



EURO  BIOIMAGING

**ANNUAL REPORT
2020**

EURO-BIOIMAGING ERIC

We are the European landmark research infrastructure for biological and biomedical imaging as recognised by the European Strategy Forum on Research Infrastructures (ESFRI). We are the gateway to 100+ world-class imaging facilities across Europe.

TABLE OF CONTENTS

5-17

INTRODUCTION

- 5 Foreword by Chair of the Euro-BioImaging Board
- 6 Foreword by Chairs of the Scientific Advisory Board
- 8 Who We Are
- 10 Mission
- 12 From Project Idea to Reality
- 13 User Access
- 14 2020 Highlights
- 16 Our Team

19-27

2020 MILESTONES

- 19 Foreword from Euro-BioImaging Directorate
- 20 Expanding our Infrastructure
- 23 Expanding our Technology Offer
- 26 Building our Governance

29-35

CORE SERVICES

- 29 Foreword from Euro-BioImaging Industry Board
- 30 Open Access to Technologies - From Particles to Patients
- 32 Technology Spotlight
- 34 Open Access to Training
- 35 Open Access to Data

37-51

COMMUNITY ACTIVITIES

- 37 European Projects
- 42 International Relations
- 44 International Collaborations
- 45 Collaboration with Partners
- 46 Communication & Outreach
- 49 Community Building

53-57

EXCELLENT SCIENCE

- 53 Introduction by Director General
- 54 COVID-19
- 55 Cancer
- 56 Neurology
- 56 Cardiovascular
- 57 Marine Biology
- 57 Plant Biology

59-75

FROM OUR NODES

- 59 Preamble
- 60 Euro-Bioimaging Nodes and Users
- 64 Our Family of Nodes

77-78

FINANCIAL INFORMATION

- 77 Income and Expenses

INTRODUCTION

FOREWORD BY CHAIR OF THE EURO-BIOIMAGING BOARD



BENJAMIN GEIGER
Principal Investigator,
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In recent decades, the overwhelming progress in precision biology and medicine, combined with the development of new molecular, cellular and computational tools, has led to a genuine revolution in biomedical research. Among the key technologies that drive this revolution are novel biological and medical imaging tools that enable the visualization of structural and molecular processes within cells and tissues with unprecedented spatial and temporal accuracy. Naturally, the power of such novel imaging technologies has created a huge demand for accessible imaging facilities that contain the most advanced equipment and are run by leading experts in the field. Addressing both biological imaging and medical imaging technologies puts Euro-Bioimaging in a particularly challenging, yet uniquely promising position, to bridge between the distinct, but complementary technologies used by the biological and medical research communities. Providing access to such technologies, throughout Europe, and beyond, is the primary mission of Euro-Bioimaging (www.eurobioimaging.eu).

In its first year, the Euro-Bioimaging Board was able to accomplish many important organizational tasks. In May 2020, a Chairman and Co-chairman were selected, and the Board voted on the accession of a new member state, Slovenia. Over the course of 2020, major milestones were achieved including appointing a Scientific Advisory Board, establishing

a scientific evaluation policy, approving the 2021 budget, validating a user funding scheme, and defining and implementing the recruitment process for the Euro-Bioimaging ERIC's Directorate.

Being part of Euro-Bioimaging at this time, and serving as the first Chairman of its Board has been a particular exciting experience for me. Since 2010 or so, I actively participated in the “preparatory” and “interim” phases of Euro-Bioimaging, addressing the introduction of new optical imaging technologies (together with Rainer Pepperkok from EMBL), and bridging between the biological and medical imaging communities, two topics which are close to my heart. Watching the current ERIC, with 16 current member countries and EMBL, and with 25 highly active and effective nodes is a genuine pleasure for me.

Throughout 2020, Euro-Bioimaging responded to the urgent need for powerful biological and biomedical imaging approaches associated with COVID-19 research.

Throughout 2020, Euro-Bioimaging responded to the urgent need for powerful biological and biomedical imaging approaches by launching multiple initiatives associated with COVID-19 research (www.eurobioimaging.eu/content/Covid19). In my own lab, collaborating with an Israeli robotic microscopy company, we are developing an immunocytology-based approach for rapid COVID-19 diagnosis, which is complementary to the commonly-used PCT procedure. Many Euro-Bioimaging Nodes are collaborating in similar ways in response to the pandemic to provide insight into SARS-COV-2 virus and ultimately improve human health. These are just examples of how an infrastructure that brings open access to imaging facilities to the larger scientific community can contribute to excellent science and improve social well-being in the coming years.

FOREWORD BY CHAIRS OF THE SCIENTIFIC ADVISORY BOARD

DELIVERING QUALITY OUTCOMES FOR ACADEMIC AND INDUSTRY RESEARCHERS

Innovation hubs across the US, Europe and Australasia are increasingly being built around open access, high-quality core facilities. In addition, universities and research institutions across the globe are recognising the value of investment in world-class, open access core facilities. These investments are helping to take research and industry collaborations to a new level. At the same time, they help create local ecosystems that enable breakthrough research outcomes. Euro-Bioimaging has pioneered this approach, taking it to a new level in terms of building a true international network of high quality and well-managed imaging core facilities.

Euro-Biolmaging was granted the legal status of an ERIC (European Research Infrastructure Consortium) in December 2019. The funding associated with the award of ERIC status has allowed Euro-Bioimaging to establish a formal Directorate (Director General supported by Section Directors of Biological and Medical Imaging) to co-ordinate the activities of the growing research infrastructure. This growth reflects regular calls for new and additional core facilities to join. Node membership requires dedicated management, governance and oversight, defined training programs, image data management systems, with a focus on the delivery of high-quality services.

Operating at the highest level of quality, many facilities now have ISO accreditation. In this context, Euro-Bioimaging is proving to be a vital conduit between academic researchers, their collaborators and industry. Leading researchers are attracted to the platforms because of their proven quality, networks and focus. Industry is attracted because it can access a first class “one-stop imaging technology shop” and a seamless, uniform research service right across this international infrastructure. Access to this high-quality network of imaging capabilities is being



IAN SMITH
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seen as a game-changer for how universities and research institutions can collaborate with industry. Commercial partners now have a central point to initiate collaboration in any particular imaging area with the capacity to deliver a high-quality, timely and responsive service.

By providing easy and open access to cutting-edge research imaging infrastructure and supporting expertise, Euro-Bioimaging helps remove barriers to excellence in research and encourages collaboration.

In summary, we strongly believe that today’s “big questions” do require big and often complex answers. By providing open access to core facilities Euro-Bioimaging is helping to bring together leading researchers from different fields across national and global academic and commercial sectors. It’s these collaborative, interdisciplinary approaches, underpinned by easy and open access to high-end imaging capabilities operating at world’s best practice, that lead to breakthrough innovations, creating impact and real value for the global community.

EUROPEAN NETWORK FOR IMAGING SCIENTISTS

Euro-Biolmaging is a European Research Infrastructure Consortium (ERIC), as recognized by the European Strategy Forum on Research Infrastructures (ESFRI). Its member facilities offer access to advanced imaging technologies in the life sciences on a fee-for-service basis. Each facility is managed and staffed by scientists with expertise and experience in image capture and analysis, as well as in training and data management services, that users might not find at their home institutions or among their collaboration partners.

As an ERIC, Euro-Biolmaging fulfills a strategic, coordinating role by bringing together Europe’s leading imaging facilities to build a professional network of imaging scientists in the life sciences. Imaging facilities offer a new career path to scientists interested in combining their interest in laboratory-based research with their technical expertise. These scientists are working together, benefiting from their shared experiences of managing facilities, and creating a close-knit European imaging community.

Euro-Biolmaging is also supporting professional development of imaging scientists by promoting training opportunities within its network through staff exchanges. In partnership with Global Biolmaging (GBI), it is fostering international dialogue on how to promote a sustainable career path for scientists working in imaging facilities. With the support of the Chan-Zuckerberg Initiative, GBI is developing new training opportunities in core management, data analytics, and novel imaging technologies. All of these opportunities are open to Euro-Biolmaging core facility staff.

Euro-Biolmaging network is part of an international effort to provide career paths across many advanced technologies. In the United States, the Federation of American Societies for Experimental Biology (FASEB), has recognized the need for a national strategy to



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Associate Professor,
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leverage federal investments in Shared Research Resources (research infrastructures similar to Euro-Biolmaging) to improve efficiency, coordination, and economic impact of these critical assets.

As an ERIC, Euro-Biolmaging fulfills a strategic, coordinating role by bringing together Europe’s leading imaging facilities to build a professional network of imaging scientists in the life sciences.

By fostering career advancement, development, and network opportunities, Euro-Biolmaging is raising the bar for excellence and leading the way for greater cooperation in the European biological and biomedical imaging communities and beyond.

LEARN MORE ABOUT FASEB



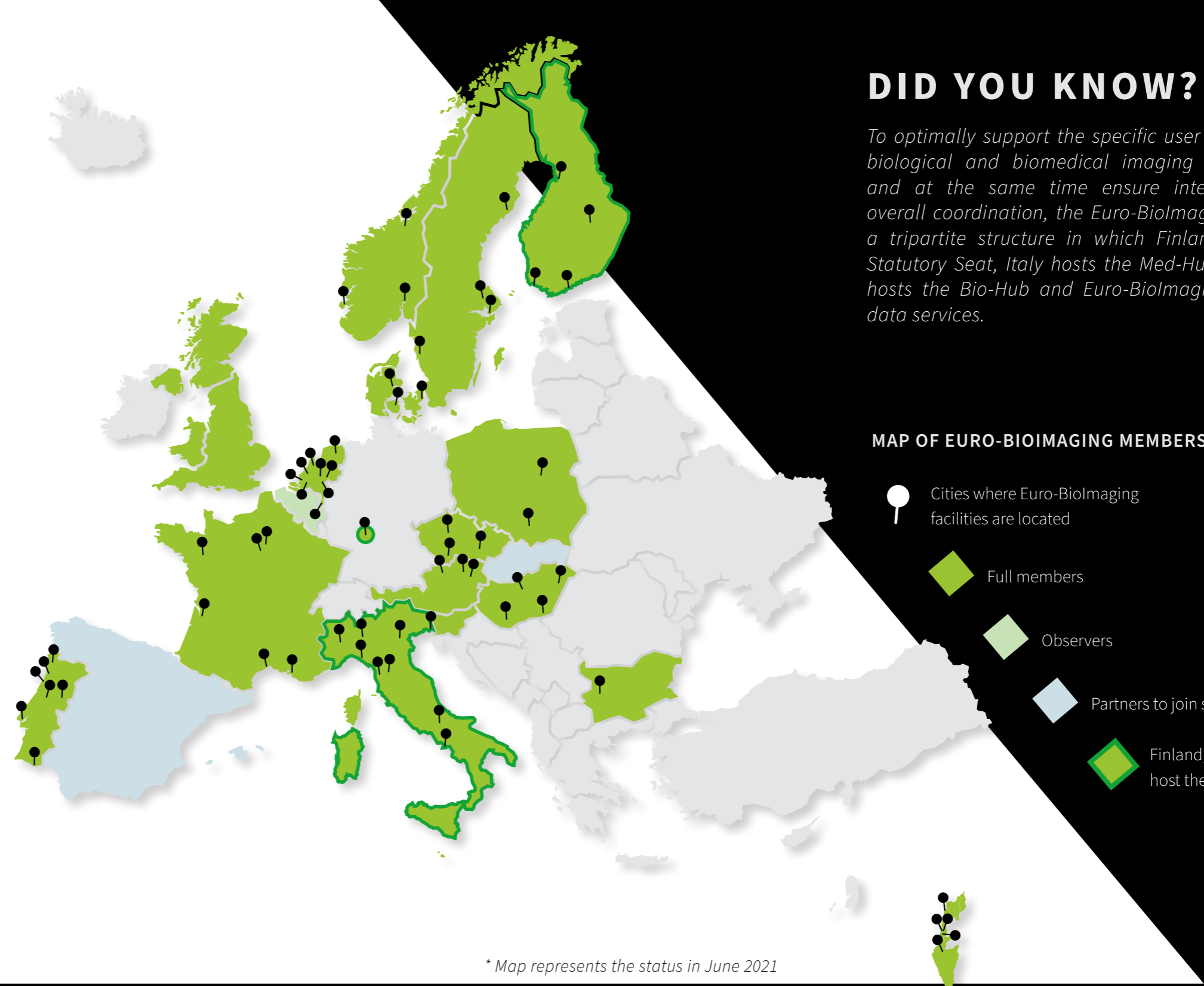
WHO WE ARE

Euro-BioImaging ERIC is the European Research Infrastructure 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 at the end of 2019 and in 2020 it comprises 16 Members and 1 Observer.

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

The Nodes are jointly coordinated by the Euro-BioImaging Hub, which provides general supporting services including the management of user access, training coordination and services for image data.

