry, science journals and policy makers both on site and online, persuaded the project coordinators to fully fund this event, including covering the travel costs for all speakers from the EOSC community and the Industry Board. Mixed sessions and the many networking opportunities during the two meetings helped build trust and lasting relationships between the participants from the Euro-BioImaging Nodes and the EBIB partners.

Attendees at the BioImaging and the European Open Science Cloud workshop in April 2023.

Outlook

Building strong partnerships with industry remains one of Euro-BioImaging's strategic goals for its next 5-year cycle. This will benefit focus areas such as image data management and training that play an important role for both partners. In 2024, the Euro-BioImaging Industry Board will also celebrate its 10th anniversary, illustrating the long-term commitment of our industry partners.

> "
> *The new Five Years strategic plan was excellently developed by the Directorate of Euro-BioImaging. It's a great guideline to further strengthen our interactions in the future - for example intensifying our collaboration between industry and the community on modern training technology.*
>
> **Herbert Schaden**
> Euro-BioImaging Industry Board Chair

EUROPEAN STAKEHOLDERS

Euro-BioImaging is an active actor in the European research policy landscape - through its participation in ERIC Forum, EOSC Association, and support for diverse policy initiatives. Here we highlight some of the relevant policy meetings and initiatives from 2023.

Euro-BioImaging supports the Lund Declaration

Research Data as a resource, as well as a challenge, unites the research landscape - therefore, Euro-BioImaging joined European leaders and Research Infrastructure representatives for a high-level conference in Lund, Sweden on "The Potential of Research Data: How Research Infrastructures Provide New Opportunities and Benefits for Society." This conference, initiated by the Swedish presidency of the EU, explored the opportunities and challenges linked to collaboration on open data and highlighted the essential role of Research

Infrastructures in the digital era.
It culminated in the publication of the Lund Declaration, a document which places the responsibility to promote FAIR data generation and sharing to improve Europe's competitiveness on the shoulders of Research Infrastructures like Euro-BioImaging ERIC.

Through our Image Data Services and the active experts at our Nodes, we are ready to take up this responsibility. Director General John Eriksson was part of the panel discussion.

Euro-BioImaging contributes to the EOSC Association

Underscoring our commitment to FAIR data and data sharing, Euro-BioImaging is also an active member of the EOSC Association since 2021.
In 2022 and 2023 we also acted as mandated organization for the ERIC Forum, representing the voices of all ERICs who are members in the EOSC Association in the EOSC Association meetings.

Euro-BioImaging provides regular input in the Multi-Annual Roadmap and actively contributes in various EOSC Association Task Forces. In 2023 we also participated in a number of related working groups, such as the ESFRI-EOSC Working Group.

The importance of the Teneriffe Declaration

Between September 25-26, Euro-BioImaging Hub members including Antje Keppler as the current Chair of ERIC Forum, attended and contributed to the Research Infrastructures event under the auspices of the Spanish Council presidency in Tenerife. Three main topics were discussed: Sustainability, global dimension of ERICs and science diplomacy. Global BioImaging was presented as an excellent example of how European RIs can foster successful global collaborations and advance science diplomacy. The meeting concluded in the Tenerife Declaration, which is supported by Euro-BioImaging.

John Eriksson, part of panel discussion on data sharing in Lund, Sweden.

Antje Keppler, part of panel discussion on Research Infrastructures in Tenerife, Spain.

INTERNATIONAL STAKEHOLDERS

Building on the connections facilitated by Global BioImaging (GBI), Euro-BioImaging was honored to be invited to the Congress of the Brazilian Society of Microscopy and Microanalysis. There we hosted alongside Latin America BioImaging, SBMM, CEBEM, and GBI a highly successful pre-congress workshop on "Bridging Borders in BioImaging".

Furthermore, Euro-BioImaging participates as a supporting partner in the RI-Hubs projects, which launched in April 2023, funded by the EU-LAC interest group, together with Instruct ERIC. In this project our PPBI and Italian ALM Nodes are collaborating with partners in Latin America, including in Uruguay, Brazil, and Peru through training courses and staff exchanges. In addition, Euro-BioImaging was among 8 European RIs that met with representatives from the Australian National Research Infrastructures (NCRIS) in September 2023 in Italy to discuss common

priorities & challenges for infrastructures in the health domain and identify opportunities for collaboration. The Euro-BioImaging directorate was invited to attend and Antje Keppler, in her role as ERIC Forum Chair, co-hosted the symposium alongside her Australian counterpart Ian Smith.

Finally, like every year, the Global BioImaging Exchange of Experience meeting is a highlight of the year. In 2023, it was co-organised with the South Africa BioImaging Community (SABI) and the Africa BioImaging Consortium (ABIC) and was held in Stellenbosch and Cape Town in South Africa. The meeting focussed on "Empowering Imaging Scientists through Training" and brought together 192 participants from 48 different countries, including strong participation from Euro-BioImaging and its Nodes, particularly France BioImaging, NMI Sweden, and Portuguese BioImaging Platform (PPBI).

Africa: Global Imaging's Exchange of Experience 2023 in Cape Town and Stellenbosch University (bottom, across).

Latin America: SBMM Congress in Brazil (right) and RI Hubs meeting (below, left. Photo by @red_cebem on X)

Australia: Attendees at the Australian RIs event in Prato, Italy. (below, right. Photo by @EMBLaustralia on X)

EXPERT GROUPS

Euro-BioImaging runs a number of Expert Groups where Node staff, community experts, and industry partners come together around topics of interest. Here we feature two of our most recent Expert Groups.

Plant Imaging Expert Group

This group addresses rising interest in applying imaging techniques to plant biology questions and utilising them to understand and impact agroecological processes. The Plant Imaging Expert Group is chaired by Nicola D'Ascenzo from the DIMP NEUROMED Node and Marc van Zandvoort from the AMMI Maastricht Node, and brings together plant imaging experts and plant scientists interested in using imaging techniques in their research from across the Euro-BioImaging community. The represented techniques range from Electron Microscopy and MassSpec Imaging, to Light Microscopy, Plant Phenotyping, Terahertz Imaging, and PET and MRI applications for plants.

The group holds a regular seminar series to introduce the diverse technologies and their applications in plant imaging, as well as coming together for joint grant applications and review paper preparation.

FAIR Image Workflows

Although there are tools and workflows available for analyzing image data, they are scattered across different research fields and locations. The goal of this Expert Group is to encourage collaboration among people who are interested in improving the usability and accessibility of image data workflows, regardless of their scientific or technical background.

Did you know?

A number of Expert Groups on varied topics are available. Check them on our website!

https://eurobioimaging.eu/expert-groups/

DIGITAL COMMUNICATIONS

Online communication channels continued to be an important way to reach our stakeholders in 2023. We used social media, primarily Twitter and LinkedIn, to interact with a variety of partners, give visibility to imaging scientists and our Nodes, promote breakthroughs in imaging research, and advertise our online events. We increased our followers on YouTube in 2023 by sharing content from events organised as part of our partcipation in EU-funded projects like eRImote (Grant Agreement #101057557) and ANERIS (Grant Agreement #101094924) as well as by continuing to record and share Virtual Pub and User Forum talks. We continued to use social media channels as well as our regular newsletters to drive traffic to our website. Thanks to increased visibility of our online channels, attendance at our online events soared. Below are our key numbers from January 2020 to January 2024.

WEBSITE

534,759

Page views since ERIC creation

SOCIAL MEDIA

| 0 | 1,000 | 2,000 | 3,000 | 4,000 | 5,000 | 6,000 |

X 5,900+ followers

in 4,900+ followers

Instagram 700+ followers

YouTube 600+ subscribers

NEWSLETTER

5,000+
Cumulative recipients including Nodes, RI partners & Governance

3
Regular newsletters - to three target audiences

36%
Average open rate for campaigns in 2022—2023

PARTICIPATION IN EURO-BIOIMAGING ONLINE EVENTS

USER FORUM
1,000 Participants   **6** Events

VIRTUAL PUB
7,594 Participants   **142** Events

= 100 PEOPLE

FUNDED PROJECTS

OVERVIEW

In 2023, Euro-BioImaging ERIC continued to lead and contribute to a wide range of EU-funded projects. In the next pages, discover the projects Euro-BioImaging is involved in and how they benefit our stakeholders and community.
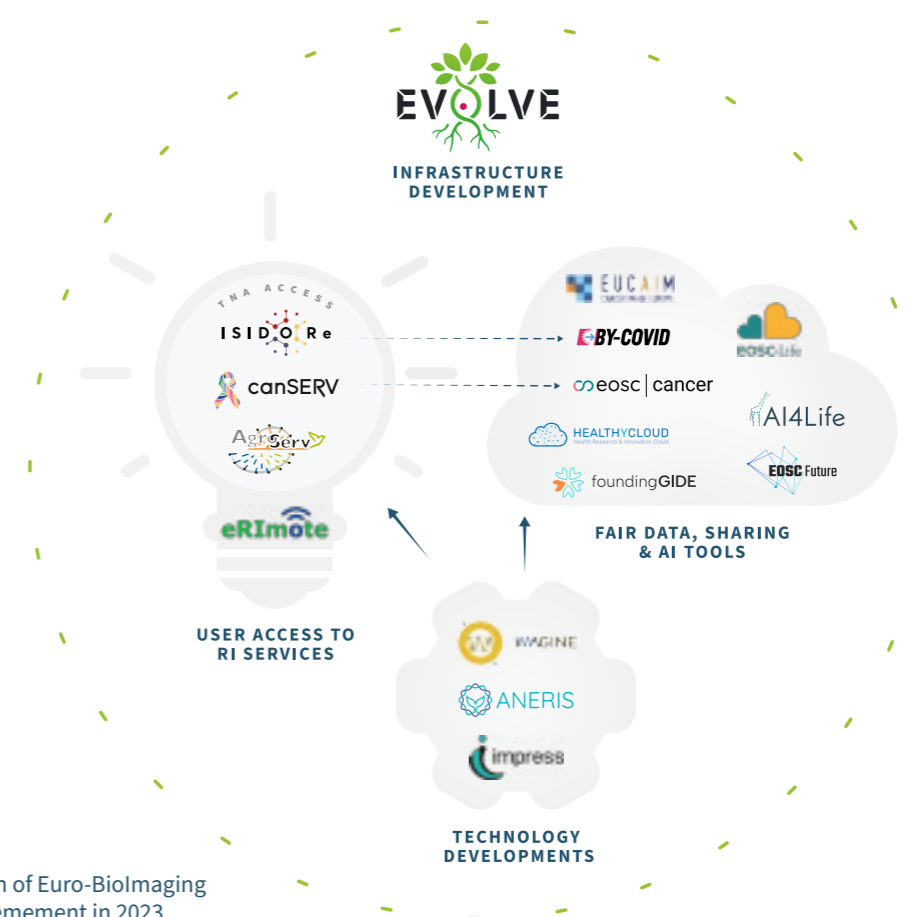
Representation of Euro-BioImaging project involvemement in 2023.

2023 marked the kick-off for a new generation of big EU-funded consortia projects dedicated to the development of new technologies and their dissemination to the research community through the Research Infrastructures - the INFRA-TECH projects. Euro-BioImaging is involved in three INFRA-TECH projects - IMAGINE, ANERIS, IMPRESS - that started this year. At the same time, Euro-BioImaging continued to provide access to its portfolio of cutting-edge imaging technologies to researchers in different domains through the INFRA-SERV projects - see for example the ISIDORe-supported user projects featured in these pages in our IMPACT section. The Euro-BioImaging coordinated project AI4Life continued to create waves in 2023 - with open calls, hackathons, and supported research

projects. We also marked the conclusion of the EOSC-Life project, which has been connecting life science researchers to the European Open Science Cloud (EOSC) since 2019 by making tools and research data cloud-compatible and accessible to all.