Access to Euro-BioImaging services takes place through the Euro-BioImaging web portal at www.eurobioimaging.eu.

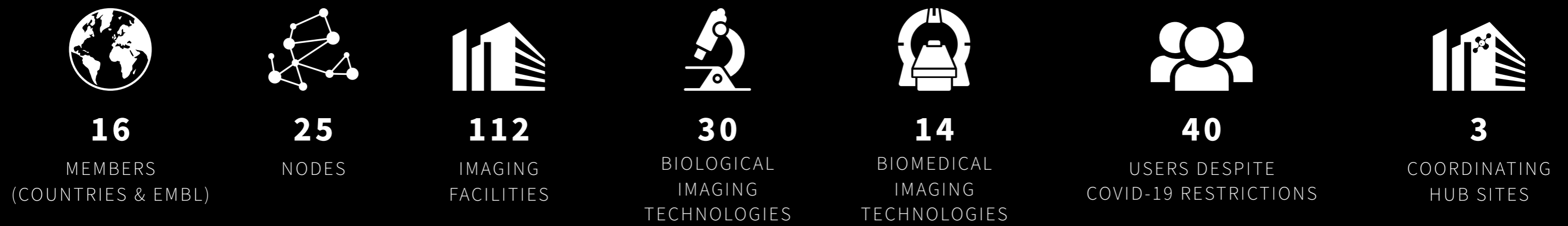


* Map represents the status in June 2021

DID YOU KNOW?

To optimally support the specific user needs in the biological and biomedical imaging communities and at the same time ensure integration and overall coordination, the Euro-BioImaging Hub has a tripartite structure in which Finland hosts the Statutory Seat, Italy hosts the Med-Hub, and EMBL hosts the Bio-Hub and Euro-BioImaging's general data services.

KEY FIGURES 2020



MISSION



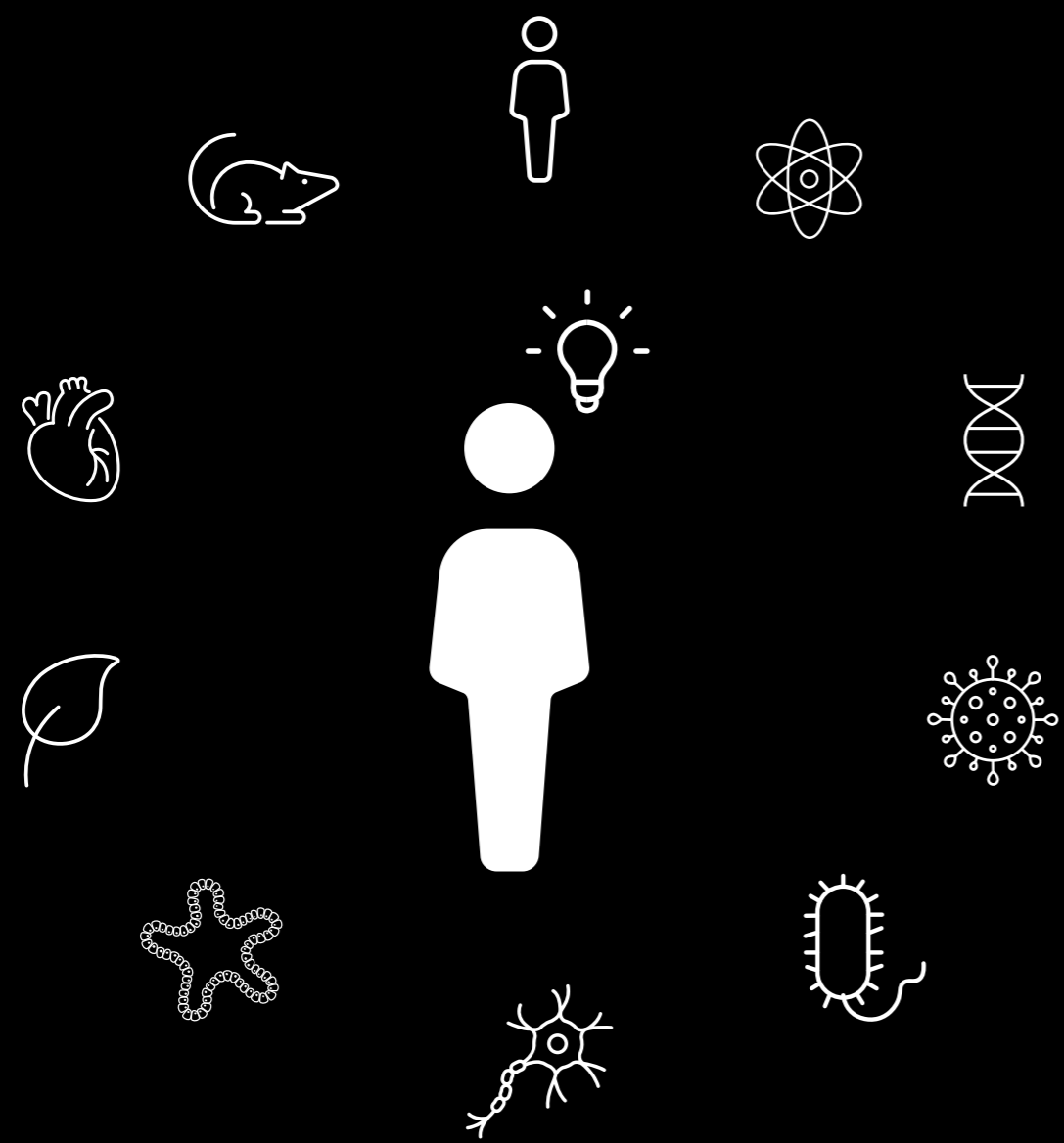
Euro-Biolmaging provides open access to cutting edge imaging technologies, advanced training and image data services for researchers in both basic biological and more applied biomedical sciences, thus integrating research communities that traditionally employ separate infrastructures.



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



FROM PROJECT IDEA TO REALITY



By providing open access to its services, Euro-Biolmaging ERIC enables European scientists across different disciplines to carry out cutting-edge research, allowing them to address key societal challenges including health and ageing, agricultural and marine research, climate action and environment and to boost the bio-economy.

It also supports technology development and innovation, and through its data services it enables the dissemination and reuse of image data by the community.

In 2020 44 technologies are available, but

Euro-Biolmaging is continuously looking for new and emerging technologies to keep its portfolio updated and to increase its offer to the scientific community.

IT ALL STARTS WITH AN IDEA

AND A NEED FOR POWERFUL IMAGING TECHNOLOGIES



USER ACCESS



INITIAL CONSULTATION

Potential users visit the Euro-Biolmaging web portal to select a technology and a Node, or contact Euro-Biolmaging 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-Biolmaging web portal (www.eurobioimaging.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.

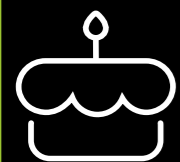
TECHNICAL ADVICE

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-Biolmaging 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.

2020 HIGHLIGHTS



Euro-Biolmaging ERIC is created



Euro-Biolmaging's first call for Nodes is open



Creation of the COVID-19 repository page on the Euro-Biolmaging website: www.eurobioimaging.eu/content/Covid19



EMBRC
EUROPEAN MARINE BIOLOGICAL RESOURCE CENTRE

Euro-Biolmaging and fellow research infrastructure EMBRC sign a Memorandum of Understanding

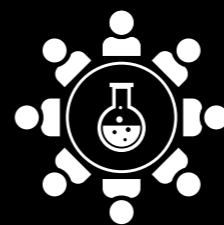
Second Euro-Biolmaging Board Meeting



New member country - Slovenia joins Euro-Biolmaging

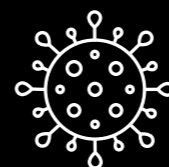


Euro-Biolmaging and Global-Biolmaging sign a Memorandum of Understanding to increase international collaboration



Euro-Biolmaging Scientific Advisory Board meets for the first time

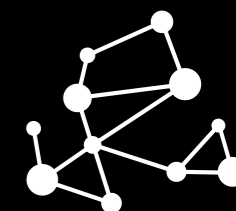
Launching Proof-of-Concept studies: Introducing 6 new technologies to our portfolio



Euro-Biolmaging - Fast Track for COVID-19 projects



Euro-Biolmaging signs the European Manifesto for COVID-19 research

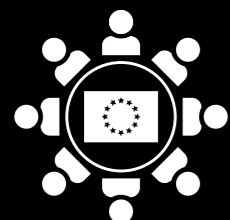


Euro-Biolmaging extends a warm welcome to four new Nodes

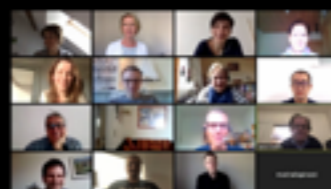


The Virtual Pub is open to all imaging enthusiasts

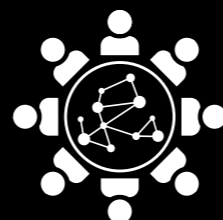
NOV 2019 DEC 2019 MAR 2020 APR 2020 MAY 2020 JUN 2020 JUL 2020 SEP 2020 OCT 2020 NOV 2020 DEC 2020



First Euro-Biolmaging Board Meeting



Euro-Biolmaging launches the Virtual Pub



Second Panel of Nodes meeting



EOSC-Life launches the first Digital Life Sciences Open Call



Inaugural meeting of the EBIB Advisory Panel

Third Euro-Biolmaging Board Meeting

OUR TEAM



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Director General

Euro-Biolmaging
Statutory Seat | Turku



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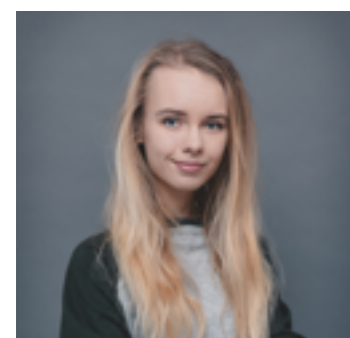
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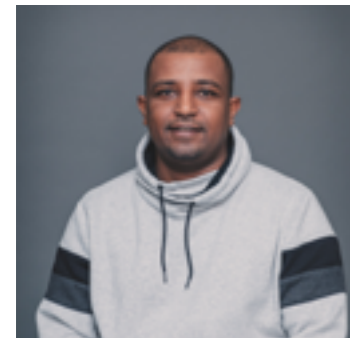
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**PASI
KANKAANPÄÄ**
Senior
Scientific Manager

Euro-Biolmaging
Statutory Seat | Turku



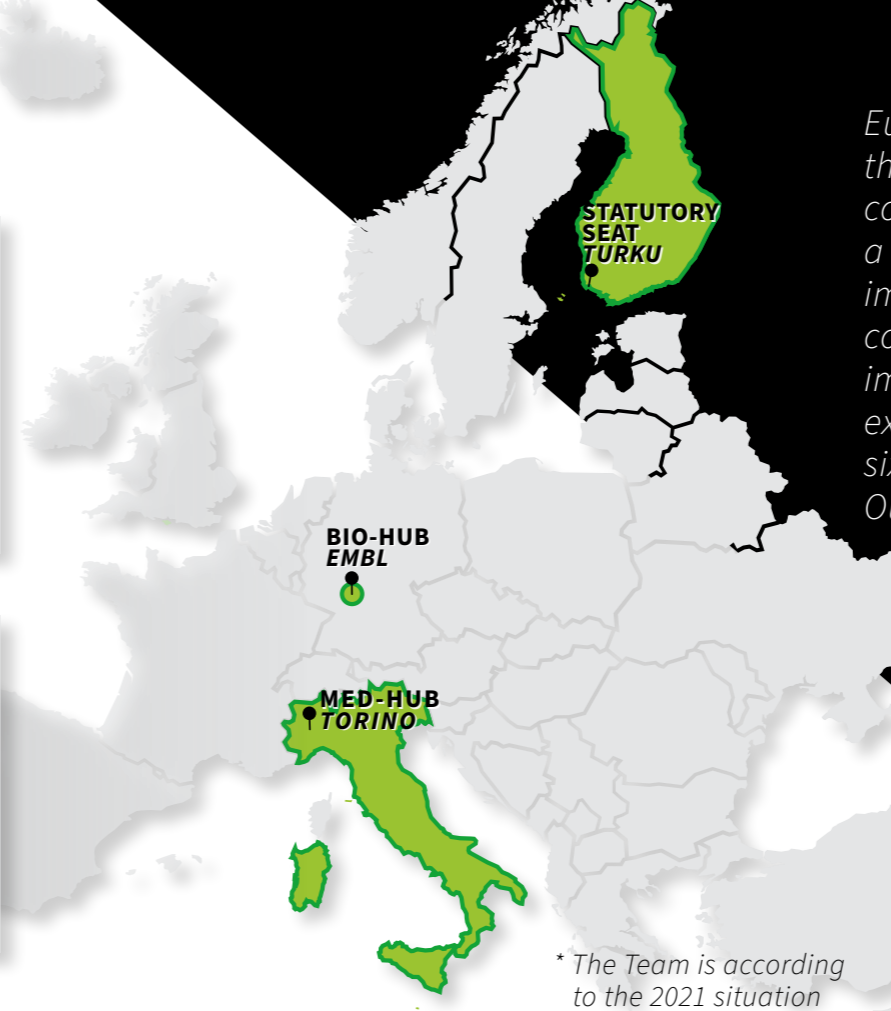
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* The Team is according to the 2021 situation



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SARA ZULLINO
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Euro-Biolmaging
Med-Hub | Torino

Euro-Biolmaging ERIC is coordinated by the Hub Team. The Euro-Biolmaging Hub consists of a Statutory Seat in Finland (Turku), a community-specific Bio-Hub for biological imaging at EMBL (Heidelberg), and a community-specific Med-Hub for biomedical imaging in Italy (Torino). In 2020, our Hub team expanded to take on new tasks. We welcomed six new colleagues across the three Hub sites. Our team will continue to grow in 2021.

2020 MILESTONES

FOREWORD FROM EURO-BIOIMAGING DIRECTORATE



JOHN ERIKSSON
Director General



ANTJE KEPPLER
Section Director Bio-Hub



SILVIO AIME
Interim Section Director Med-Hub

In our first full year as an ERIC, Euro-BioImaging faced the challenge of operating a pan-European research infrastructure designed for transnational open user access within the context of a global pandemic. Over the course of 2020, we witnessed remarkable resilience and determination among our Nodes and users, and significant strength within our community. In this Editorial, the Euro-BioImaging Directorate looks back on 2020 and forward to the post-pandemic world.

“A prime goal of Euro-BioImaging ERIC is to ensure that its imaging technologies are truly cutting-edge,” says Silvio Aime, Interim Director of the Med-Hub. “To ensure that our repertoire of provided technologies will stay abreast with the fast development and the breakthroughs in imaging research, we have, together with our Nodes, developed and implemented showcasing and proof-of-concept as a process to identify and assess new and innovative imaging technologies and integrate them in our portfolio.”

“The heart of Euro-BioImaging beats at its Nodes,” says Antje Keppler, Director at the Bio-Hub. “So in our first year as ERIC, we put special emphasis on opening a call for including new Nodes.” The Call for Nodes is based on a published procedure involving the Scientific Advisory Board for independent evaluation and the Euro-BioImaging ERIC members for final ratification of successful Node applicants. At the end of 2020, over 112 individual imaging facilities distributed from the Southwest in Portugal

all the way to the Northeast in Finland now offer their imaging platforms and expertise as Euro-BioImaging Nodes to European and international researchers.

Our success in 2020 is all thanks to the wonderful people who are part of the Euro-BioImaging community.

“Euro-BioImaging ERIC emerges from 2020 in good health. Our family of Nodes has grown significantly and our technology offer has expanded. Our governing bodies have shown they work together well. This year we have built solid foundations that ensure that Euro-BioImaging will remain on the cutting edge in the years to come,” says John Eriksson, Director General of Euro-BioImaging. “This is all thanks to the wonderful people who are part of the Euro-BioImaging community.”

As we look to the future, Euro-BioImaging will aim to expand our user base by cooperating closely with universities, industry, European Life Science Research Infrastructures, and the Euro-BioImaging family. In the post-pandemic world, we hope our infrastructure will continue to expand to benefit our users, helping them make discoveries that provide better understanding of the basis of our world as well as scientific solutions to its grand challenges.

EXPANDING OUR INFRASTRUCTURE

Four new Nodes have joined Euro-Biolmaging ERIC in 2020, opening their cutting-edge and quality-managed services to all Euro-Biolmaging users. Together, they represent 31 imaging platforms in Austria, Finland, Portugal and Sweden. In total, Euro-Biolmaging now offers access to 25 biological and biomedical imaging Nodes hosted by 12 of its 16 Members, representing over 110 individual imaging platforms (see also p. 59-75).

CALL FOR NODES

In March 2020, Euro-Biolmaging published its 1st Open Call for Nodes. Thirteen Expressions of Interest from ten countries were received. In addition, six existing Euro-Biolmaging Nodes applied for an upgrade to include one or more new capabilities into their Node structure. The Euro-Biolmaging Scientific Advisory Board - composed of highly qualified, internationally recognized scientific, ethical and technical experts - evaluated all applications against General and Technology Specific Review Criteria



and forwarded their recommendations to the Euro-Biolmaging Board. Expressions of Interest for four new Nodes and four upgrades to existing Nodes were approved by the Euro-Biolmaging Board in November 2020, another six were invited to submit improved applications by February 2021. Meet the new Euro-Biolmaging Nodes below!

AUSTRIAN BIOIMAGING NODE / CMI

- A multi-sited Node with its facilities hosted by eight institutions in Vienna, Klosterneuburg, and Wels.
- Imaging techniques span the entire resolution range of interest for (pre)clinical and biological studies, and provide complementary sample information about structure, function, dynamics and chemical composition.
- Correlated Multimodal Imaging (CMI): A clear strength is the capacity to develop and deliver on various multimodal imaging workflows, to tackle a variety of (previously inaccessible) biomedical research questions – accessing both multi-scale and holistic information.
- Examples include autophagy in plants, micro-calcifications in rats, angiogenesis in tumors, thrombosis in knock-out mice, or jawbone regeneration in osteonecrosis.



FIND OUT MORE AT
www.bioimaging-austria.at



FINNISH BIOMEDICAL IMAGING NODE

- A multi-sited Node covering biomedical imaging from mouse to man.
- Hosted by four partner institutions who formed the Finnish Infrastructures for Functional Imaging in 2013, each specializing in a certain spearhead technology:
 - Preclinical and clinical positron emission tomography (PET)
 - Preclinical high-field magnetic resonance imaging (MRI)
 - Magneto-encephalography (MEG)
 - Preclinical optical intravital imaging
- This technology offer is coupled with a broad repository of imaging tracers and probes, numerous animal models from mice to pigs, and diverse stimulation systems for both animals and humans.
- Key expertise and main research applications focus on major challenges especially in cardiovascular and metabolic diseases, neuroscience, and cancer.



FIND OUT MORE AT
www.ppbi.pt



FIND OUT MORE AT
www.eurobioimaging.fi/FiBi



PORTUGUESE PLATFORM OF BIOIMAGING (PPBI)

- A multi-sited Node representing the national biological imaging community of Portugal.
- It consists of 14 facilities, which are split into 3 geographical clusters, and are currently coordinated by the IBMC in Porto.
- PPBI services focus on advanced microscopy and image analysis for a wide range of life science domains - from cell and developmental biology, to neurosciences, oncobiology, immunology, infection, regenerative medicine and marine biology.
- PPBI offers state-of-the-art light and electron microscopy systems, covering applications from nano- to mesoscopy, and has a strong expertise in live cell imaging and high throughput microscopy. More importantly, Euro-Biolmaging users can expect to work together with highly qualified staff, who support the facilities and linked services, to boost user research projects.

SWEDISH NATIONAL MICROSCOPY INFRASTRUCTURE (NMI)

- Multi-sited Node offering a powerful portfolio of different state-of-the-art technologies in the fields of biological imaging.
- NMI was created as a distributed infrastructure in 2015/2016 and consists of five, specialized, complementary and interlinked technical nodes and one administrative host located across Sweden.
- The infrastructure is coordinated by KTH in Stockholm that provides the single-entry point from which users are directed to the relevant imaging technology.
- Cutting-edge imaging technologies comprise among others CLEM, cryo-EM, high-throughput microscopy, intravital microscopy, functional imaging, light-sheet microscopy, various super-resolution techniques, and a special focus on correlative multimodal imaging.



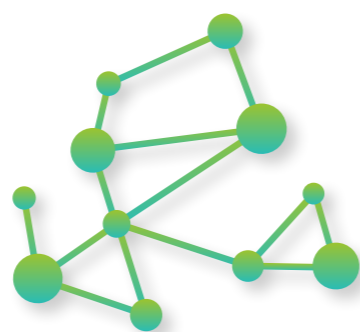
FIND OUT MORE AT
www.nmisweden.se



UPGRADES OF 1ST GENERATION NODES

Four existing Nodes successfully submitted their applications for including one or more new capabilities into their existing Node structure. These applications were evaluated by the Scientific Advisory Board and based on their recommendation approved by the Euro-BiolImaging Board in November 2020:

- Advanced Light and Electron Microscopy Node in Prague includes the Laboratory of Electron Microscopy, Biology Centre of the Czech Academy of Sciences, in Ceske Budejovice, expanding the Nodes offered EM and CLEM expertise.
- Advanced Light Microscopy and Medical Imaging Node in Brno includes the Experimental Biophotonics Facility, Brno University of Technology, bringing on board holographic incoherent Quantitative Phase Imaging.
- Finnish Advanced Light Microscopy Node includes the High Content Imaging and Analysis Unit at the Institute for Molecular Medicine Finland (FIMM), University of Helsinki, with extensive expertise in High-Throughput Microscopy.
- French BiolImaging Node includes the new site in Bretagne-Loire, which specialises in imaging approaches for translational research, including CLEM, Functional Imaging, Super-Resolution Microscopy, and Mesoscopic Imaging.



EXPANDING OUR TECHNOLOGY OFFER

In order to provide our users open access to relevant and up-to-date imaging technologies, Euro-BiolImaging is constantly evaluating new technologies' readiness for open access in collaboration with the imaging community, our Nodes, and our users. Since July 2020, six new technologies are being offered in Proof-of-Concept studies at the Euro-BiolImaging Nodes. If successful, these technologies will become part of the official Euro-BiolImaging portfolio in 2021.

SHOWCASING AND PROOF-OF-CONCEPT STUDIES

For the past decades, the imaging field has seen unprecedented technological innovation, driving numerous discoveries while making it more challenging for scientists to gain access to the latest technologies. To ensure that our technology portfolio stays abreast of the breakthroughs in imaging, Euro-BiolImaging has a process to identify and assess new imaging technologies. The procedure comprises:

- Identification of new technologies based on community input/recommendations

- Assessment of technology's relevance and the feasibility of access provision (showcasing)
- Evaluation of the technology under real-world open access conditions (proof-of-concept study).

In July 2020, Euro-BiolImaging launched the first Proof-of-Concept studies, bringing 6 previously unavailable technologies to our users. These technologies represent a significant expansion of the Euro-BiolImaging technology portfolio – covering imaging from the nano- to the tissue-scale with applications ranging from biophysics and cell biology to studying cancer cells in isolation and in animals.

ATOMIC FORCE MICROSCOPY - AFM

- AFM allows characterization of sample morphology and biophysical properties at the nanoscale.
- Recent developments of high-speed AFM allow imaging of dynamic samples.
- Applications range from the study of membranes and filamentous structures, to biomechanical properties of cells and the structure of viral particles.
- AFM also has potential as a correlative technique, combined with fluorescence microscopy or spectroscopy.

AFM IS OFFERED IN THE PCS BY

- France BiolImaging Node
- Finnish Advanced Light Microscopy Node

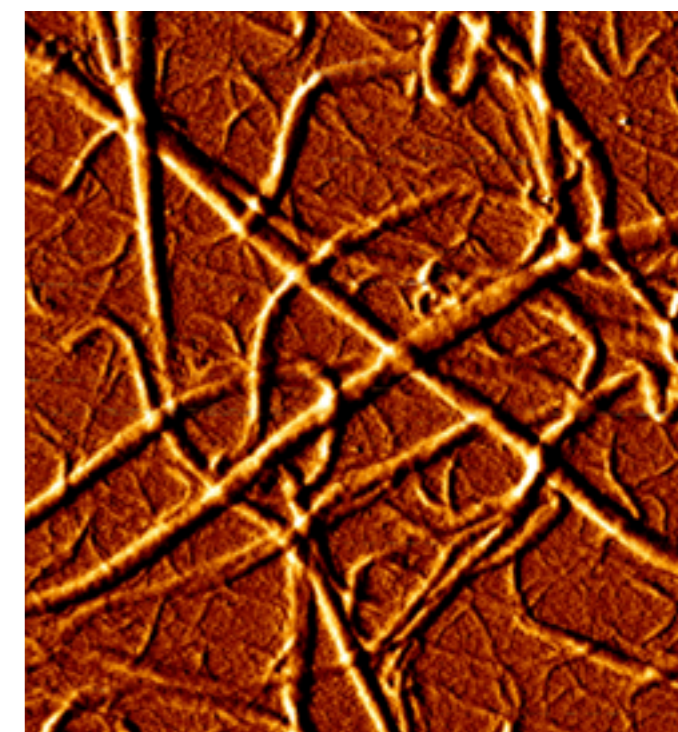


Image credit: Pasi Kankaanpää

COHERENT ANTI-STOKES RAMAN SPECTROSCOPY - CARS

- CARS is a label-free multiphoton imaging techniques that uses a three-photon nonlinear optical process to probe molecular vibrations in the sample material.
- Applications of CARS often focus on characterisation of lipids in cells and even small animals, as well as pharmaceutical research.
- CARS is offered as both single-frequency CARS, as well as in combination with SHG and 2P-fluorescence imaging.