Together with our Nodes, we are also actively participating in one of the Digital program projects that started this year, EUCAIM, aiming at building a federated infrastructure for cancer image data. In 2023 we also celebrate the granting of two new EU INFRA-DEV projects - foundingGIDE and EVOLVE - that are described in our ACHIEVEMENTS section and complement our growing and constantly evolving project landscape.

OUR PROJECTS

2023

2019   2028

EOSC-Life — Building cloud-based tools and solutions for bioimaging data and promoting interoperability

HEALTHYCLOUD Health Research & Innovation Cloud — Supplying image data and management tools for the health research and innovation cloud

BY-COVID — Providing image data stewardship service and making COVID-19 image datasets FAIR

EOSC Future — Developing tools and workflows for bringing image data to the cloud

ISIDORe — Funding for imaging services in support of infectious disease management

eRImote — Sharing solutions and providing training for remote access service provision in imaging facilities

eosc | cancer — Providing a European-wide foundation to accelerate data-driven cancer research including image data with set standards for data sharing and metadata

canSERV — Funding user access to imaging services in cancer research

AgroServ — Enhacing agroecology research by funding access to imaging services

AI4Life — Developing advanced AI methods for image analysis and making them easily available to life scientists

ANERIS — Developing image analysis tools for underwater imaging and training to use these tools

EUCAIM CANCER IMAGE EUROPE — Building a pan-European federated infrastructure for cancer images to enhance diagnosis and treatments

impress — Developing new tools and applications in Transmission Electron Microscopy and training

IMAGINE — Supporting community adoption and validation of innovative tools for imaging across scales

ERIC FORUM 2 — Consolidating the integration of the ERICs in the European Research Area

foundingGIDE — Laying the foundation for a Global Image Data Ecosystem (GIDE) for sharing bioimaging data

EVOLVE — Enhancing Euro-BioImaging ERIC to shape the future of imaging
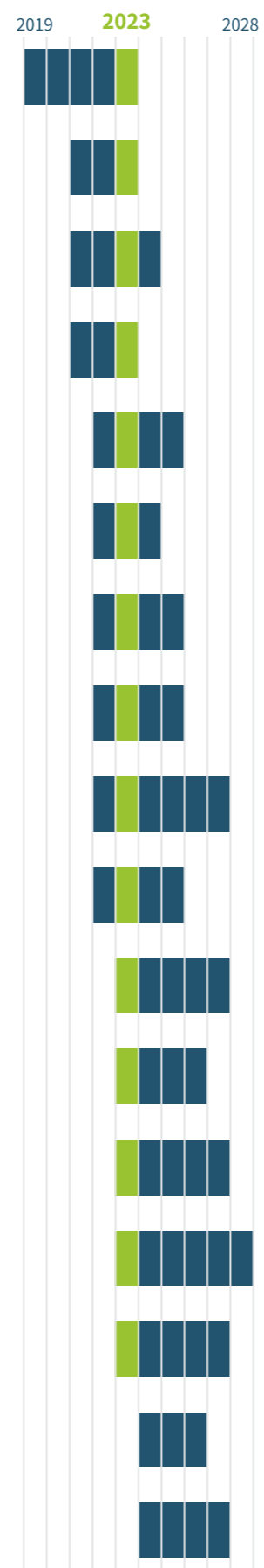
USER ACCESS PROJECTS

Euro-BioImaging provides access to a large range of cutting-edge imaging technologies and expert support, but to ensure equitable access, we are always working to provide funding that allows researchers to access these services free of charge.

In this regard, the EU-funded INFRA-SERV projects are a great resource. The INFRA-SERV projects bring together large consortia of Research Infrastructures that make their services available to researchers. The consortia receive funding from the EU that allow these services to be provided free of charge to the researchers while the experts and service providers at the Nodes receive fair compensation. The grouping of different Infrastructures in these consortia also allows for the provision of integrated services from different domains - combining, for instance, imaging services from Euro-BioImaging with murine animal models of disease from INFRAFRONTIER ERIC, or with plant screening services from EMPHASIS ERIC.

The ISIDORe project, supporting infectious disease research, kicked off in February 2022 and was running full steam in 2023. Some examples of research projects supported by the ISIDORe project at Euro-BioImaging Nodes are featured in the IMPACT section of our Annual Report. Here are some key numbers explaining how ISIDORe has supported user projects at Euro-BioImaging Nodes so far.

In 2023, the first Open Calls also launched in canSERV and AgroServ. These projects will continue to provide ongoing opportunities for funded user access in 2024 and beyond. All researchers are encouraged to take advantage of these opportunities!

In AgroServ, user projects have to include services from at least two Research Infrastructures to facilitate the development of an integrated service provision for agroecology research. During the 1st AgroServ Call for expressions of interest, Euro-BioImaging received about 20% of all pre-proposal applications and our services were requested in conjunction with the services from most consortium partners, such as AnaEE, EU-OPENSCREEN, EMPHASIS, MIRRI, EMBRC, and ELIXIR, showing the broad applicability of imaging services.

ISIDORe Overview

19 user projects at

7 Nodes — including travel grants & free biological resources supporting user projects.

343K€ TNA budget

Amount of proposals received per RI and the connections to other RI in the same proposal in AgroServ.
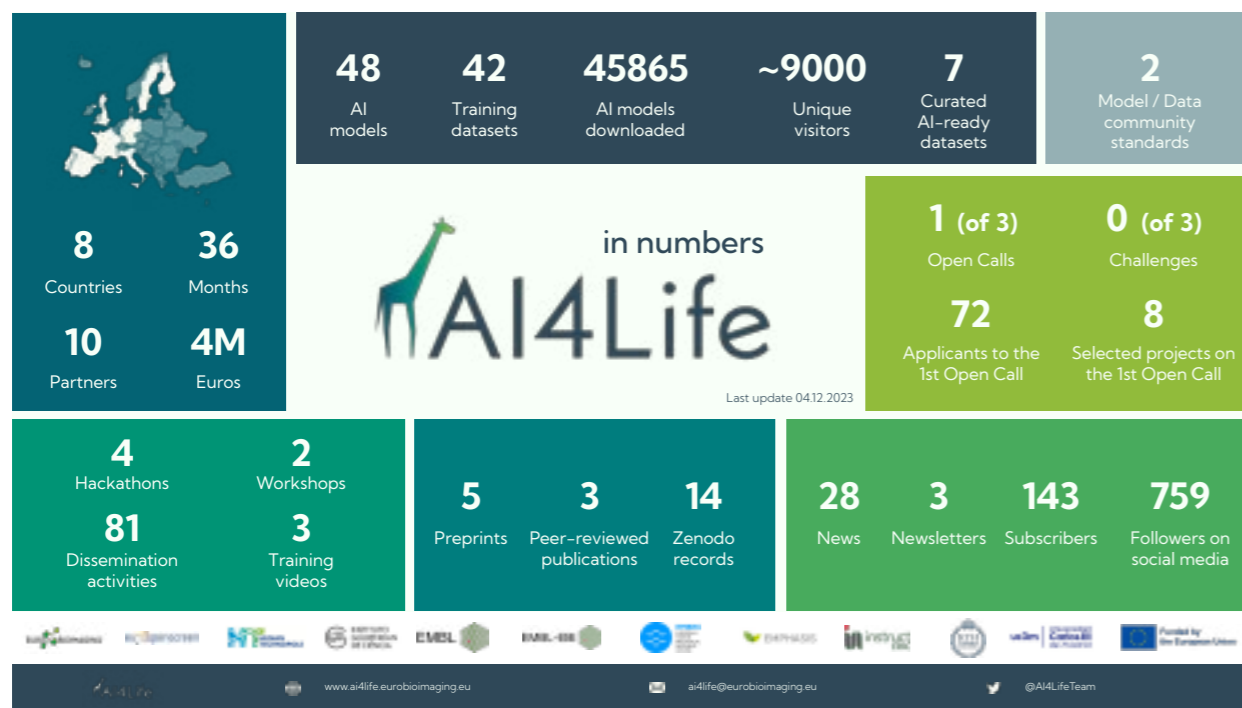
DATA PROJECTS

AI4Life

In 2023, AI4Life launched our first open call, receiving 72 applications and ultimately selecting 8 projects. A list of services provided by AI4Life is now available on our project website. We also published the MIFA preprint, offering valuable recommendations for image annotations to enhance AI-ready datasets.

Our year was filled with numerous workshops, hackathons, and active participation in various conferences.

ANERIS

In November-December 2023, Euro-BioImaging organized in collaboration with its Nodes France BioImaging and Israel BioImaging a three-part workshop series to explore the realms of AI application for image processing as part of the ANERIS project. These workshops, featuring speakers from Life, Marine and Computer science communities, entitled "AI Basics for Image Processing" drew substantial attendance with over 400 participants and provided them with both theoretical introductions as well as practical demos of specific AI tools, garnering lots of positive feedback.

48	42	45865	~9000	7	2
AI models	Training datasets	AI models downloaded	Unique visitors	Curated AI-ready datasets	Model / Data community standards

8	36
Countries	Months
10	4M
Partners	Euros

in numbers AI4Life

Last update 04.12.2023

1 (of 3)	0 (of 3)
Open Calls	Challenges
72	8
Applicants to the 1st Open Call	Selected projects on the 1st Open Call

4	2
Hackathons	Workshops
81	3
Dissemination activities	Training videos

5	3	14	28	3	143	759
Preprints	Peer-reviewed publications	Zenodo records	News	Newsletters	Subscribers	Followers on social media

www.ai4life.eurobioimaging.eu ai4life@eurobioimaging.eu @AI4LifeTeam

AI4Life factsheet 2023 (DOI 10.5281/zenodo.10257243)

AI4Life News
https://ai4life.eurobioimaging.eu/news/
Newsletter sign-up
https://ai4life.eurobioimaging.eu/newsletter/

◀ Scan to check the sessions on the Euro-BioImaging YouTube channel

EOSC-Life

During the course of its four and half years, the EOSC-Life project (eosc-life.eu) supported many user projects through Open Calls and expert support, as well as by facilitating the sharing of data and research tools and resources interoperable in the cloud. To draw from the spectrum of outputs and experiences across disciplines in Life Sciences, the EOSC-Life consortium partners concluded the project with a landmark publication in the EMBO Journal, "Be sustainable": EOSC-Life recommendations for implementation of FAIR principles in life science data handling" (https://doi.org/10.15252/embj.2023115008) with co-authoring contributions from the Euro-BioImaging Hub Team and imaging community. This work refers to lessons learned from cross-disciplinary, community-driven, and competitively selected projects supported through EOSC-Life, and presents key findings, procedures, effective measures, and recommendations that can be used to generate and establish sustainable life science research resources in the EOSC (European Open Science Cloud). It also highlights how Life Science communities in the Open Science framework urgently need to increase the sustainability and re-use of data resources, software tools, and workflows, especially when conducting large-scale data-driven research and computational analyses.