CARS IS OFFERED IN THE PCS BY

- Advanced Light and Electron Microscopy Node Prague
- Finnish Advanced Biolmaging Node

MASS SPECTROMETRY-BASED IMAGING - MSI

- MSI allows the spatially resolved analysis of the chemical composition across a sample, including detection of metabolites, proteins, lipids, peptides, glycans and even drugs.
- MSI allows for the parallel detection of thousands of different analytes.
- Applications of MSI lie in medicinal and pharmacological research.

MSI IS OFFERED IN THE PCS BY

- Advanced Light Microscopy Italian Node
- Facility of Multimodal Imaging - AMMI Maastricht Node

PHOTOACOUSTIC IMAGING - PAI

- PAI combines optical and ultrasound imaging, providing good spatial resolution and sensitivity for imaging in living animals.
- PAI produces 3D-high resolution images of soft tissues which provide anatomical, functional, and molecular information.
- PAI is used widely in preclinical biomedical imaging, for applications ranging from oncology and neurobiology to cardiology and image-guided drug injection.

PAI IS OFFERED IN THE PCS BY

- Molecular Imaging Italian Node

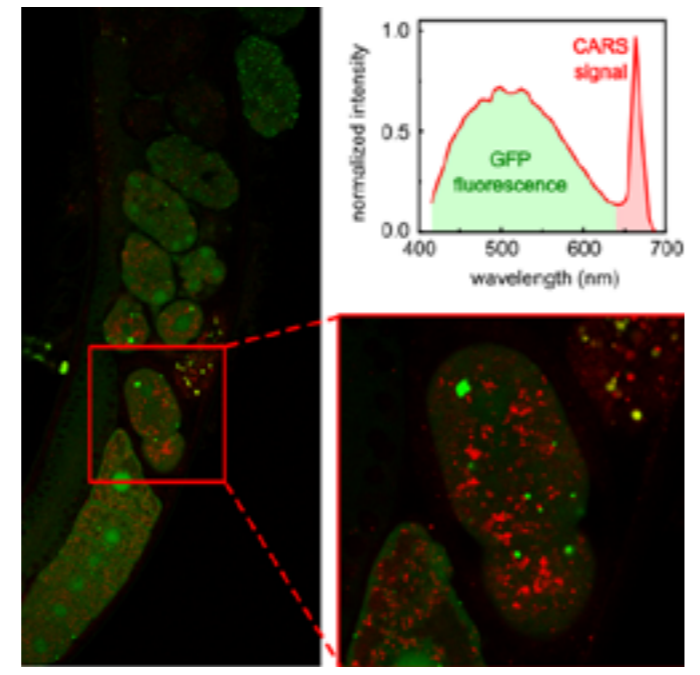


Image credit: Z. Kostrouch

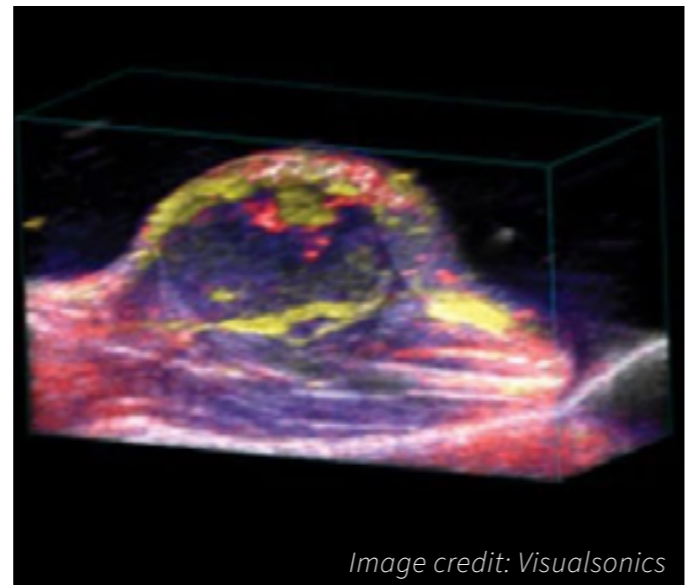
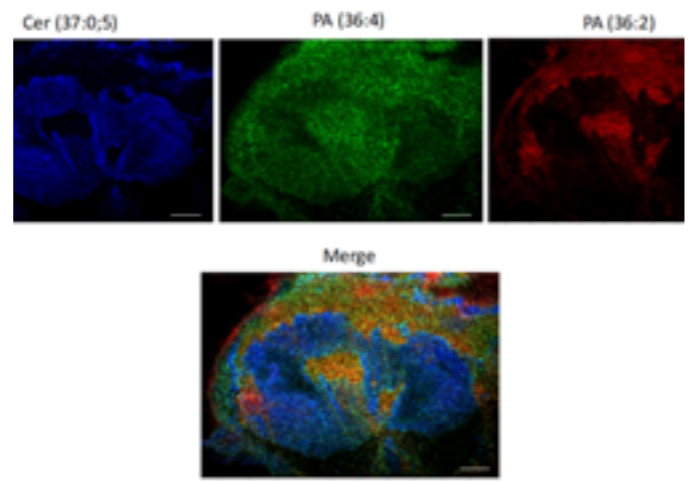


Image credit: Visualsonics

QUANTITATIVE PHASE IMAGING - QPI

- QPI operates on unlabelled specimens and is complementary to established fluorescence microscopy.
- QPI allows for the measurement of the dry mass of the cell, its morphology and dynamics.
- Applications of QPI are the study of cell biology, biophysics and cell migration.

QPI IS OFFERED IN THE PCS BY

- Advanced Light and Electron Microscopy Node Prague

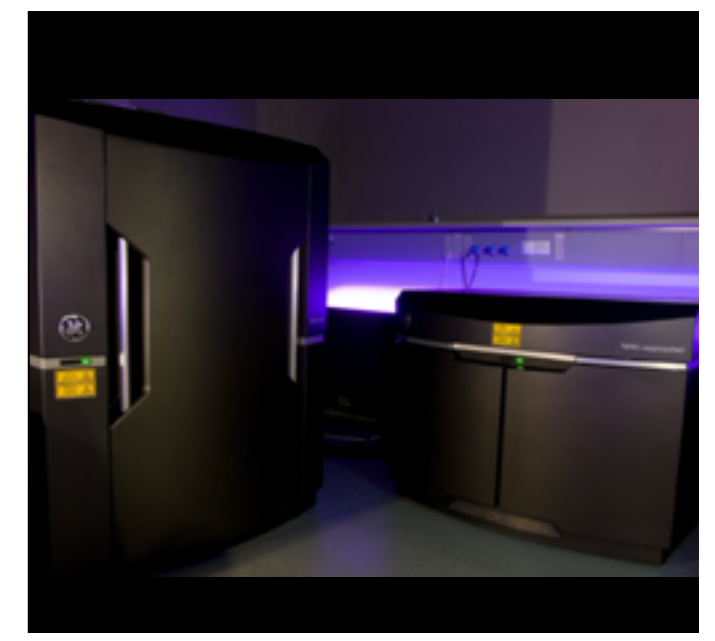
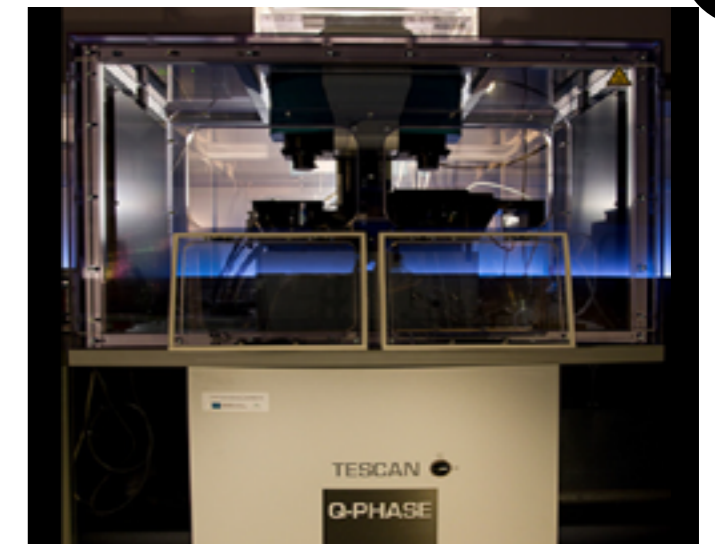
STRUCTURED ILLUMINATION MICROSCOPY - SIM

- SIM is a super-resolution microscopy technique that provides 2x higher spatial resolution than conventional fluorescence microscopy.
- SIM is a fast and live-cell friendly super-resolution technique, compatible with standard sample preparation.
- Applications of SIM include the study of cells and tissues in many biological and biomedical contexts.

SIM IS OFFERED IN THE PCS BY

- Advanced Light and Electron Microscopy Node Prague

All of these exciting technologies are available for open access to Euro-Biolmaging users, along with 40+ others, via the Euro-Biolmaging web portal. Euro-Biolmaging is constantly expanding its technology offer and new technologies will start in



Proof-of-Concept studies in 2021, including Magnetoencephalography (MEG), Correlated Optical Coherence Tomography/Photoacoustic Imaging (OCT/PAI), and micro X-ray Fluorescence Spectrometry (XFS).

“ We appreciate the increased visibility, community building, networking and access to specific core facility related trainings we benefit from as part of Euro-Biolmaging.

- Aleš Benda, Head of IMCF at BIOCEV, Advanced Light & Electron Microscopy Node, Prague



BUILDING OUR GOVERNANCE

For Euro-Biolmaging ERIC, 2020 marked the first full year of operations. Therefore, further building and engaging our governing bodies was a key focus. For instance, the Euro-Biolmaging Board appointed the Chair and vice-Chair (late 2019), welcomed the accession of Slovenia as a new member, validated a pilot user access funding scheme, and defined and implemented the recruitment process for the Euro-Biolmaging ERIC's Directorate.

The Node representatives met virtually in June 2020 to discuss the setup of governance for the Panel of Nodes, e.g. to determine the rules of procedure. In conjunction, a community-wide meeting took place with over 90 participants discussing virtual/remote user access to Nodes,

pre-publication image data management and processing, and how to strengthen the Euro-Biolmaging family of Nodes.

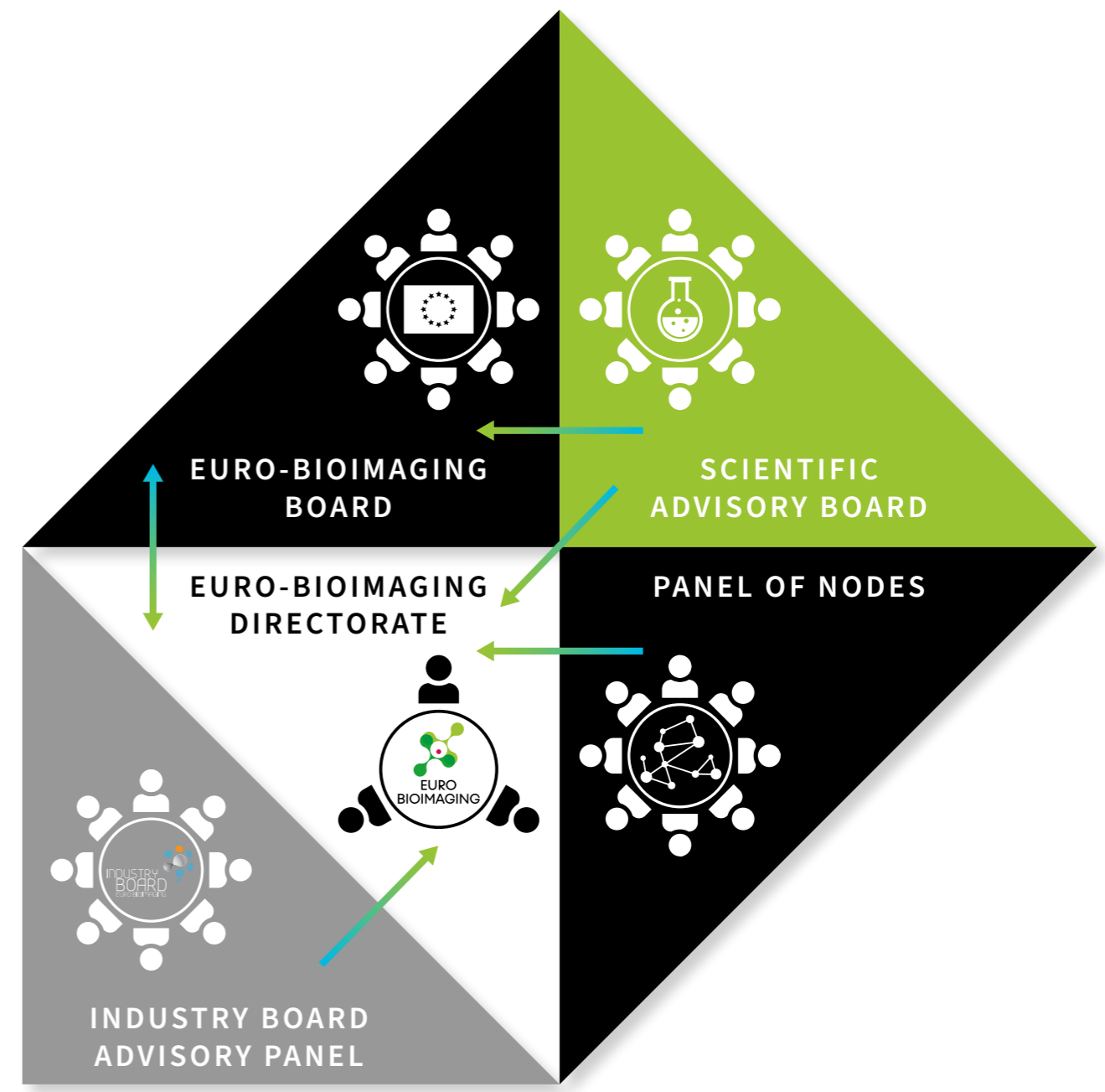
The [Scientific Advisory Board](#) was appointed in July 2020, and its highly-qualified, internationally recognized scientific, ethical and technical experts, immediately undertook the major task of evaluating the 2020 Call for Nodes Expressions of Interest.