EUCAIM CANCER IMAGE EUROPE

EUropean Federation for CAncer IMages (EUCAIM) aims at deploying a federated infrastructure of cancer images, making them available to clinicians, researchers, and innovators. It will allow for the development, benchmarking, testing, and piloting of Artificial Intelligence-based technologies for cancer diagnosis and treatment. The consortium consist of 76 partners from 14 countries. Several partners are also part of the AI4Health Imaging initiative or major European Research Infrastructures (such as Euro-BioImaging, BBMRI, EATRIS and ELIXIR). Euro-BioImaging is proud to participate in the project alongside several of its Nodes: DIMP NEUROMED, the Portuguese Brain Imaging Network (University of Coimbra), as well as the Population Imaging Flagship Node Rotterdam (ERASMUS MC) and MMMI Italian Node (IRCSS SDN). The EUCAIM project is a flagship of Europe's Beating Cancer Plan (EBCP), and coordinated by Prof. Luis Marti-Bonmati who is leading one of the new Spanish nodes: Population Imaging Valencia. Euro-BioImaging and its Nodes contribute to a number of Work Packages to help build the backbone for the next generation of cancer diagnostics and treatments. In October 2023, the EUCAIM consortium announced the first public release of its platform, marking a major milestone in the project's development and an exciting step towards achieving its vision and goals.
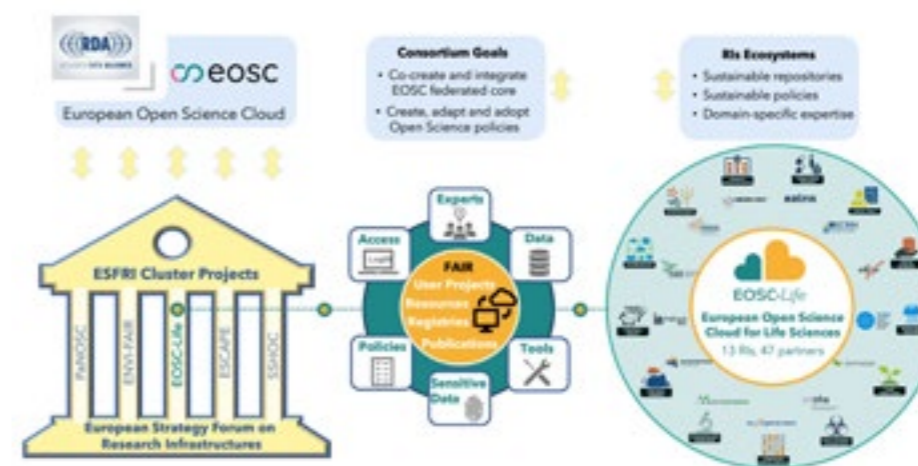
Illustration of the EOSC-Life project positioning within the LS RIs ecosystem and the EOSC landscape.
https://www.eosc-life.eu/achievements/recommendations-for-fair-resources-in-life-sciences-research/

PERSPECTIVES

In 2023, Euro-BioImaging took significant steps towards building its future. Developed and approved during 2023, the Strategic Plan for 2024-2028 materialises Euro-BioImaging's ambition to advance the forefront of European science. Articulated around six objectives, the plan is designed to strengthen Euro-BioImaging's structural operability, deepen the infrastructure's relations with all its stakeholders and support and connect the European imaging landscape. Through pursuing these strategic objectives, Euro-BioImaging is steadfast in its commitment to promoting research excellence and fostering innovation in Europe.

The Strategic Plan was designed with a greater impact in mind. The six strategic goals are not one-sided but bidirectional: their achievement will benefit Euro-BioImaging and the imaging community as a whole. The Strategic Plan for 2024-2028 envisions a future where imaging plays a pivotal role in sustaining, enabling, and advancing science.

This will be achieved by enhancing the accessibility and capacity of the imaging infrastructure, championing Open Science, expanding the services available to researchers, increasing awareness, communicating impact of imaging, and fostering stronger collaborations with industry and academia.

Our Strategic Plan engages all our diverse stakeholder groups and lays a solid foundation for the next five years of Euro-BioImaging activities.

Scan to read more about the Strategy Plan 2024-2028

Overview of the six Euro-Bioimaging strategic goals for 2024-2028

FINANCIAL INFORMATION

The income and expenses for the financial year 2023 and the reserve funds are outlined in Table 1. Received in-kind contributions and costs booked to project funding sources are presented in Table 2. Euro-BioImaging ERIC's accounts are audited every year according to Finnish law.

Income Statement and Reserve Funds for the financial year January 1 - December 31, 2023 (table 1)

INCOME (in Euros)	
Income	
Membership Contributions	**1,584,043**
Other	**83,156**
Expenses	
Personnel Cost	**–1,282,474**
Services, consultation, outsourcing	**-182,566**
Meetings and events	**-108,270**
Depreciation	**0**
Travel	**-119,689**
Euro-BioImaging Web Portal (EWP)	**-93,837**
Other (computer equipment, software and licenses, fees, shipping, and exchange rate fluctuation costs)	**-58,641**
User Access Funding	**-37,037**
Net Financial Result	**-215,316**

RESERVE FUNDS (in Euros)	
Reserve, January 1, 2023	**2,122,587**
Net Financial Result 2023	**-215,316**
Reserve, December 31, 2023	**1,907,270**

Table 2. External funding sources for the financial year January 1 - December 31, 2023 (table 2)

EXTERNAL FUNDING (in Euros)	
In-kind (FTE)	**0.7 FTE**
Costs booked to external project funding (€)	**-797,148**

FINANCIAL INFORMATION

OVERVIEW

Euro-BioImaging is a distributed infrastructure - our central activities are coordinated by our three Hub sites, but services are provided in the imaging facilities called 'Nodes'. By becoming a Euro-BioImaging Node, imaging facilities agree to provide open access to technologies, services and expertise to all Euro- BioImaging users, independent of where the users come from, their field of research or their level of expertise.

To become a Euro-BioImaging Node, facilities go through a rigorous application and review process in the Call for Nodes. They are evaluated by our Scientific Advisory Board on a wide variety of factors, including:

• Scientific and technical excellence
• European and national significance
• Technology maintenance and updates
• Access and service package
• Quality assurance
• User training
• Other technology-specific factors

Following successful evaluation and approval by the Board, the Nodes join the Euro-BioImaging family by signing service level agreements that outline the services to Euro-BioImaging users.

After an intense period of growth between 2020 to 2022, in 2023, our Node family remained stable. In January 2024, we welcomed 6 new Nodes in Spain and in Belgium, our new member states, and more Node upgrades follow in 2024 arising from the Call for Node Upgrades launched in November 2023.

In addition to supporting user projects, our Nodes are active in European-funded research projects, support and develop technological breakthroughs, organise outstanding training courses and conferences, and make science accessible to the public through their outreach efforts.

They also engage in teaching on the Master's and PhD levels and get kids inspired by STEM subjects through hands-on imaging experiences.

In the following pages, discover just some of the activities that are taking place at our Nodes, as well as the new instruments they are offering in open access to support scientific advancement in the European Research Area and beyond.
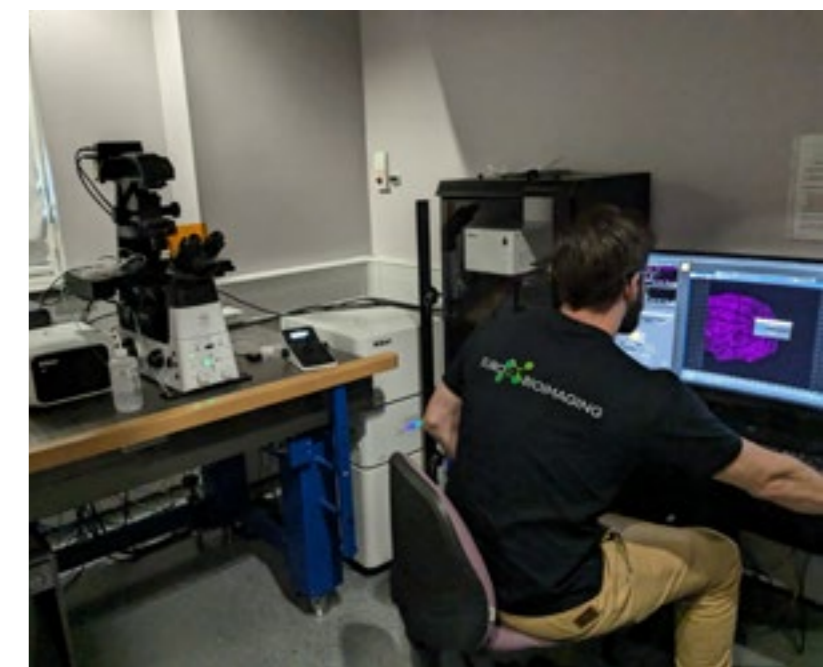
Flying the Euro-BioImaging colors at the Microscopy Innovation Centre, King's College London, part of our UK Node.

" *Working for the Population Imaging Flagship Node gives us the opportunity to bring solutions to the European imaging community, widening our audience and increasing our impact.*

Hakim Achterberg
Research Software Engineer,
Population Imaging Node Rotterdam

FROM OUR NODES

TRAINING

With the advances in imaging technology, more and more new technologies are available to users, making training in the correct use of the technologies and the connected sample preparation and data analysis crucial. The Euro-BioImaging Nodes offer a wide range of training opportunities.

Training opportunities at Euro-BioImaging Nodes cover the full spectrum of technologies available from biological to biomedical imaging as well as sample preparation and handling, and image data analysis. Some courses are taught remotely and virtually, increasing their accessibility. As a general rule, the courses combine theory and hands-on learning. The training courses at the Euro-Bioimaging Nodes are:

• Available for users, students, and facility staff
• Taught in English
• Open for anyone to apply to

In 2023, **259 training courses** were open to external participants at 30 Nodes

OUR NODES IN 2023
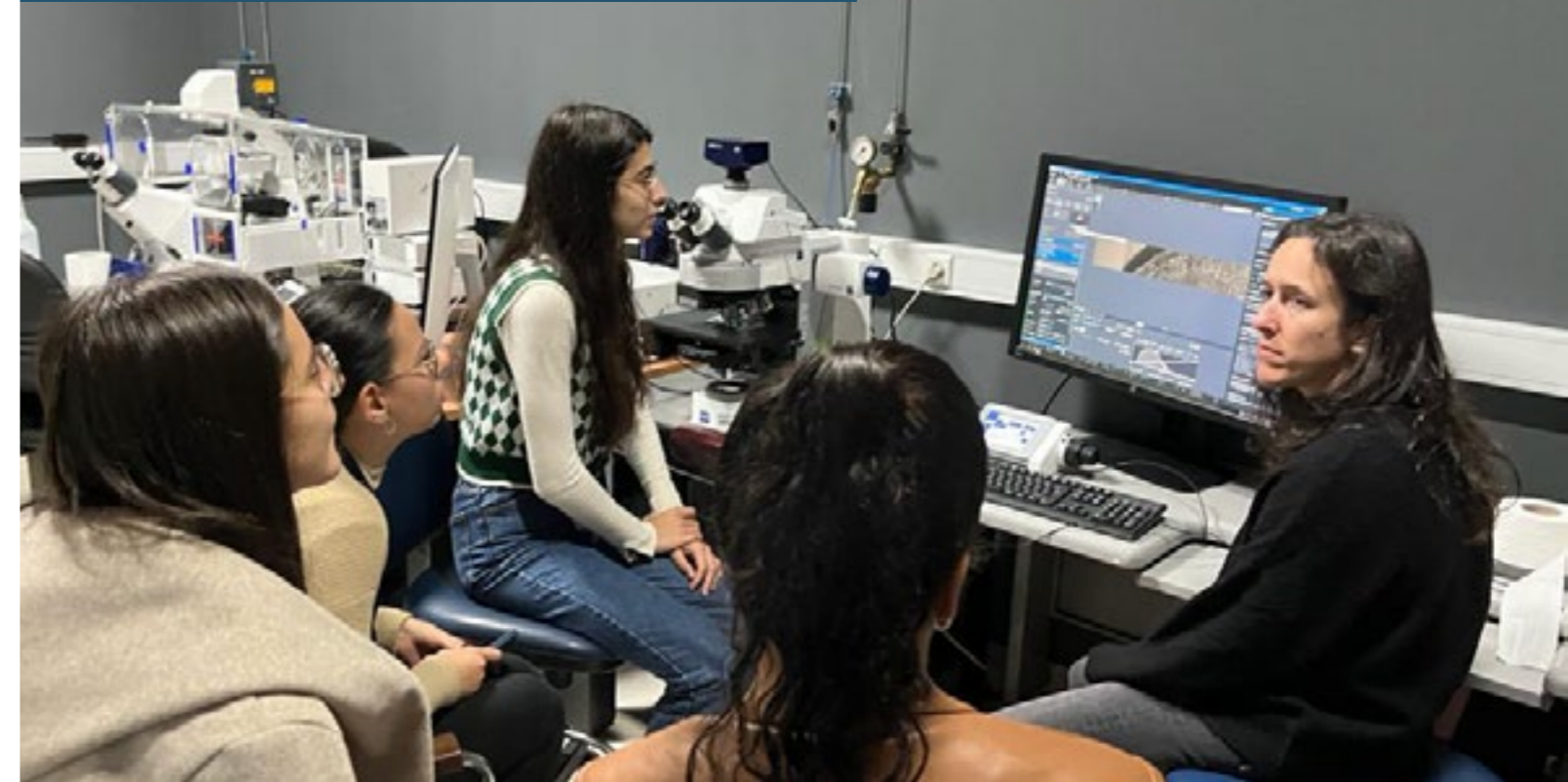
Above: This photo is from one of the hands-on sessions of the annual Quantitative Fluorescence Microscopy Course organised by PPBI. In this specific session students saw multidimensional imaging in a widefield system combining multichannel, z-stack and tiles.

Below: The Dutch CLEM Node organised the 25th anniversary edition of the Utrecht EM workshops with 24 participants from 11 countries.

> *2023 was a positive year for our Node, with some achievements in technological development, recruitment of personnel in several facilities, providing a scientific support to a high number of users.*

MMMI Italian Node coordinating team

Right: The Portuguese Brain Imaging Network is at the forefront in the neurosciences field, providing access to different types of advanced technologies for neuroimaging, including functional EEG in correlation with MRI.

Above, top: Functional imaging during the annual PhD course of the Erasmus Optical Imaging Centre (OIC). Photo courtesy of ERASMUS MC OIC Node.
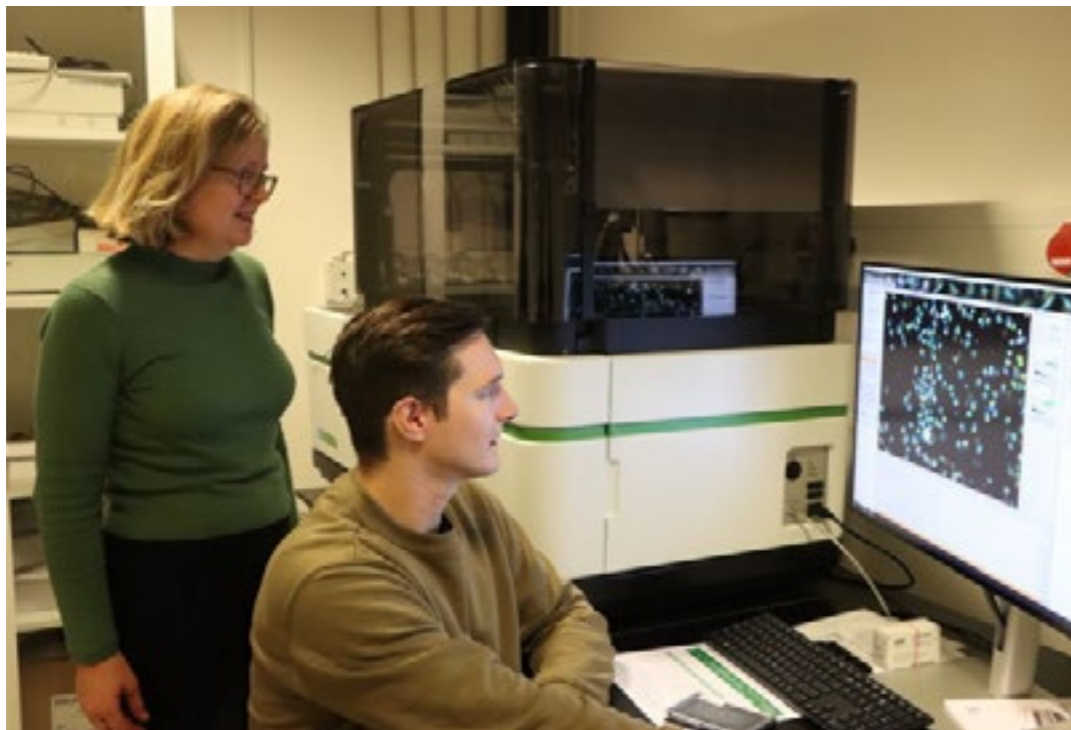
Above, bottom: Istvan Balint Szücs, using the High Content Screening (HCS) Spinning Disk confocal microscope at at the Center for Advanced Bioimaging (CAB), University of Copenhagen, to investigate spontaneous miscarriage. Photo courtesy of Danish BioImaging.

Above: In this photo, a user project is underway at the Dutch High-Throughput Node, University of Leiden. Automated imaging of multiple plates for live phenotypic screening is being set-up with the HTM operator of the Dutch High-Throughput Node Dr. Kostas Tassis (University Leiden).
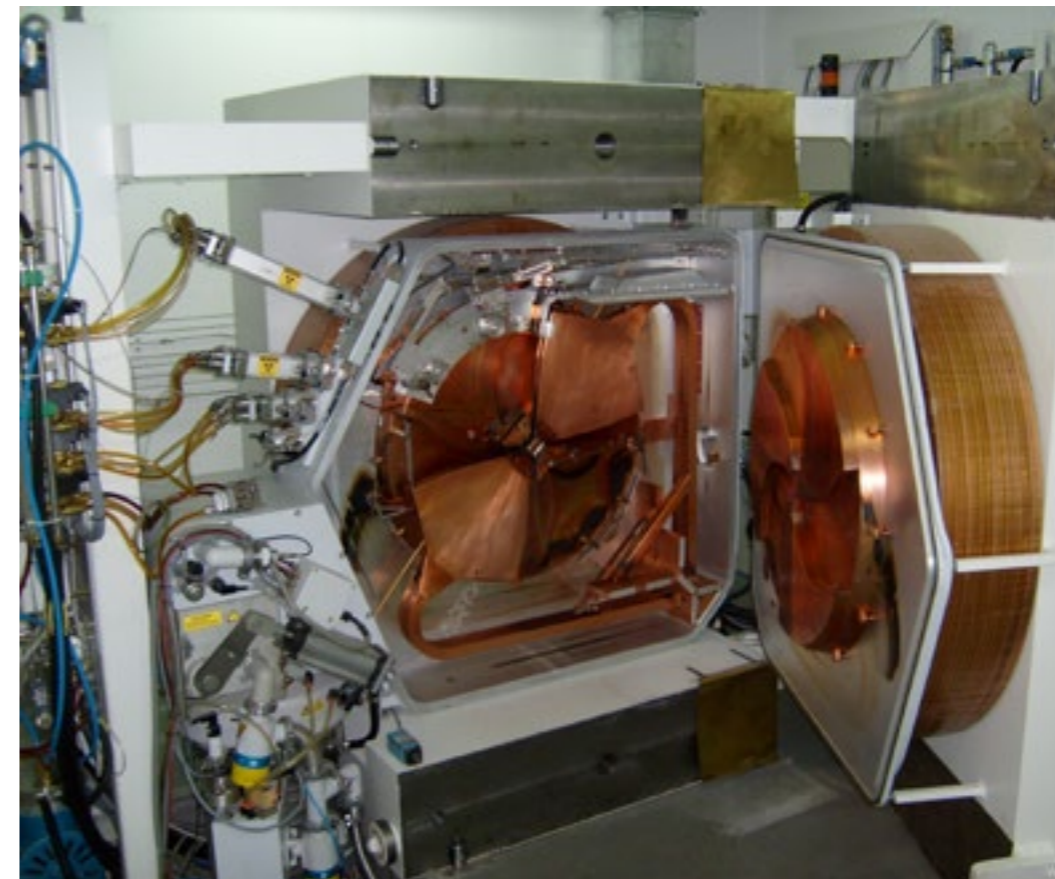
Left: The PETtrace 800 cyclotron went through a Ten Years Life Extension and Refurbishment upgrade program at the Medical & Preclinical Imaging Hungary Node.
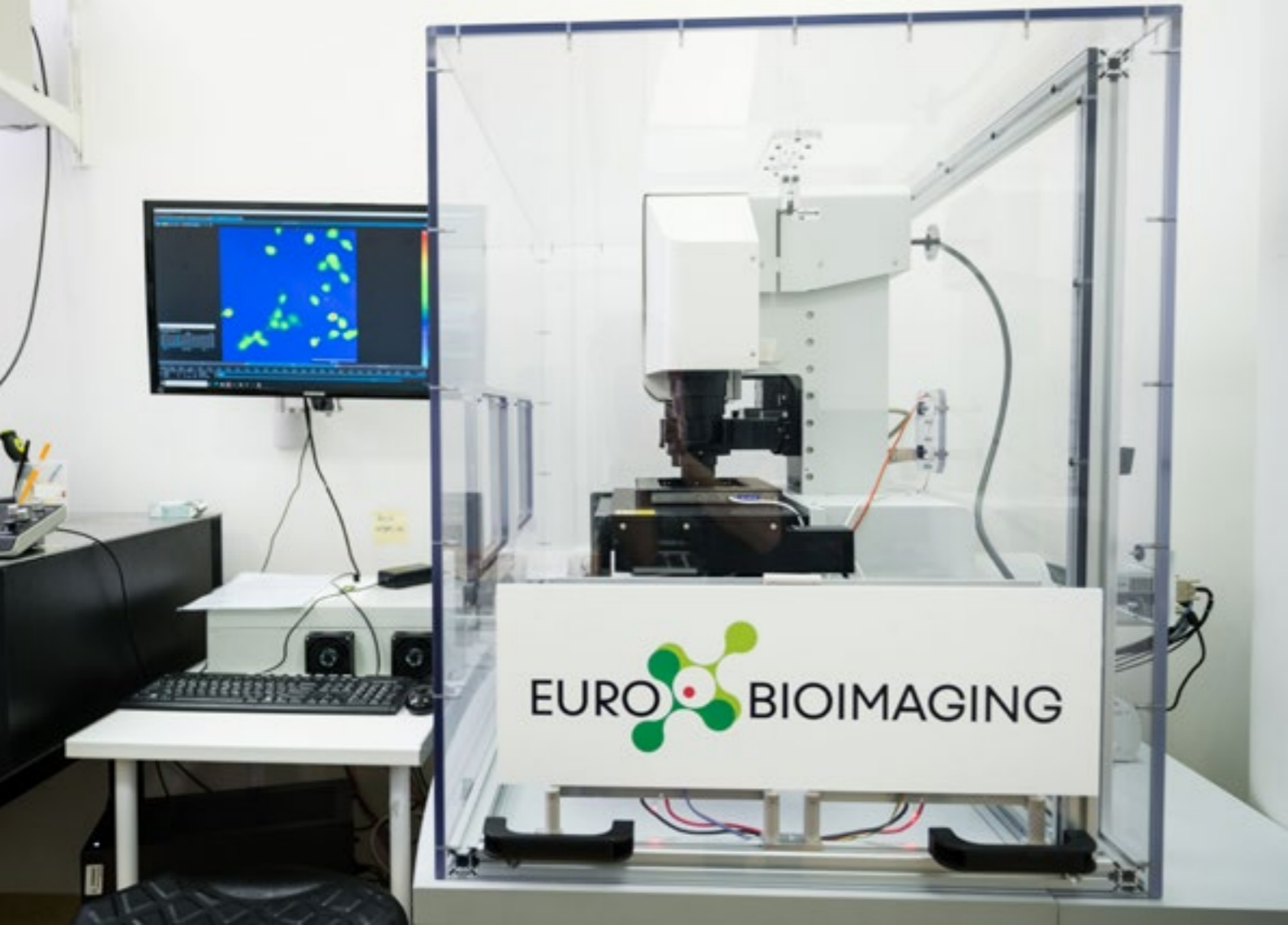
Above: A Quantitative Phase imaging system (QPI) is measuring living cells and their dynamics at the new location of the Biophotonics Core Facility at Brno University of Technology, part of the Advanced Light Microscopy and Medical Imaging Node Brno.