A new coordinator was recruited for the [Euro-Biolmaging Industry Board](#) (EBIB) in 2020 and the EBIB Advisory Panel was set up with its inaugural meeting in November.

DID YOU KNOW?

Euro-Biolmaging is managed by its Hub and governed by the Euro-Biolmaging Board. Euro-Biolmaging ERIC's governance also includes a Scientific Advisory Board (SAB), whose role is to oversee the scientific, ethical, technical and management quality of the Euro-Biolmaging ERIC activities.

The Panel of Nodes, representing the individual Nodes, advises the Euro-Biolmaging Directorate. In addition, the Industry Board Advisory Panel interacts with the Directorate on industry-relevant needs or industry aspects that Euro-Biolmaging should address.



December 12-13th, 2019
First Euro-Biolmaging Board Meeting, Helsinki

April 9th, 2020
EBIB Meeting

May 5th, 2020
Second Euro-Biolmaging Board Meeting, Virtual

June 8th, 2020
Second meeting of Nodes & Friends

July 2020
Appointment of the Scientific Advisory Board (two meetings)

November 11th, 2020
EBIB Meeting

November 18th, 2020
Inaugural meeting of the EBIB Advisory Panel

November 30th, 2020
Third Euro-Biolmaging Board meeting

FOREWORD FROM EURO-BIOIMAGING INDUSTRY BOARD



MARTIN TEWINKEL

Chair of Euro-BioImaging
Industry Board and
EBIB Advisory Panel



CLAUDIA PFANDER

Euro-BioImaging Industry
Board Coordinator



HERBERT SCHADEN

Vice Chair of Euro-BioImaging
Industry Board and
EBIB Advisory Panel

CORE SERVICES

Companies want to ensure that Euro-BioImaging facilities remain at the fore-front of technology and services, to provide their imaging facility users with high-quality services. Companies and researchers constantly develop new technologies and solutions for highly diverse user applications, addressing a wide range of biological and biomedical questions.

This innovation process benefits from a continuous knowledge exchange between the highly-skilled technical staff at Euro-BioImaging Nodes and companies in the imaging field, offering opportunities for co-development and the evaluation of new technologies in a research laboratory environment.

The COVID-19 pandemic has had a profound impact on the way we interact with our customers and collaborators, from roll-out of new products to the provision of routine maintenance services. We are therefore happy that we could continue to work closely with Euro-BioImaging and its network of 112 imaging facilities.

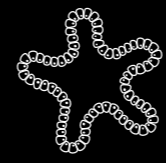
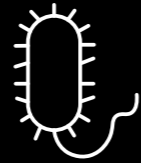
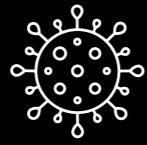
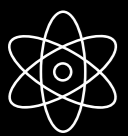
The research infrastructure has demonstrated a considerable resilience, mostly keeping facilities operational and even expanding its technology offer with 6 new proof-of-concept technologies.

Facilities have found creative ways to offer remote access to many technologies, from mail-in services to full remote instrument control. EBIB members participate in the exchange of best practices for remote access in a dedicated expert group and support the users with free access to their digital training resources linked from the Euro-BioImaging website.

This, together with the positioning of Euro-BioImaging as partner in European and global initiatives, has ensured that even in such challenging times, Euro-BioImaging continues to serve its user community and its excellence in imaging remains visible.



OPEN ACCESS TO TECHNOLOGIES - FROM PARTICLES TO PATIENTS



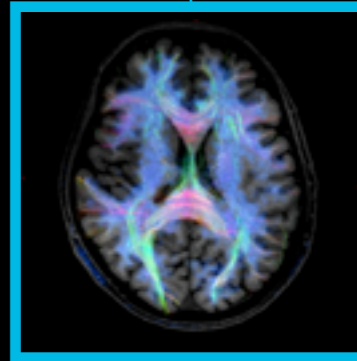
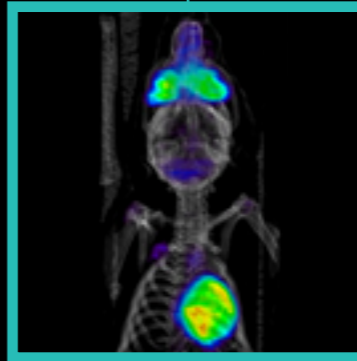
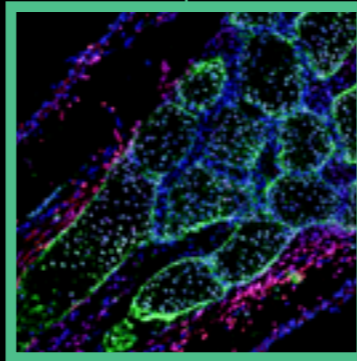
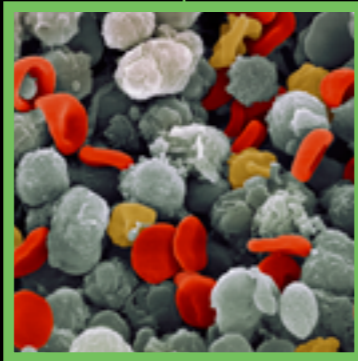
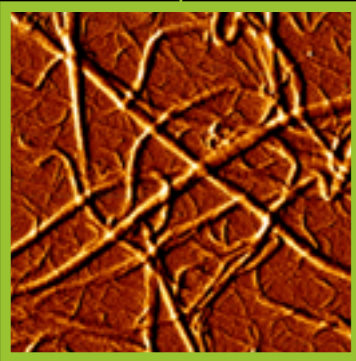
ATOMIC FORCE MICROSCOPY

PRECLINICAL IMAGING

LIGHT MICROSCOPY

ELECTRON MICROSCOPY

HUMAN IMAGING



ATOMIC FORCE MICROSCOPY

ELECTRON MICROSCOPY

LIGHT MICROSCOPY

PRECLINICAL IMAGING

HUMAN IMAGING

- Correlative Light and Atomic Force Microscopy

- Volume EM (FIB-SEM, SBF-SEM, Array Tomography...)
- TEM tomography
- Immuno-electron microscopy
- cryoEM

- Widefield and Confocal Microscopy
- Functional Imaging
- Super-resolution Microscopy
- Mesoscopic Imaging
- Label-free Imaging

- μ -MRI
- Nuclear imaging (μ -PET, μ -SPECT, μ -CT)
- μ -US
- Bimodal techniques
- Photoacoustic Imaging
- Phase Contrast Imaging
- In vivo Optical Imaging

- MRI
- PET-MRI
- Magnetoencephalography
- Population Imaging



MOST REQUESTED BIOLOGICAL IMAGING TECHNOLOGY 2020:

STOCHASTIC OPTICAL RECONSTRUCTION MICROSCOPY (STORM)

STORM is a super-resolution technology, allowing the imaging of subcellular structures with up to 20nm resolution, well below the diffraction limit of light.

STORM belongs to the larger class of Single Molecule Localisation Microscopy (SMLM) methods. To take a STORM image, many individual images are taken step-by-step with only a few fluorescent molecules active in each image. The individual fluorescent molecules are far enough apart that their very precise position can be calculated. Combining many images with a few individually located fluorescent molecules allows the formation of a final image with very high resolution.

SMLM was first described in 2006 and has since then become a popular tool in cell biology to image cellular structures at the highest resolution. The 2014 Nobel Prize in Chemistry was partially awarded to the team that first developed SMLM.

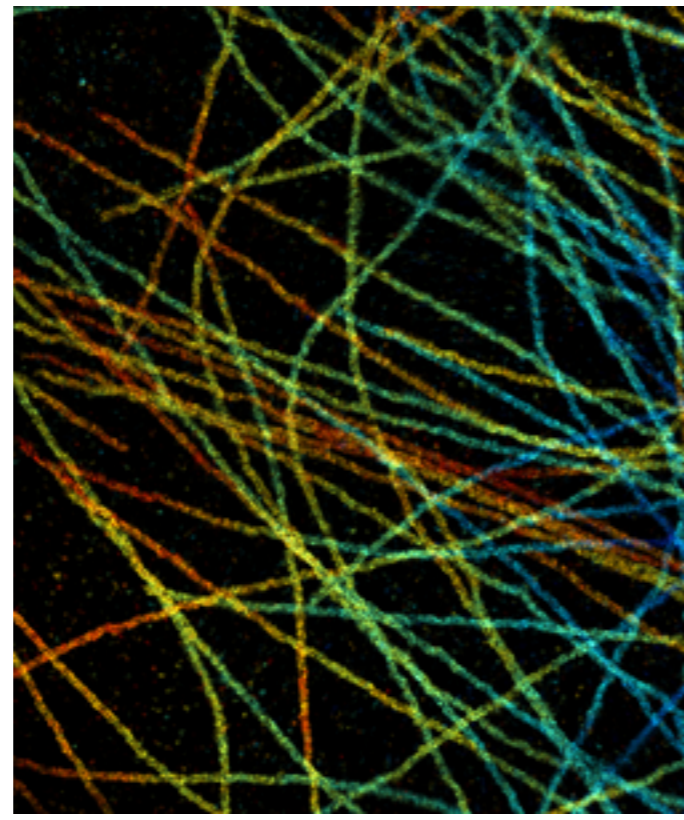


Image credit: Li et al. Real-Time 3D Single-Molecule Localization Using Experimental Point Spread Functions. Nature Methods 2018, doi.org/10.1038/nmeth.4661