" *At DIMP NEUROMED, lots of external users were attracted by the imaging facility, with an evident net increase. We acquired new computing systems to store and analyse all data! It is particularly clear that the main demand is also on new data analytics, besides the traditional imaging service.*

Prof. Dr. Nicola D'Ascenzo
DIMP NEUROMED

" *2023 was exceptionally good in terms of publications, companies as users, and receiving grant money.*

Marc van Zandoort
Facility for Multimodal Imaging
AMMI Maastricht

Right, top: Rumen Stamatov, from the Sofia BioImaging Node, Bulgaria, visualises cellular imaging data in 3D.
Right, bottom: Hans Blom, Swedish NMI, MINFLUX PSF alignment.

"
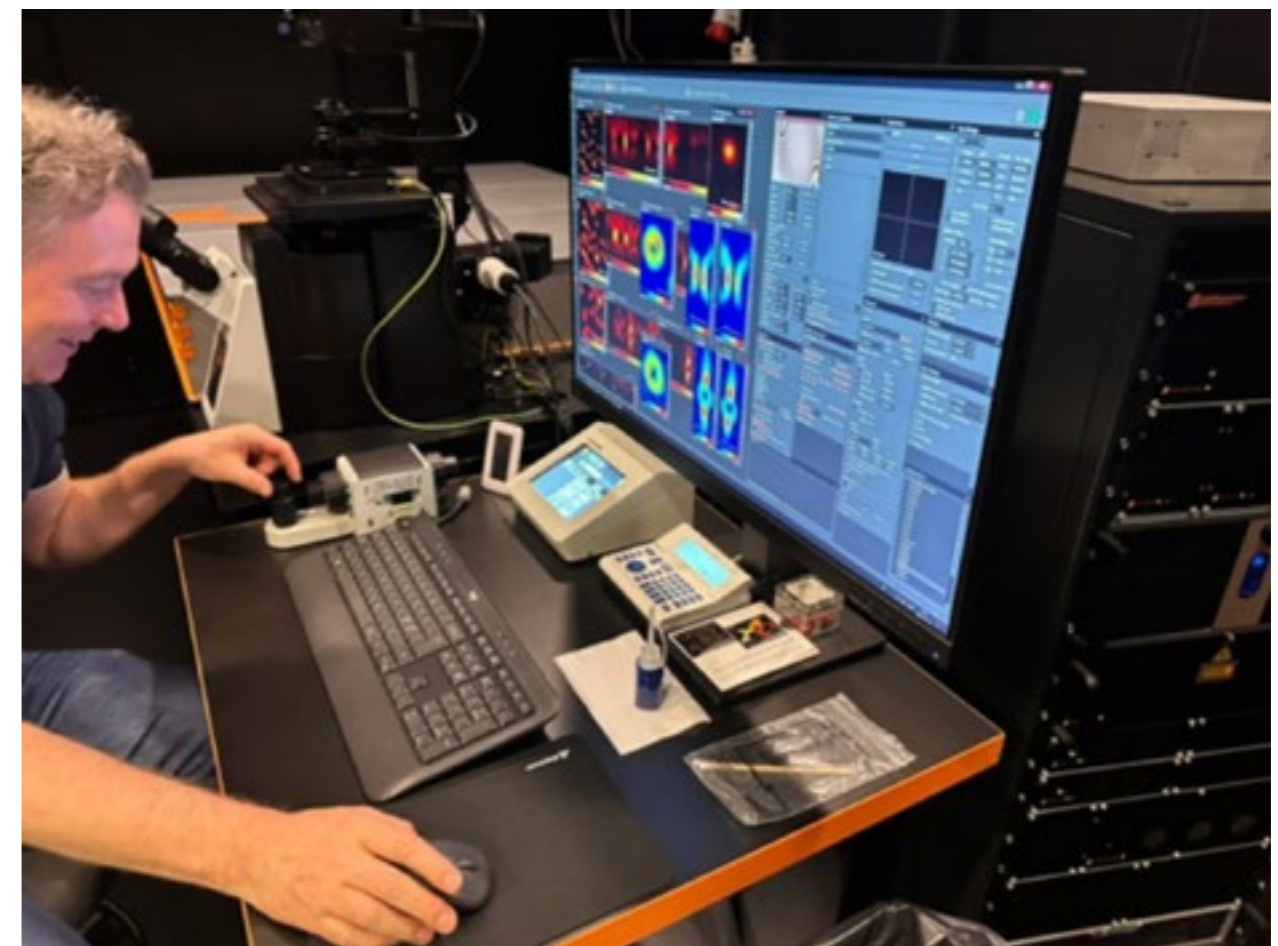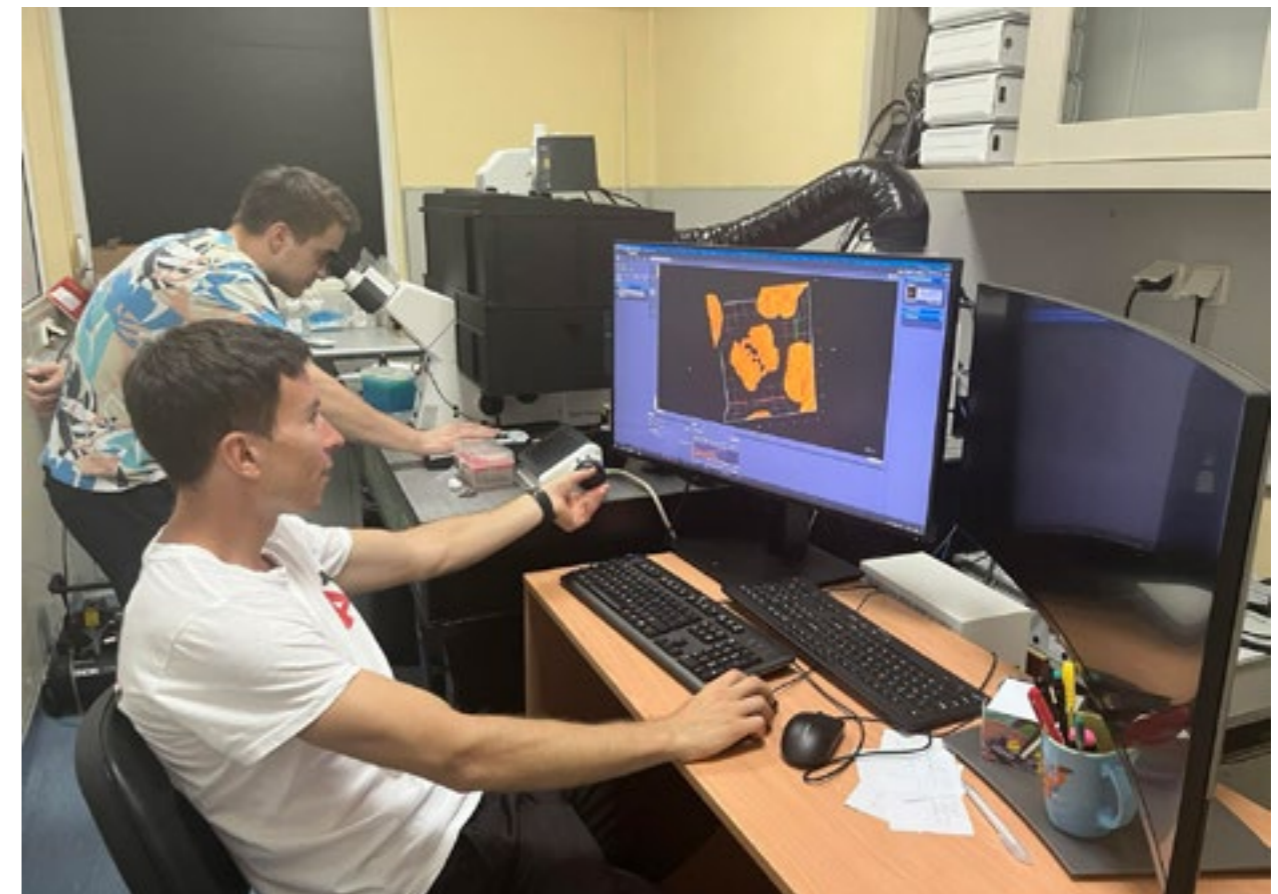
2023 was a good year since after years of effort of LCAM members in the NL-BioImaging board, the Netherlands roadmap proposal was granted which will result in major equipment investments in the near future.

Mark Hink, Van Leeuwenhoek Center for Advanced Microscopy (LCAM)
Functional Imaging Flagship Node Amsterdam

Every year, IMCF BIOCEV, part of our Prague Node, runs an imaging contest to award their users with the best images. Here, Node staff and winners from 2023.

Above: The CAPI Node, hosted at Charles University in Prague, is fully equipped with state of the art multi-modality preclinical imaging instrumentation for in vivo testing of novel drugs and diagnostic tools.
The equipment includes a 7T MRI scanner for small animal imaging.
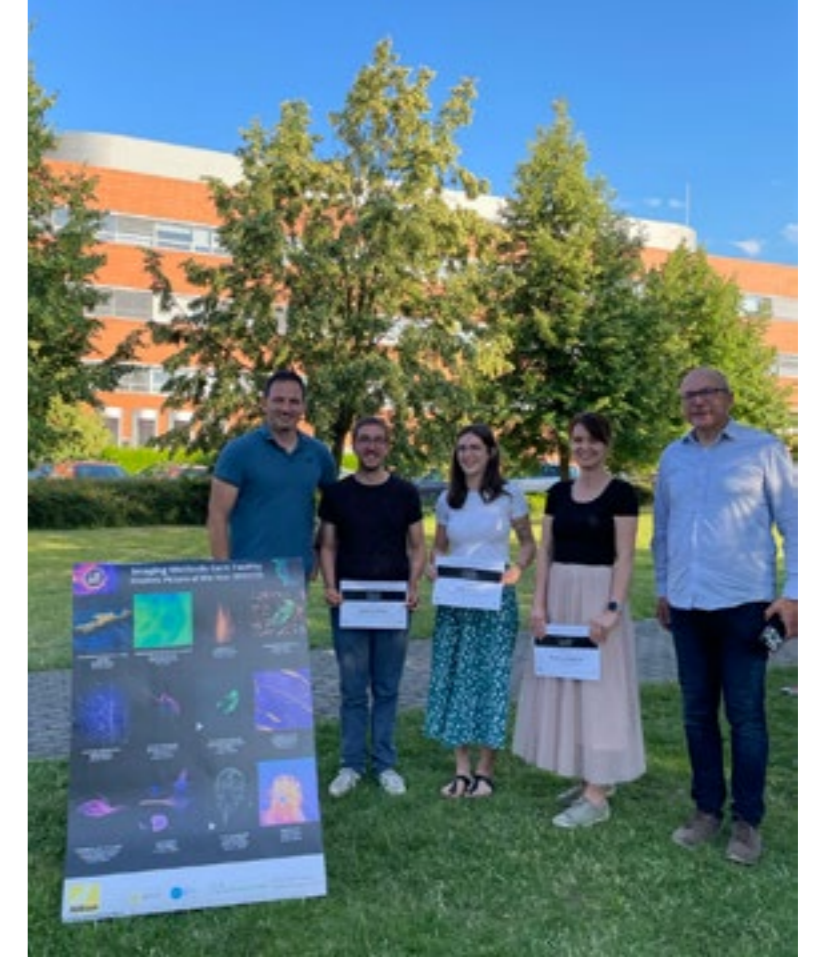
A demonstration of microscopy techniques was held at the "Researchers' Night" to the public at University of Debrecen, part of our Cellular Imaging Hungary Node. (picture taken at the University of Debrecen).
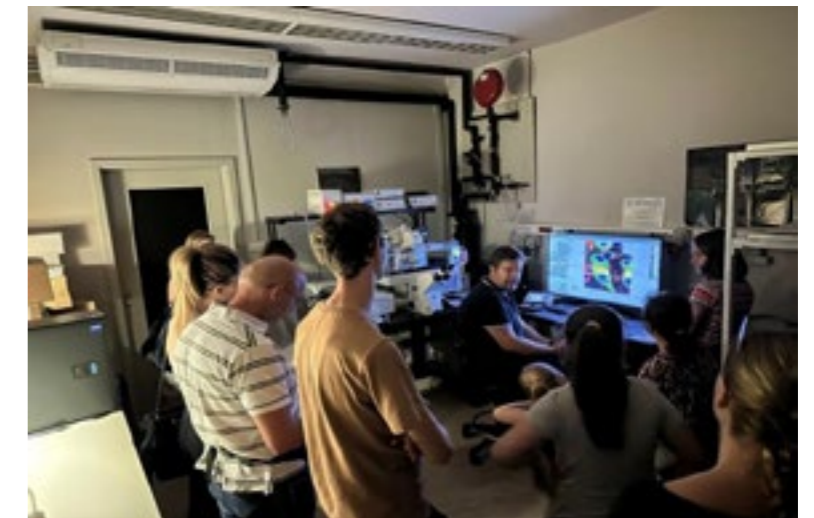
The team at BC LEM core facility in České Budějovice, part of the Prague Node, loading a grid into a cryoholder prior to cryo-TEM observation.
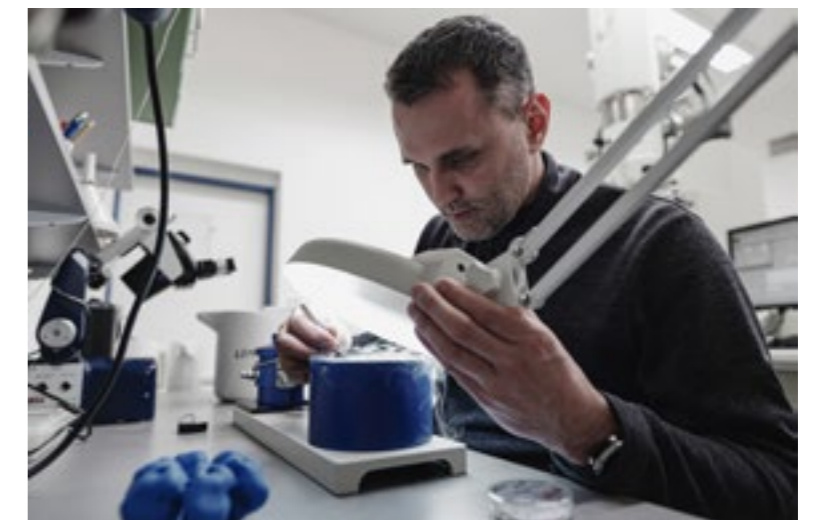
AUSTRIA
Austrian BioImaging/CMI

Node contact: Baubak Bajoghli
Website: austrian-bioimaging.at

FACILITIES
🏛 22

EXTERNAL USERS
👥 >50

USER PUBLICATIONS
📑 n/a

REMOTE USERS
🖥 <10

TRAINING COURSES ORGANIZED
👥 2

STAFF INVOLVED
👥 >40

- The Node received funding for the collaborative ISIDORe JRA project VIRAL.
- Baubak Bajoghli received Science 2023 award by PHOENIX Group.
- Node staff hosted Euro-BioImaging Hub team visit in March 2023.
- The Node produced its first Annual Report, covering 2022-2023. Read it here:
  https://austrian-bioimaging.at/wp-content/uploads/2024/05/CMI_AnnualReport-22-23.pdf

CZECHIA
Advanced Light and Electron Microscopy Node Prague

Node contact: Aleš Benda
Website: czech-bioimaging.cz/euro-bi/

FACILITIES
🏛 6

EXTERNAL USERS
👥 349

USER PUBLICATIONS
📑 94

REMOTE USERS
🖥 14

TRAINING COURSES ORGANIZED
👥 17

STAFF INVOLVED
👥 34.1

- The Node was awarded nearly 10 Mil EUR to upgrade its equipment in 2024-2026 (infrastructure investment funding for the project "Modernisation of the VVI Czech-BioImaging"). Funding from LM 2023050 Czech-BioImaging (1.5 M Euros a year) covers operating costs.
- IMCF at BIOCEV acquired high-end imaging platform Nikon iLas2 Ring-TIRF with photostimulation   - a new wide-field microscope with Ring-TIRF illumination and photoactivation/FRAP module.
- The Node has actively engaged in European projects providing user access as part of ISIDORe.

BULGARIA
Sofia BioImaging Node

Node contact: Stoyno Stoynov
Website: dnarepair.bas.bg/eurobioimaging.bg/site/

FACILITIES
🏛 1

EXTERNAL USERS
👥 9

USER PUBLICATIONS
📑 n/a

REMOTE USERS
🖥 n/a

TRAINING COURSES ORGANIZED
👥 1

STAFF INVOLVED
👥 9

- Node received 1 970 000 Euro grant from the Bulgarian National Roadmap for Research Infrastructures.
- New machines include: BD FACSDiscover™ S8 Cell Sorter with BD CellView™ Image Technology and BD SpectralFX™ Technology.

CZECHIA
Advanced Light Microscopy and Medical Imaging Node Brno

Node contact: Michal Mikl
Website: eurobioimaging.eu/Nodes/advanced-light-microscopy-and-medical-imaging-Node-brno-cz

FACILITIES
🏛 4

EXTERNAL USERS
👥 69

USER PUBLICATIONS
📑 47

REMOTE USERS
🖥 0

TRAINING COURSES ORGANIZED
👥 14

STAFF INVOLVED
👥 26.7

- The Node benefits from funding from National Infrastructure for Biological and Medical imaging CZ grants.
- New instruments include a Zeiss LSM 980 at the Biophotonics core facility.
- Human MRI facility started the development of novel data processing tools for multi-echo fMRI data.
- Technological developments at the Node include new chambers for holograhic microscopy, new MR-data processing tools, new methods for quantification of T1 in myocardium and new QUEST and AI-based methods for MRS quantification.

CZECHIA
Center for Advanced Preclinical Imaging (CAPI)

Node contact: Ludek Sefc
Website: capi.lf1.cuni.cz/en/address-capi

FACILITIES
1

EXTERNAL USERS
28

USER PUBLICATIONS
11

REMOTE USERS
16

TRAINING COURSES ORGANIZED
4

STAFF INVOLVED
10

- The Node acquired a Kaer Labs Open Optical Imaging System for Fluorescence-guided Surgery.
- Together with TU Dresden described novel approaches in regulating tumor metabolism.
- The Node is developing ThyroPIX: a new generation camera for thyroid glands and small organs imaging by nuclear medicine methods.
- The Node hosted a student supported via Fulbright stipend.

EMBL
Euro-BioImaging EMBL Node

Node contact: Virginia Pierini
Website: eurobioimaging-access.eu/Nodes/advanced-light-microscopy-facility-embl
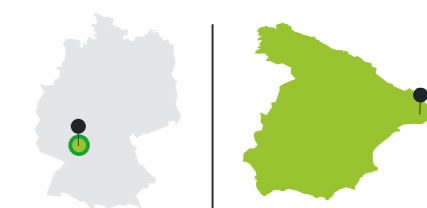
FACILITIES
4

EXTERNAL USERS
178

USER PUBLICATIONS
76

REMOTE USERS
54

TRAINING COURSES ORGANIZED
8

STAFF INVOLVED
19.5

- The Node is working on developments for the following technologies: Brillouin microscopy, Oblique plane microscopy, EasyGrid, Serial 'lift-out' for in situ structural biology, Dynamic MINFLUX imaging, Cryo-FIB lift-out for in situ structural biology (together with the Mahamid group and Zeiss, Leica and Oxford Instruments), an automated trimming tool for the ultramicrotome (together with Leica), Cell 3D Positioning by Optical encoding (C3PO).
- EMBL Imaging Centre 2023 highlights are available here:
  https://embl.org/about/info/imaging-centre/blog/2024/02/embl-ic-highlights-of-2023/

DENMARK
Danish BioImaging Infrastructure

Node contact: Clara Prats, Sonia Garcia
Website: dbi-infra.eu

FACILITIES
5

EXTERNAL USERS
254

USER PUBLICATIONS
92

REMOTE USERS
15

TRAINING COURSES ORGANIZED
10

STAFF INVOLVED
5

- DaMBIC (SDU) received new Nikon AX multiphoton microscope. The Core Facility for Advanced BioImaging (UCPH) got an analytical Electron microscope S/TEM (FEI) + EDS. The CFIM (UCPH) facility has purchased a Carl Zeiss Elyra 7 to perform SIM and dual colour SMLM.
- The DaMBIC infrastructure supported over 40 grant applications in different fields in 2023.
- The new DBI infrastructure team relocated to a bigger office space.
- DBI-INFRA Image Analysis Core Facility (IACF) officially started its open-access image analysis services on September 1st, 2023.
- Node produced its first Annual Report, covering 2022-2023. Read it here:
  https://www.danishbioimaging.dk/wp-content/uploads/2023/11/DBI-INFRA_Report2022-23.pdf

FINLAND
Finnish Advanced Microscopy Node (FiAM)

Node contact: Irina Belaia
Website: eurobioimaging.fi/FiAM/

FACILITIES
8

EXTERNAL USERS
135

USER PUBLICATIONS
181

REMOTE USERS
35

TRAINING COURSES ORGANIZED
15

STAFF INVOLVED
26

- FiAM received 7.22 Mil EUR of investments from the Research Council of Finland FIRI 2023 funding to upgrade instruments and services.
- FiAM is beta-testing the Aurox clarity for live cell imaging, establishing analysis tools for hyperspectral SRS imaging data, developing on custom-built optical tweezers set-up.
- FiAM is developing optimized sample preparation protocols for volumeEM technologies and establishing workflow for volumeEM data sharing and reuse.
- FiAM developed Ocul-AR, a mobile app to guide researchers and students in becoming independent microscopy users with the help of augmented reality.