HOW STORM WORKS

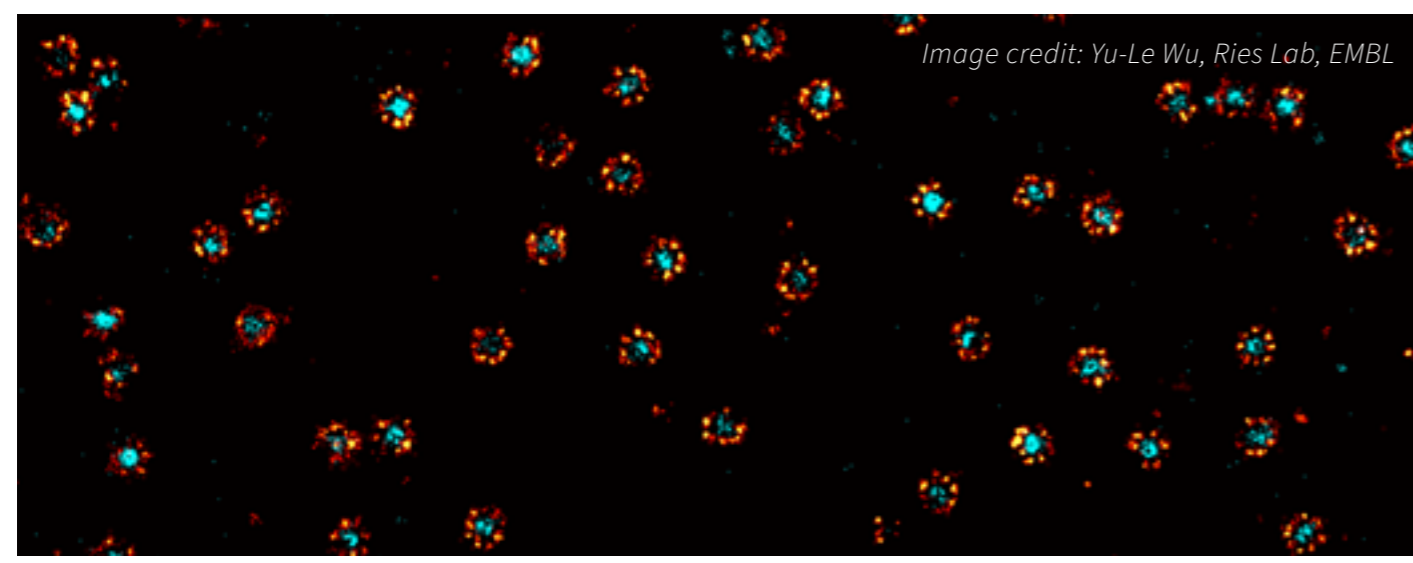


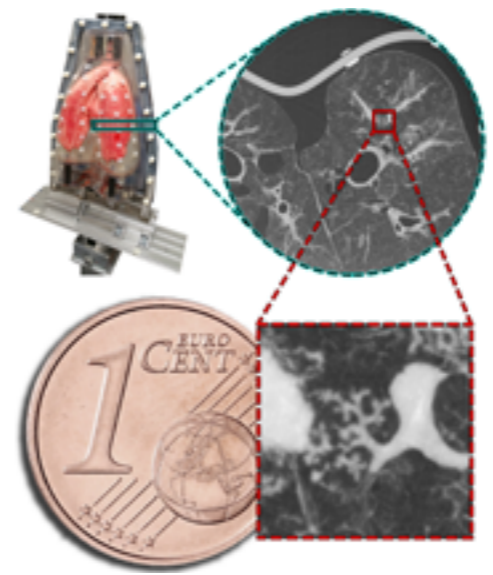
Image credit: Yu-Le Wu, Ries Lab, EMBL

MOST REQUESTED BIOMEDICAL IMAGING TECHNOLOGY 2020:

PHASE CONTRAST IMAGING

Phase Contrast Imaging makes use of Synchrotron Radiation, which allows the effective application of phase contrast techniques.

Differently from conventional radiology, where the image formation relies on the absorption properties of the sample, phase contrast is effective for imaging of soft biological tissues, where the conventional technique has strong limitations due to the poor intrinsic X-ray absorption.



Users and staff at Elettra Sincrotrone Trieste

Example of Multiscale phase contrast micro-tomography (micro-CT) of a pig lung carried out at the Trieste Node for Phase Contrast imaging' (courtesy of Jonas Albers and Christian Dullin) First image (left, high) shows a photo of the pig lung under study kept inflated inside a special phantom.

Second image (top right) visualizes a slice obtained within a micro-CT study at 100 micron pixel size. A local area micro-CT scan, carried out with 2 micron resolution (third image) on a limited sample area (sizes compared with a 1 cent coin) highlights the tiniest tissue details reaching the alveolar level.

“ Great communication with the experts of the Phase Contrast Imaging Flagship Node Trieste allowed for timely and thorough planning and preparation of the experiments, even in context of the ongoing COVID-19 pandemic

- Willi Wagner, University Hospital Heidelberg/ German Center for Lung Research



OPEN ACCESS TO 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.

THE TRAINING AT EURO-BIOIMAGING NODES:

- are targeted at users, students, and facility staff,
- cover a wide range of topics - from basic introductory courses to advanced technologies, in both biological and biomedical imaging,
- mostly combine theory and hands-on learning,
- are taught in English,
- are open for anyone to apply to.

90+
 NUMBER OF TRAINING COURSES OFFERED

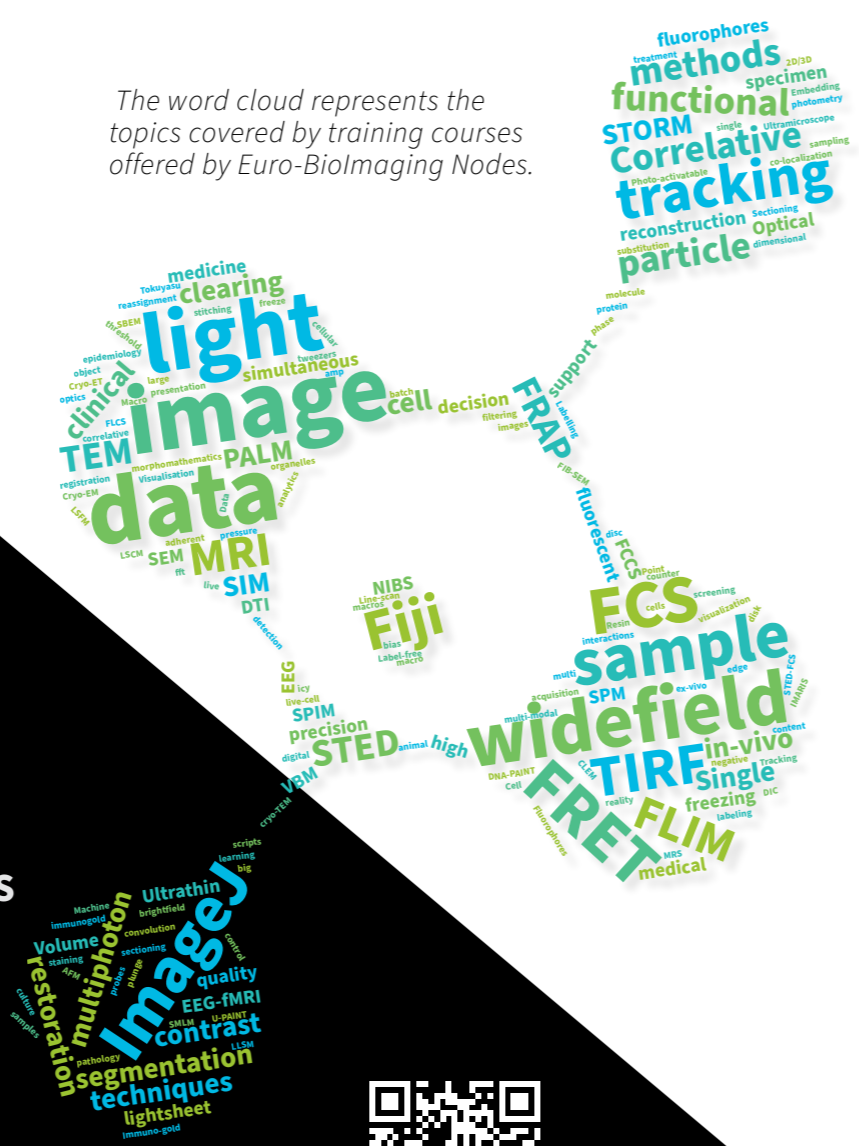
21
 NUMBER OF NODES OFFERING TRAINING COURSES

A LIST OF THE UPCOMING TRAINING COURSES IS AVAILABLE AT
www.eurobioimaging.eu/content/training

TRAINING DURING COVID-19

The COVID-19 pandemic and the resulting restrictions on travel and gatherings, impacted many processes at our Nodes, including training activities. With remarkable effort, many of the Euro-BioImaging Nodes transitioned their training courses into remote and virtual formats while maintaining the dedication to participant engagement and active learning. At the same time, everyone is looking forward to resuming in person training soon.

The word cloud represents the topics covered by training courses offered by Euro-BioImaging Nodes.



OPEN ACCESS TO DATA

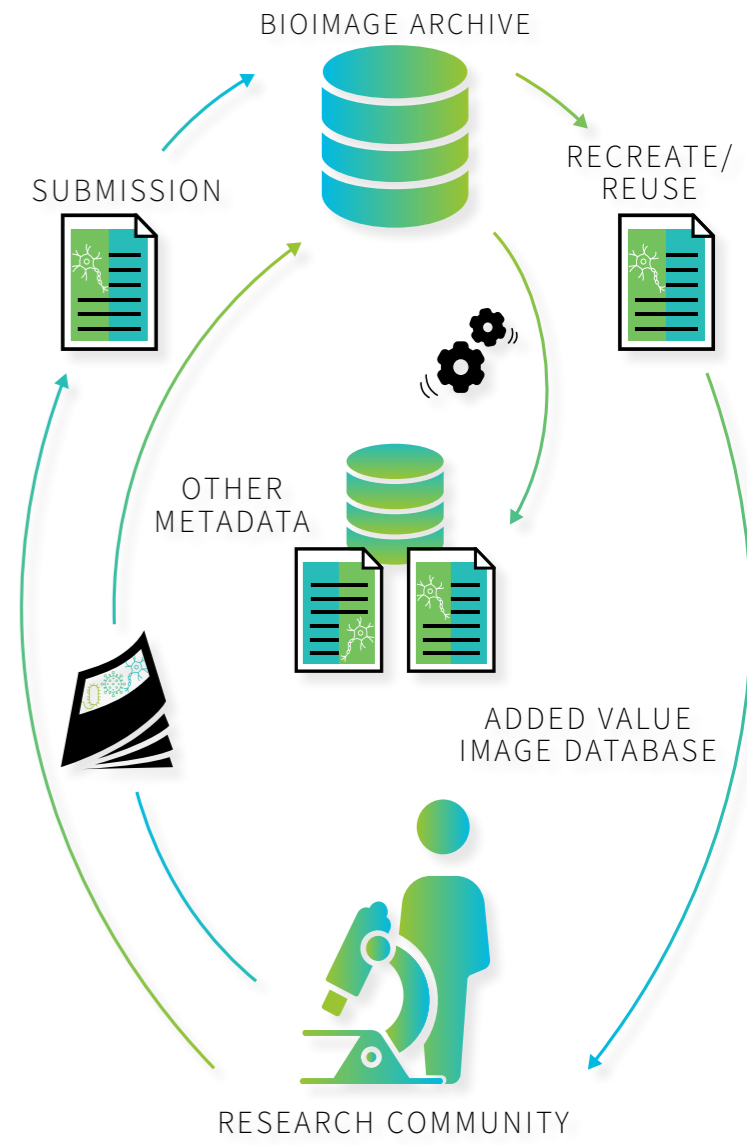
Advanced imaging tools can generate huge amounts of data very quickly - easily producing multiple TB/hr. Transferring, storing, and analysing these large datasets is a central challenge of modern imaging. At the same time, a lot of the produced imaging data is ripe for re-use and re-analysis to make most efficient use of the resources used in creating it. This requires the data to be FAIR (Findable, Accessible, Interoperable, Re-usable).

The Euro-BioImaging Nodes support their users with a wide variety of local data storage, analysis and transfer solutions. At the same time, Euro-BioImaging also supports solutions for large-scale image data sharing and re-use, through image data repositories.

Euro-BioImaging supports the BioImage Archive, hosted at EMBL-EBI, which stores and distributes biological images that are useful to life-science researchers

Part of the BioImage Archive are added-value bio-image data repositories such as EMPIAR for electron microscopy data and the Image Data Resource (IDR) for light microscopy.

The Euro-BioImaging Nodes offering medical imaging services, supported by the Med-Hub, are working together to build a catalogue of curated (and anonymized, if needed) preclinical and medical image datasets. Furthermore, an extension for preclinical imaging researchers with tools to easily extract, import, and archive biomedical image data as well as with reusable processes for high-throughput extraction of quantitative features from raw image data.



“ Working with the Euro-BioImaging community will be key to building the BioImage Archive and ensure that image data from all imaging modalities is available for open access to foster reuse, new research and new tool development.

- Matthew Hartley, Team Lead, BioImage Archive, EMBL-EBI



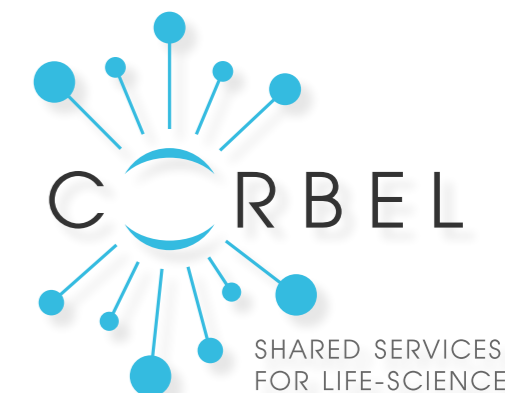
COMMUNITY ACTIVITIES

EUROPEAN PROJECTS

Euro-Biolmaging is embedded in the landscape of European research infrastructures (RIs) and maintains strong links with other RIs in the life sciences and beyond. Via cluster projects like CORBEL and EOSC-Life, Euro-Biolmaging participates in common activities that facilitate joint access to the participating RIs and build a digital space for the life sciences, respectively.

CORBEL

2020 saw the conclusion of the highly successful Horizon 2020-funded cluster project CORBEL (Coordinated Research Infrastructures Building Enduring Life-Science Services). The consortium, comprising of Euro-Biolmaging and 12 other life science research infrastructures, aimed to facilitate the access to services offered consecutively or in parallel by the participating research infrastructures, thereby supporting scientists in performing advanced interdisciplinary research. In two Open Calls for research projects – co-organized by Euro-Biolmaging - almost 40 user projects were selected and granted access, funded by CORBEL, to at least two RIs of their choice.

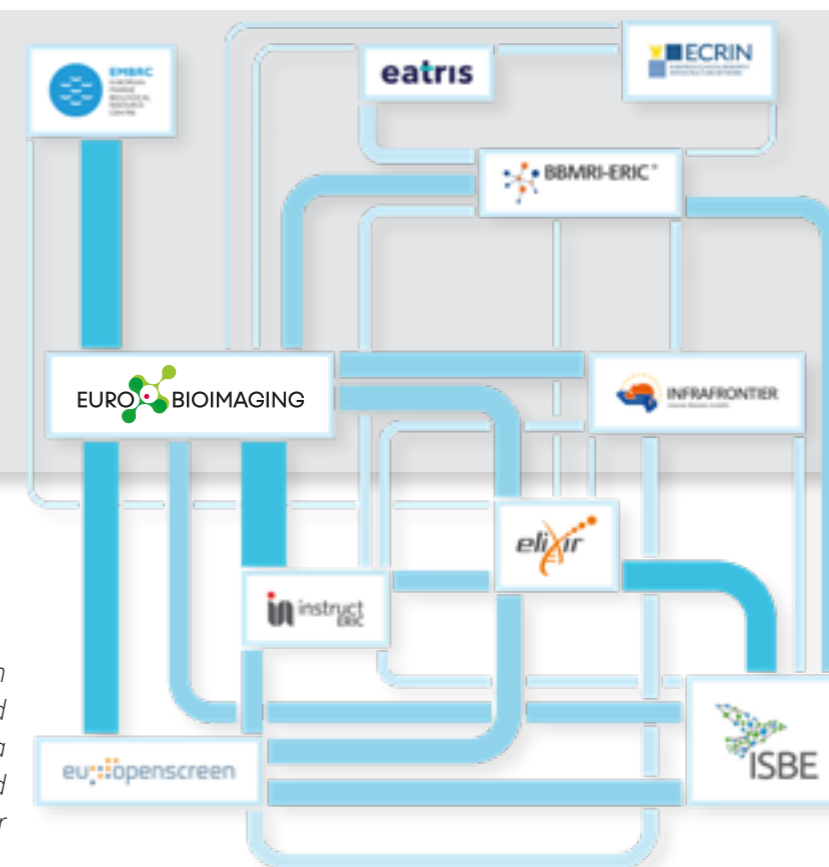


Euro-Biolmaging was the most requested research infrastructure, underlining the **importance of imaging technologies to cross-disciplinary research in the life sciences**. Based on the needs identified in collaboration with the scientific community, the CORBEL consortium created a setting that enables users to access services and resources across the European Life Science RIs.

“Euro-Biolmaging was the most requested research infrastructure in the CORBEL project.”

- Frauke Leitner,
CORBEL Open Call Manager,
Euro-Biolmaging

Network of European life science RIs, based on the CORBEL user projects which were selected via Open Calls. For each project, access to a combination of at least two RIs was required (line thickness indicates the user requests for the respective combination).



CORBEL ACCESS MODEL - AN EXAMPLE FOR FUTURE PROJECTS



- ✓ Access to cutting-edge technologies and services across the Life Science RIs is provided
- ✓ Research projects receive constant support from dedicated and knowledgeable scientific project managers
- ✓ A central contact point between different RIs is available for consultation and ensures transparent project management and fluent communication
- ✓ Researchers from both academia and industry are eligible to apply
- ✓ Central funds cover requested access and travel costs of researchers

KEY OUTCOMES

- Shaping cross-RI service provision
- Driving creation of scientific cross-disciplinary results
- Increasing visibility of RI services

KEY FIGURES FROM CORBEL SURVEY

84%

of participants rated the quality of services provided within CORBEL as “good” or “very good”

86%

of participants rated the interconnection of RIs as established in the CORBEL framework as “good” or “very good”

91%

of participants rated the effectiveness of the centralized support throughout the whole project as “good” or “very good”

77%

of participants rated the scientific impact of the project in which CORBEL work was embedded as “good” or “very good”

SOURCE: CORBEL FINAL USER SURVEY, FULL RESULTS HERE



The Success Stories from the CORBEL project illustrate how support from multiple Life Science Research Infrastructures was fundamental to helping scientists with their interdisciplinary research. Collaboration between the research infrastructures has a positive impact on the European Life Science research landscape.

Jointly realising interdisciplinary and challenging scientific projects in the life sciences leads to progress in health and disease, combats

marine pollution, and accelerates drug discovery and other areas, as illustrated by the CORBEL Open Call success story below.

REVEALING THE MORPHOLOGICAL PLASTICITY OF A CELL IN PLANKTONIC SYMBIOSES

BY JOHAN DECELLE, UNIVERSITY OF GRENOBLE ALPES, FRANCE

Symbiotic interactions with microalgae are widespread among today’s oceanic plankton and play a significant role in the functioning of marine ecosystems. However, their basic functioning and the subcellular mechanisms by which a cell can accommodate and engineer an intracellular microalgal cell remain unknown. The goal of Dr. Johan Decelle’s project is to unveil the structural architecture of the microalgal cell and its integration into a host cell using cutting-edge imaging technologies. Working with the EMBRC Node has allowed him to collect symbiotic plankton in near-shore waters, which facilitates experiments on live cells. At the Euro-BioImaging Node, he used the 3D imaging technique FIB-SEM (Focused Ion Beam scanning electron microscopy) to visualize subcellular modifications of the photosynthetic machinery and the microalgal cell at high resolution before and during symbiotic interaction.

All partners agree that this project will improve our knowledge of the functioning of planktonic symbioses and bring new evolutionary insights into chloroplast acquisition in eukaryotes.

OTHER CORBEL SUCCES STORIES

<https://lifescience-ri.eu/success-stories.html>



Image credit: EMBL/Marietta Schupp

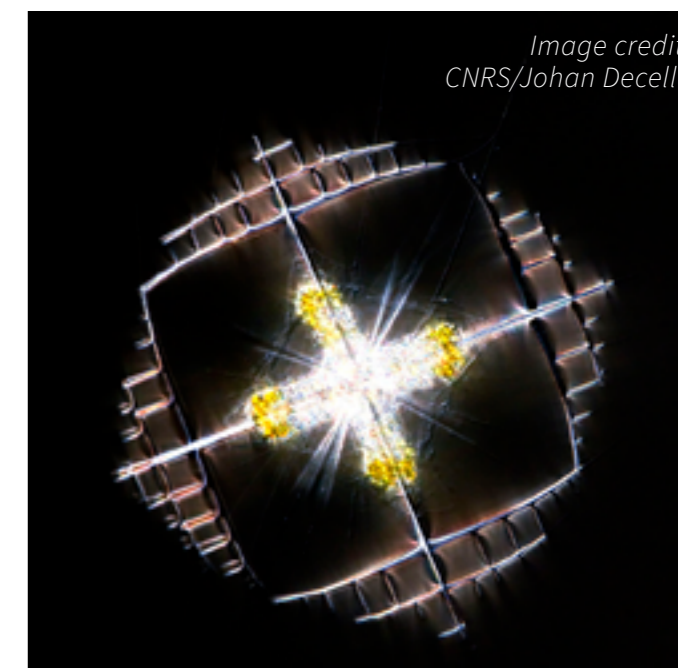


Image credit: CNRS/Johan Decelle

EOSC-LIFE - A DIGITAL SPACE FOR THE LIFE SCIENCES IN THE EUROPEAN OPEN SCIENCE CLOUD

In EOSC-Life, Euro-Biolmaging works together with 12 Research Infrastructures in the Life Sciences to build an open, digital and collaborative space for biological and medical research in the European Open Science Cloud (EOSC).

Euro-Biolmaging is a strong partner in the EOSC-Life project, co-leading WP2 and WP3, two of the three major work packages.



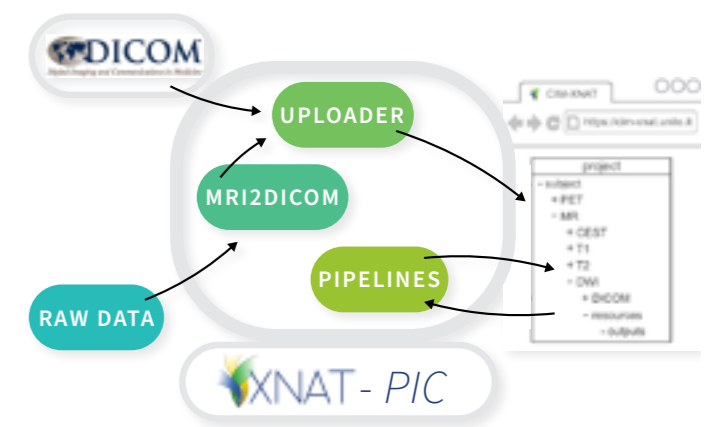
“ One of the major achievements in the EOSC-Life WP3 this year was the successful completion of the pilot projects. These pilot projects show through specific use cases how life science

research can happen in the EOSC and provide tools and resources for different research communities, including bioimage analysis and medical imaging.

- Johanna Bischof,
Scientific Project Manager,
Euro-Biolmaging

XNAT-PIC: XNAT FOR IMAGE ARCHIVING AND PROCESSING IN PRECLINICAL IMAGING

Sharing and analysing preclinical imaging datasets brings many challenges related to the variety of imaging instrumentation yielding huge volumes of raw data. The EOSC-Life pilot project XNAT for Preclinical Imaging Center (XNAT-PIC), driven by experts at the University of Torino, part of the MMMI Italian Node of Euro-Biolmaging, developed solutions for these problems by building tools on top of the popular open-source imaging informatics platform XNAT.



Zullino et al. XNAT-PIC: Extending XNAT to Preclinical Imaging Centers, DOI: arxiv.org/abs/2103.02044

LEARN MORE AT www.eosc-life.eu/d5

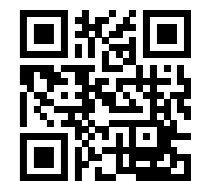
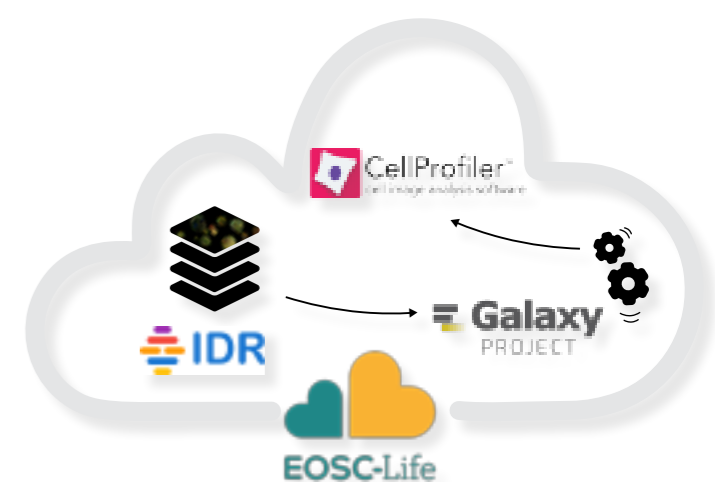
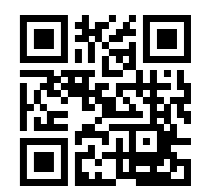


IMAGE REPOSITORY AND SCALEABLE MINING

Large bioimaging screens are resource-intensive undertakings that produce very rich datasets, containing much more information than that used in the original analysis. They are therefore ideal for data re-use but require high-performance computing infrastructure. This EOSC-Life pilot project, driven by a team of experts at the EMBL Node of Euro-Biolmaging, developed tools to run image analysis workflows on publicly available image data sets from genome-wide screens. To do so, they connected the public data resources, such as the IDR, with Galaxy, and brought the image analysis tool CellProfiler into Galaxy to collect and analyse the data in the cloud.