FINLAND
Finnish Biomedical Imaging Node (FiBI)

Node contact: Tiina Saanijoki
Website: eurobioimaging.fi/FiBI/

FACILITIES
5

EXTERNAL USERS
170

USER PUBLICATIONS
276

REMOTE USERS
19

TRAINING COURSES ORGANIZED
10

STAFF INVOLVED
93

- Turku PET Centre acquired a new Raycan small animal PET/CT.
- FiBI contributes to development of a multichannel optically pumped magnetometer (OPM) system in collaboration with Aalto University and MEGIN Ltd.
- Development of artificial intelligence-based tools for dementia diagnostics in EU2020 Horizon project AI-Mind, proposing novel biomarkers based on functional brain imaging.
- Developing stimulus and monitoring devices for MEG and MRI/fMRI as well as contributing to the MEG vendor's R&D validation projects.
- Development of zero echo fMRI as a tool across most preclinical imaging manufactures as well as testing its clinical suitability.

FRANCE
France BioImaging Node (FBI)

Node contact: Caroline Thiriet
Website: france-bioimaging.org/

FACILITIES
25

EXTERNAL USERS
876

USER PUBLICATIONS
246

REMOTE USERS
18

TRAINING COURSES ORGANIZED
66

STAFF INVOLVED
209

- FBI launched 2 calls of the "Africa-France Joint Initiative for Biological Imaging", pairing imaging scientists and researchers in Africa and France.
- FBI organised a FBI.data Sprint week to work on FAIR image data management.
- Technology development areas include: Correlative X-ray and Electron Microscopy (CXEM), LM/AFM correlative microscopy, Lattice lightsheet - ideal for high-resolution imaging of live samples, and sequential smFISH for high-resolution spatial transcriptomics.
- Toulouse & Alsace Nodes joined France-BioImaging, becoming part of the Euro-BioImaging Node in 2024.

HUNGARY
Cellular Imaging Hungary

Node contact: János Szöllősi, György Vamosi
Website: eurobioimaging.eu/Nodes/cellular-imaging-hungary

FACILITIES
5

EXTERNAL USERS
101

USER PUBLICATIONS
~100

REMOTE USERS
0

TRAINING COURSES ORGANIZED
5

STAFF INVOLVED
9

- A Beckman Coulter CytoFLEX cell sorter with 4 lasers was acquired at the University of Debrecen.
- The sub-Node in Szeged participated in a project funded by the Chan Zuckerberg Initiative; Semmelweis University (Budapest) in Marie Curie Training Networks; the University of Debrecen in a JPND project for the investigation of Parkinson's disease.
- A demonstration of microscopy techniques was held at the "Researchers' Night" for the public.
- 33 PhD defenses took place based on research utilising the Node's facilities.
- An ISIDORe project was awarded to Dr. Veronika Huntošová (University of Kosice, Slovakia) for studying hypericin-nanoparticle uptake for photodynamic therapy at the University of Debrecen (Pevná et al, JPPB B: Photobiology).

HUNGARY
Medical and Preclinical Imaging Hungary

Node contact: Viktória Zsófia Arató
Website: https://eurobioimaging.eu/Nodes/medical-and-preclinical-imaging-hungary

FACILITIES
4

EXTERNAL USERS
22

USER PUBLICATIONS
70

REMOTE USERS
4

TRAINING COURSES ORGANIZED
2

STAFF INVOLVED
19.4

- The PETtrace 800 cyclotron went through a Ten Years Life Extension and Refurbishment upgrade program.
- Ongoing projects with international and national companies of radiolabelling of new type phamaceutical ingredients (in pre-clinical and clinical phase).
- Several grants and scholarships were awarded to staff members of the Node by their university and the Technology Transfer Center.
- In 2023, 3 students successfully completed their PhD program with support of the Node.

ISRAEL

Israel BioImaging

Node contact: Michal Neeman
Website: eurobioimaging.eu/Nodes/israel-bioimaging

FACILITIES
7

EXTERNAL USERS
50

USER PUBLICATIONS
60

REMOTE USERS
0

TRAINING COURSES ORGANIZED
5

STAFF INVOLVED
20

- A new spinning disk confocal, the Olympus ixplore spin, arrived at the Technion sub-Node.
- Users are funded predominantly by the Israel Science Foundation and ERC.
- Thirty industry users undertook projects at the Israel BioImaging Node.
- University of Haifa sub-Node contributed to ANERIS project training course on AI tools for image restoration.

ITALY

Digital Imaging Multimodal Platform Neuromed - DIMP NEUROMED

Node contact: Prof. Nicola D'Ascenzo
Website: neuromed.it

FACILITIES
8

EXTERNAL USERS
12

USER PUBLICATIONS
12

REMOTE USERS
1

TRAINING COURSES ORGANIZED
0

STAFF INVOLVED
4

- >10 Mil EUR funding obtained from Italian National Recovery Plan involving the use of the Node's imaging facility.
- The Node participated in Horizon 2020 project PETAL (PET in Agriculture and Life).
- The Node worked on the development of portable Positron Emission Tomography systems including a helmet PET system for dedicated brain imaging, and a portable plant PET system (see INNOVATION section).

ITALY

Advanced Light Microscopy Italian Node

Node contact: Dr. Seetharaman Parashuraman
Website: eurobioimaging.eu/Nodes/advanced-light-microscopy-italian-Node/

FACILITIES
5

EXTERNAL USERS
72

USER PUBLICATIONS
23

REMOTE USERS
7

TRAINING COURSES ORGANIZED
3

STAFF INVOLVED
15.5

- New instruments include: Confocal super-resolution STED microscope Leica Stellaris SP8 + FLIM in Padua.
- Technology developments include novel probes for EM, technology for identifying CTCs; Vibrationally-resonant/third-order sum frequency generation microscope; Combination of optical tweezers with single molecule fluorescence microscopy; Dual color 3D super-resolution microscopy; Combination of Expansion Microscopy with Super-resolution PALM; Inverted LSFM for automated large sections reconstruction.
- The Node benefits from funding from a number of projects and was active in PhD programmes.

ITALY

MMMI - Multimodal Molecular Imaging Italian Node

Node contact: Enzo Terreno
Website: www.mmmi.unito.it/

FACILITIES
9

EXTERNAL USERS
25

USER PUBLICATIONS
10

REMOTE USERS
56

TRAINING COURSES ORGANIZED
1

STAFF INVOLVED
35.5

- Node acquired new NIRF/BLI modules interfacing to the existing PET/SPECT/CT scanner and a new PET/MRI scanner.
- Technology developments include: Connectomic analysis of regional brain metabolism; MRI preclinical Imaging protocols and analysis on liver steatosis/fibrosis, MRI preclinical imaging Resting-State protocols for connectivity & structural brain analysis, development of preclinical MRI sequences for tumor pH imaging.
- Further developments of clinical MRI dedicated sequences, for the evaluation of bone densitometry.
- Node staff participate in Lessons to Neuroscience PhD programme and the MORPHOPHEN Erasmus Mundi Master's programme.

ITALY

Phase Contrast Imaging Flagship Node Trieste

Node contact: Giuliana Tromba
Website: eurobioimaging.eu/Nodes/phase-contrast-imaging-flagship-Node-trieste

FACILITIES
1

EXTERNAL USERS
15

USER PUBLICATIONS
24

REMOTE USERS
0

TRAINING COURSES ORGANIZED
2

STAFF INVOLVED
2

- The Node acquired a new phantom to perform studies on human-like lungs kept inflated by an adequate pumping system.
- The Node is a partner in the recently funded: 'GAP' - image-guided computational and experimental Analysis of fractured Patients - European training network https://gapmscaproject.com/
- Node received funding for the collaborative ISIDORe JRA project VIRAL.

NETHERLANDS

Dutch High Field Imaging Hub

Node contact: Dennis Klomp
Website: highfieldmri.nl

FACILITIES
5

EXTERNAL USERS
52

USER PUBLICATIONS
~100

REMOTE USERS
0

TRAINING COURSES ORGANIZED
4

STAFF INVOLVED
10

- New instruments include a test console to prepare for 14T MRI and a Gradient booster for 1.5T, 3T and 7T MRI.
- Grants awarded to the Node include IHI Illuminate, Eurostars femscan and selfscan, NWO maestro and NWO holistic.
- The Node is working to develop 14T MRI: the world's strongest whole body MRI system, planned to be operational at Radboud Nijmegen in 2026, funded by NWO.

NETHERLANDS

Correlative Light Microscopy Dutch Flagship Node

Node contact: Judith Klumperman, Nalan Liv
Website: microscopie.nl

FACILITIES
3

EXTERNAL USERS
27

USER PUBLICATIONS
~60

REMOTE USERS
5

TRAINING COURSES ORGANIZED
4

STAFF INVOLVED
8

- The Node was awarded a number of important grants from NWO and Dutch National Growth Fund.
- New instruments include Xenium In Situ (UMCG) and a new self-build correlative fluorescence and ion beam SEM.
- NL Minister of Education, Culture and Science was highly interested in Dutch Microscopy in 2023 and visited the awardees of roadmaps, including NL-BioImaging, and attended the opening of the new EM building in Utrecht.
- The Node organised the 25th year of Utrecht EM workshops
  https://cellmicroscopy.nl/workshops/

NETHERLANDS

Erasmus MC OIC - Advanced Light Microscopy Rotterdam Node

Node contact: Gert-Jan Kremers
Website: erasmusoic.nl

FACILITIES
1

EXTERNAL USERS
4

USER PUBLICATIONS
31

REMOTE USERS
2

TRAINING COURSES ORGANIZED
4

STAFF INVOLVED
8

- The Node upgraded an RCM confocal into an AI-driven smart microscope for image guided functional imaging.
- The OIC is the lead core facility in the Convergence Flagship consortium CIFIC, to promote collaboration between Erasmus MC and TU Delft.
- The OIC image analysis course is now part of the Erasmus MC Graduation school.

NETHERLANDS
Facility of Multimodal Imaging - AMMI Maastricht

Node contact: Marc A.M.J. van Zandvoort
Website: www.eurobioimaging-access.eu/nodes/facility-of-excellence-in-imaging---alm-and-molecular-imaging-node-maastricht

FACILITIES
5

EXTERNAL USERS
~50

USER PUBLICATIONS
n/a

REMOTE USERS
n/a

TRAINING COURSES ORGANIZED
4

STAFF INVOLVED
16

- The Optical imaging part of the Node obtained a national grant of 2.5 Mil EUR.
- The Node acquired a new Multiphoton intravital and stimulated Raman spectroscope and a multiphoton endoscope.
- All Node staff is involved in the Bachelor Biomedical sciences (BBS) program, the Master of Science (MBS) and others.
- The Node participates in EU projects - PETAL, MSCA-ITN THERADNET, EuCanImage, IMPRESS, UNLOCC.

NETHERLANDS
Preclinical Imaging Centre (PRIME) - Molecular Imaging Dutch Node

Node contact: Amanda Kiliaan, Wilma Janssen
Website: radboudumc.nl/en/research/radboud-technology-centers/imaging/preclinical-imaging-center
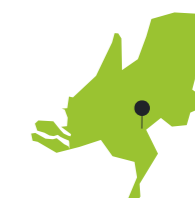
FACILITIES
1

EXTERNAL USERS
7

USER PUBLICATIONS
n/a

REMOTE USERS
n/a

TRAINING COURSES ORGANIZED
6

STAFF INVOLVED
7

- Through the NL-BioImaging Roadmap the Node receives more than 1 Mil EUR for installing a next-generation 3- and 4-photon intravital microscopy platform in PRIME.
- Award of the NWO Perspectief grant for upgrading the SPECT/CT scanner and a new high-end CT system.
- Using funds from the NWO-Zwaartekracht funding IMAGINE!, a new laser type for low-repetition high-pulse-energy 3- and 4-photon excitation and ultra-deep tissue microscopy was installed.

NETHERLANDS
High Throughput Microscopy Dutch Flagship Node

Node contact: Sylvia Le Dévédec
Website: eurobioimaging.eu/nodes/high-throughput-microscopy-dutch-flagship-node

FACILITIES
2

EXTERNAL USERS
20

USER PUBLICATIONS
10

REMOTE USERS
0

TRAINING COURSES ORGANIZED
0

STAFF INVOLVED
4

- The Node purchased different compound libraries including the GPCR targeting compound library, updated FDA library, NRF2 pathway activating library.
- The Node purchased an automated screening system with ImageXpress and dedicated robotics.
- Busy year in terms of outreach including meeting with minister Robert Dijkgraaf in Leiden and developing a Lego microscope workshop for kids at Leiden Science family day.
- The Node organized many training courses for PhD/PD students on BioImaging and FAIR image data.

NETHERLANDS
Population Imaging Flagship Node Rotterdam

Node contact: Ilva Vanhouwelingen
Website: populationimaging.eu

FACILITIES
1

EXTERNAL USERS
107

USER PUBLICATIONS
7

REMOTE USERS
n/a

TRAINING COURSES ORGANIZED
3

STAFF INVOLVED
2.5

- The Node undertook major advances in its management as the Erasmus MC Imaging Office - the gateway to the combined knowledge and skills of the Radiology & Nuclear Medicine department of the Erasmus MC - is being established, and will integrate with the Population Imaging Flagship Node.
- The Node participates in EuCanImage, canServ, EOSC4Cancer & EUCAIM EU projects.
- The Node contributed to EUCAIM platform's public catalogue of cancer imaging datasets from the repositories of the AI4HI cancer imaging projects.
- The Node developed multiple tools for use with XNAT, and is working on an image viewer with possibilities for tailored additional functionality.

NETHERLANDS
The van Leeuwenhoek Centre for Advanced Microscopy (LCAM)

Node contact: Mark Hink
Website: lcam.nl

FACILITIES
3

EXTERNAL USERS
8

USER PUBLICATIONS
~40

REMOTE USERS
0

TRAINING COURSES ORGANIZED
6

STAFF INVOLVED
11

- The Node acquired a Leica Stellaris 8 confocal.
- The Node was part of the successful NL-BioImaging roadmap application.
- Multiple LCAM staff members were involved in the main organisation of the ELMI 2023 meeting.
- The Node worked to develop FLIM-STED.

NORWAY
NorMIC Oslo - Advanced Light Microscopy Node Oslo

Node contact: Oddmund Bakke
Website: mn.uio.no/ibv/english/research/infrastructure/
                 facilities/life-science/imaging/normic

FACILITIES
1

EXTERNAL USERS
56

USER PUBLICATIONS
27

REMOTE USERS
0

TRAINING COURSES ORGANIZED
3

STAFF INVOLVED
5

- The Node acquired a Zeiss LSM 980 Airyscan.
- The Node and the Oslo network was awarded 0.6 Mil EUR including a position to support the network for the next 3 years.
- The Node organized workshops on Biological Microscopy and on imaging processing.
- The Node co-organized a successful Nordic BNMI symposium in Odense, Denmark.
- Preparation is underway for the move of half of the NorMIC Oslo Node into the University of Oslo Life Science Building, joining it with the facility at the University Hospital creating a larger combined NorMIC Oslo Node.

NETHERLANDS
Wageningen Imaging and Spectroscopy Hub (WISH) - ALM and Molecular Imaging Node

Node contact: Johannes Hohlbein
Website: eurobioimaging.eu/Nodes/wageningen-imaging-and-spectroscopy-
                 hub-(wish)---alm-and-molecular-imaging-Node-wageningen

FACILITIES
2

EXTERNAL USERS
19

USER PUBLICATIONS
~40

REMOTE USERS
0

TRAINING COURSES ORGANIZED
7

STAFF INVOLVED
3.1

- The Node received Funding for 3D functional imaging confocal (NL-Bioimaging Roadmap).
- The Node contributed to TARDIS (single particle tracking algorithm) published in Nature Methods.
- The Node's annual PhD and Postdoc course for the research schools VLAG and EPS was very highly appreciated and scored by all 24 participants.
- The Node was very active in training, providing 127 personal training sessions.

NORWAY
NORMOLIM, Norwegian Molecular Imaging Infrastructure

Node contact: Lili Zhang, Jin Li
Website: normolim.w.uib.no
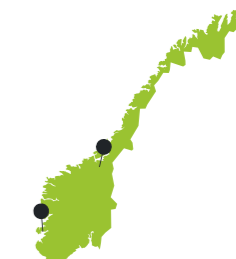
FACILITIES
3

EXTERNAL USERS
28

USER PUBLICATIONS
9

REMOTE USERS
2

TRAINING COURSES ORGANIZED
1

STAFF INVOLVED
7.5

- The Node is working on the PseudoPET with Luxembourg. The project aims to use multimodal MRI and AI to generate PET images of hypoxia. In this project, immunodeficient rats are implanted with human glioblastoma specimens, and FLT PET as well as multimodal MRI are performed. All animal work is performed at Dept of Biomedicine and MIC, and image analysis is done at Luxembourg Institute of Health
- Developments at the Node include gluCEST and cardiac MRE.

POLAND
Advanced Light Microscopy Node Poland

Node contact: Jędrzej Szymański
Website: amf.nencki.edu.pl

FACILITIES
4

EXTERNAL USERS
33

USER PUBLICATIONS
25

REMOTE USERS
0

TRAINING COURSES ORGANIZED
0

STAFF INVOLVED
7

- The Node acquired a super-resolution microscope - the Nanoimager from ONI.
- The Node got support from the Ministry of Science and Higher Education to maintain the technologies in their portfolio.
- The Node also received funding to support user access via the National User Access grant scheme.
- The Node hosted several visits of young researchers and school pupils interested in life sciences, allowing them to familiarize themselves with state of the art imaging techniques.

PORTUGAL
Portuguese Platform of BioImaging (PPBI)

Node contact: Luisa Cortes
Website: ppbi.pt

FACILITIES
15

EXTERNAL USERS
125

USER PUBLICATIONS
232

REMOTE USERS
15

TRAINING COURSES ORGANIZED
24

STAFF INVOLVED
38

- The Node acquired many new instruments such as: High-content screening systems, a multiplexing system, microscopes for cellular observations, a Scanning Electron Microscope; a combined Atomic force and fluorescence microscope, a biodynamic system for 3D-mechanical stimulation, super-resolution SIM systems and a large sample light-sheet system.
- The Node organised FOM2023 and NEUBIAS conferences.
- The Node was active in job shadowing with Global BioImaging and CTLS, hosting facility staff from Mexico and Spain respectively.
- Several public engagement initiatives such as the celebration of the "International day of light" were organised by the Node.

PORTUGAL
Brain Imaging Network (BIN)

Node contact: Miguel Castelo-Branco
Website: uc.pt/en/brainimaging/

FACILITIES
13

EXTERNAL USERS
8

USER PUBLICATIONS
28

REMOTE USERS
3

TRAINING COURSES ORGANIZED
3

STAFF INVOLVED
7

- The Node benefits from many funding schemes and all scanners have been upgraded.
- The Node is involved in projects to study potential impacts of prenatal diet on neurodevelopmental diseases; innovative treatment for neuropsychiatric disorders using neurofeedback and Neurostimulation.
- The Node is participating in major EU projects - STIPED combining NeuroImaging and Neurostimulation and AIMS-2-Trials combining MR and PET to study biomarkers in Autism.
- The Node is very active in communication and outreach, participating in a number of science communication events, organises courses and had regular presence in the main national media (magazines and several TV shows).

SLOVENIA
SiMBION

Node contact: Primož Pelicon
Website: simbion.mf.uni-lj.si/en/home-2/

FACILITIES
16

EXTERNAL USERS
24

USER PUBLICATIONS
15

REMOTE USERS
1

TRAINING COURSES ORGANIZED
0

STAFF INVOLVED
4

- The Node acquired a new TOF mass spectrometer for advanced ICP-MS imaging (National Institute of Chemistry, Ljubljana) to probe micron sized trace element features in solid samples and determine the elemental composition of individual nanoparticles.
- The Node participated in the Horizon Europe EU project ReMade@ARI (https://remade-project.eu/) to explore the properties and structures of recyclable materials.
- University of Ljubljana, Biotechnical faculty participates in the project FunContrAPest: "Novel Fungal Proteins as Biopesticides for Control of Challenging Invasive Alien Agricultural Pests."
- The Node published micro-PIXE developments, see INNOVATION, p. 33.

SWEDEN
Swedish National Microscopy Infrastructure

Node contact: Hjalmar Brismar, Julia Fernandez-Rodriguez
Website: nmisweden.se

FACILITIES
5

EXTERNAL USERS
120

USER PUBLICATIONS
95

REMOTE USERS
25

TRAINING COURSES ORGANIZED
25

STAFF INVOLVED
30

- The Swedish Research Council (VR) has agreed to continue to support NMI until 2028.
- The Node acquired many new instruments, including lightsheet and super-resolutions systems for SIM, SMLM, and MINFLUX; EM systems for Array Tomography and improved systems for FIB-SEM and cryo-lamella preparation.
- The Node is involved in technology development in smart microscopy, volume EM, Clearing and Expansion microscopy, tissue engineering.
- The image analysis sub-Node is developing new workflows for cell segmentation and classification using QuPath, Ilastik, and Python.

UNITED KINGDOM
The UK Node

Node contact: Georgina Fletcher
Website: eurobioimaging.eu/Nodes/uk-Node

FACILITIES
14

EXTERNAL USERS
202

USER PUBLICATIONS
134

REMOTE USERS
9

TRAINING COURSES ORGANIZED
5

STAFF INVOLVED
47.6

- The Node acquired many new instruments, including super-resolution systems from SMLM, SPT, SRRFnTIRF, new MassSpec imaging system TOF-ICP-MS, Functional and live imaging systems for FLIM, a Magnetic Particle Imaging scanner, lightsheet system, a FIB-SEM system as part of a correlative imaging pipeline, and Imaging Cell Sorter.
- King's College London hosted a grand opening of the LMF following a 6 month ~£1M refurbishment with several talks and commercial engagment.
- At ESRIC, the Node was involved in the first Apprentices programme for 17 year olds. Apprentices were working in the Advanced Imaging Facility with super-resolution equipment. The apprentices have gone forwards to either university or to apprenticeships with microscopy manufacturers.

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