LEARN MORE AT www.eosc-life.eu/d6



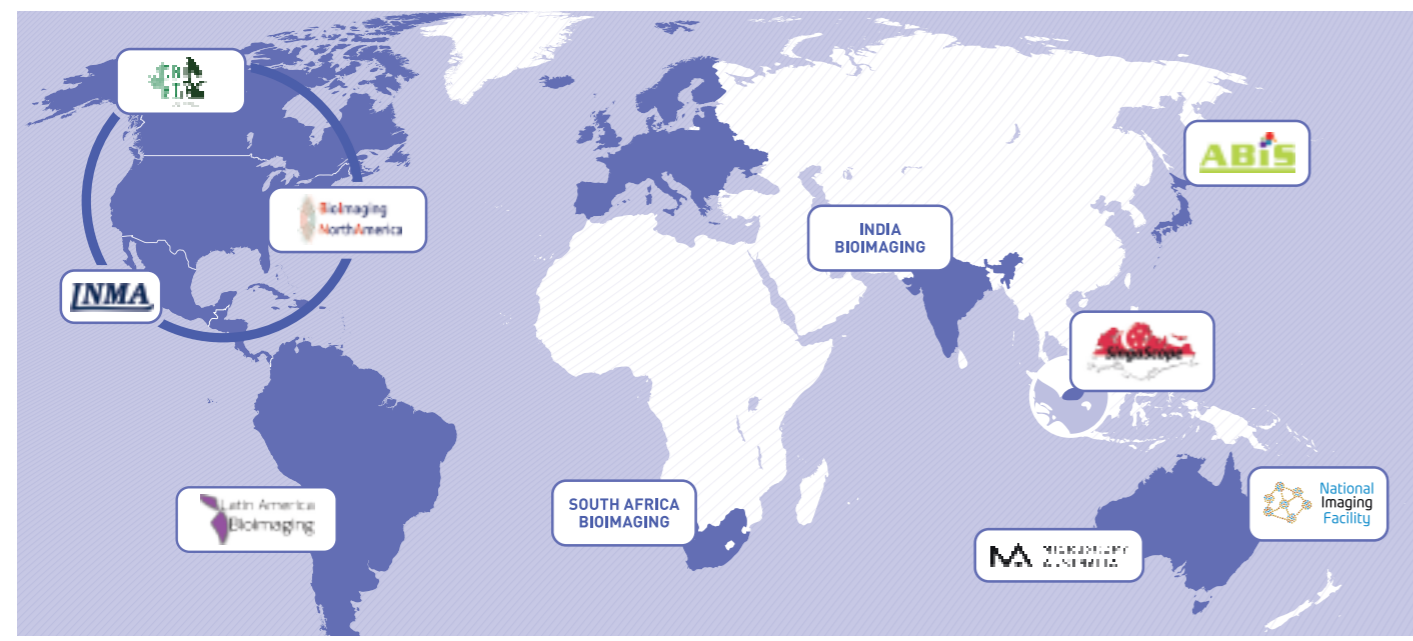
INTERNATIONAL RELATIONS

Euro-BioImaging ERIC has many flourishing international relations with imaging infrastructures and communities around the globe, as it is a founding partner of the Global BioImaging (GBI) network (www.globalbioimaging.org).

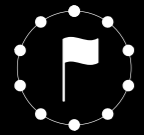


To further strengthen its international relations Euro-BioImaging ERIC signed the **Global BioImaging Memorandum of Understanding** in May 2020, sealing its formal participation in GBI and complementing the existing bilateral collaboration

agreements with Microscopy Australia, National Imaging Facility (NIF), Advanced BioImaging Support (ABiS), Canada BioImaging, SingaScope and India BioImaging.

INTERNATIONAL PARTNERS OF EURO-BIOIMAGING



EURO-BIOIMAGING'S GLOBAL PRESENCE IN 2020

 10	 25	 5
Within Global BioImaging, Euro-BioImaging interacts with 10 established national imaging networks and infrastructures	Countries represented at the Exchange of Experience V – co-chaired by Euro-BioImaging & ABiS and organized by Global BioImaging	Nodes participating as hosts in GBI's international job shadowing program

COMMUNITY BUILDING

The Global BioImaging annual event, the Exchange of Experience V workshop, held in September 2020, was co-organised by Euro-BioImaging (in the person of Jason Swedlow from the University of Dundee, UK) and ABiS, highlighting the strong Europe-Japan scientific partnership on the topic of image data. The workshop discussed the theme “Prepublication image data: management and processing” and attracted a record number of 158 participants worldwide.

EXCHANGE OF EXPERIENCE V, SEPTEMBER 2020



158 participants from 25 countries joined virtual EOE V. Euro-BioImaging co-chaired the event with ABiS, our partner from Japan.

JOB SHADOWING

Five Euro-BioImaging Nodes, namely Advanced Light and Electron Microscopy Node Prague CZ, Finnish Advanced Light Microscopy Node, France BioImaging, Molecular Imaging Italian Node, Preclinical Imaging Centre (PRIME) - Molecular Imaging Dutch Node and Euro-BioImaging EMBL Node participate in Global BioImaging international job shadowing program. These European facilities provide excellent opportunities for international imaging core facility staff to visit their facilities and exchange experience during a short visit of 1-2 weeks.

Learn more: www.globalbioimaging.org/international-job-shadowing-program

TRAINING

Global BioImaging, with support from the Chan Zuckerberg Initiative, provides training opportunities in multiple avenues including core facility management, image data, and novel biological and biomedical imaging technologies for directors and staff of imaging infrastructures and imaging core facilities. Euro-BioImaging ERIC members will collaborate and participate in the Global BioImaging training events that are planned for 2021, as instructors, trainers and trainees.

Learn more about Global BioImaging's training offer: www.globalbioimaging.org/international-training-courses

GLOBAL BIOIMAGING JOB SHADOWING VISIT

“ My stay (at PRIME) greatly helped to establish promising first contacts to enable closer collaboration and will help to improve our local processes and management structures in the facility. Unexpectedly the visit also opened up potential new opportunities, which may also become of interest for my further career development in the future.

- Andre Bongers, University New South Wales Sydney Australia, June 2018



INTERNATIONAL COLLABORATIONS

QUAREP-LiMi

QUAREP-LiMi stands for Quality Assessment and Reproducibility for Instruments & Images in Light Microscopy.

This initiative brings together microscopists from academia and industry from all over the world with the goal of improving quality assessment (QA) and quality-control (QC) for all aspects of light microscopy.



QUAREP-LiMi has grown to more than 250 members in its first year of operation, indicating the need for this initiative in the community. Experts from the facilities of the Euro-BioImaging Nodes have been part of the different working groups from the very beginning and Euro-BioImaging strongly supports the goals of QUAREP-LiMi and has worked to promote the initiative, for example via presentations at the Euro-BioImaging Virtual Pub.

Euro-BioImaging's hub team and the Euro-BioImaging Industry Board Coordinator are involved in the overall planning working group. Through this, we contribute to the important work as well as ensuring synergies with other quality control initiatives and working groups in the wider imaging community.



QUAREP-LiMi covers many different aspects of the light microscopy imaging process, as represented by the working groups:

- Illumination Power
- Detection System Performance
- Uniformity of Illumination Field
- System Chromatic Aberration
- Lateral and Axial Resolution
- Stage and Focus
- Microscopy Data Provenance
- Metadata
- Image Quality
- Microscopy Publication Standards

QUAREP-LiMi is an entirely open and transparent group, where new members are always welcome to join and contribute. To find out more about QUAREP-LiMi, you can consult the first White Paper of the group, available www.arxiv.org/abs/2101.09153

250	14	250	27
Members in 2020	Members from standards organizations	Members from industry	Countries represented

COLLABORATIONS WITH PARTNERS

ESFRI COMMUNITY

EMBRC AND EURO-BIOIMAGING SIGN A COLLABORATION AGREEMENT

The European Marine Biological Resource Centre (EMBRC) and Euro-BioImaging signed a collaboration agreement on 14 May 2020 to enhance communication about their respective services, to promote the development of joint services, and to encourage best-practice sharing and staff exchanges. The collaboration agreement focuses on facilitating access to marine model organisms and encouraging the use of advanced microscopy techniques in their study.

To date, a number of collaboration agreements have been signed between the 13 European life science research infrastructures.

These agreements on long-term collaboration recognise the need to overcome the silos that currently separate scientific disciplines, facilitating access for scientists to the best equipment and facilities available in Europe.

WATCH THE VIDEOS ABOUT LIFE SCIENCE RESEARCH INFRASTRUCTURES



“Euro-BioImaging is well-connected to other life science research infrastructures in Europe that offer complementary services and technologies. We are there to support the imaging community in the development of complex



Euro-BioImaging has signed bilateral Collaboration Agreements with several European Life Science Research Infrastructures (RIs). These include collaboration agreement with EU-OPENSOURCE, Instruct and ELIXIR. Working together in the life sciences on interdisciplinary and challenging scientific projects will lead to progress in health and disease, drug discovery, and other areas.



In August 2020, Euro-BioImaging organized a workshop called “How Life Science Research Infrastructures can support your research” with fellow research infrastructures, Instruct, EATRIS, BBMRI, INFRAFRONTIER and BioImaging Greece. The workshop was very successful with nearly 60 participants from the biomedical imaging community.

research projects that boost the productivity and impact of research across Europe.

- Frauke Leitner, Scientific Project Manager, Euro-BioImaging

COMMUNICATION & OUTREACH

2020 was the first year of operations for the Euro-BioImaging ERIC. Our communication strategy for 2020 thus focused on building the Euro-BioImaging community of Nodes and expanding our visibility in order to attract new users.

WEBSITE

The Euro-BioImaging website was rolled out in December 2019. In 2020, our communication strategy focused on creating content for the website – in particular News content - and attracting visitors, primarily using social media and our newsletter to increase traffic.

In November 2020, 20.7% of web visitors came from social media.



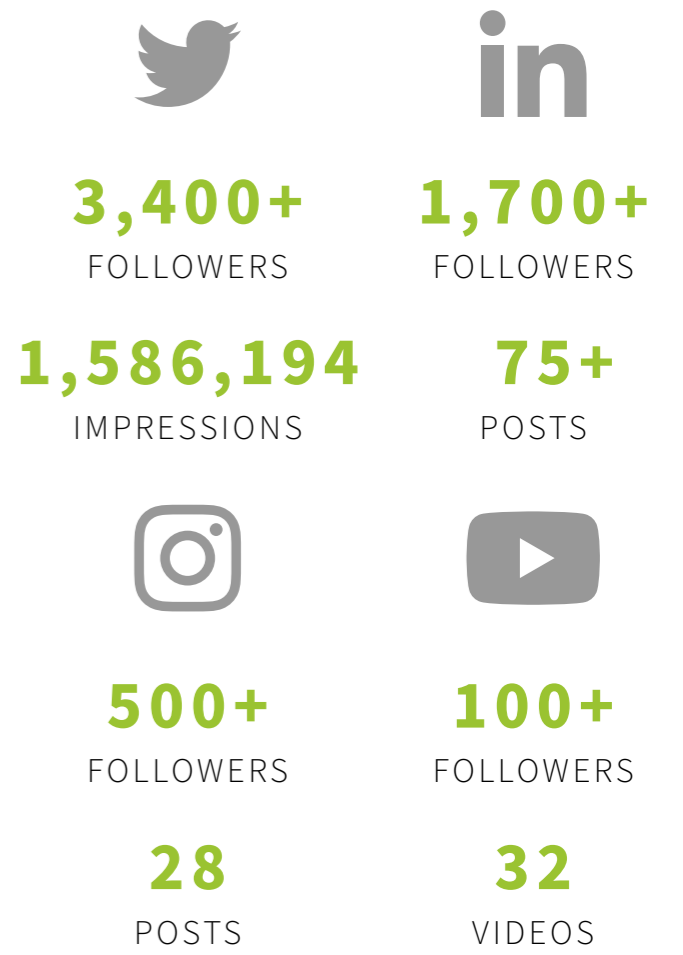
NEWSLETTER

The Euro-BioImaging newsletter is a quarterly publication. Topics this year included “Responding to the COVID-19 crisis” focusing on the resilience of Euro-BioImaging Nodes to adapt their working practices with regards to lockdown but also on the excellent research being undertaken in our Nodes to better understand the virus. We also compiled a newsletter on the theme of our expanding technology offer, announcing the 6 new technologies that are part of the Proof-of-Concept studies, to become part of the Euro-BioImaging portfolio. The newsletter successfully drove traffic to our website.



SOCIAL MEDIA

Social media, namely Twitter, has been an important part of our community-building strategy in 2020. We used Twitter to interact with partner Life Science research infrastructures, give visibility to imaging scientists, give visibility to our Nodes, promote breakthroughs in imaging research, and advertise our Virtual Pub. Our main objective in 2020 was to increase our followers and get the word out about Euro-BioImaging’s service offer. The number of followers grew exponentially thanks to our very engaged community. Creating multimedia content was also a focus in 2020. We created short, technology-focused videos which were shared on Twitter in 2020. In addition, we recorded many Virtual Pub sessions and shared these videos on YouTube. We also interacted with our community on LinkedIn. We plan to further develop our content on Instagram and YouTube in 2021.

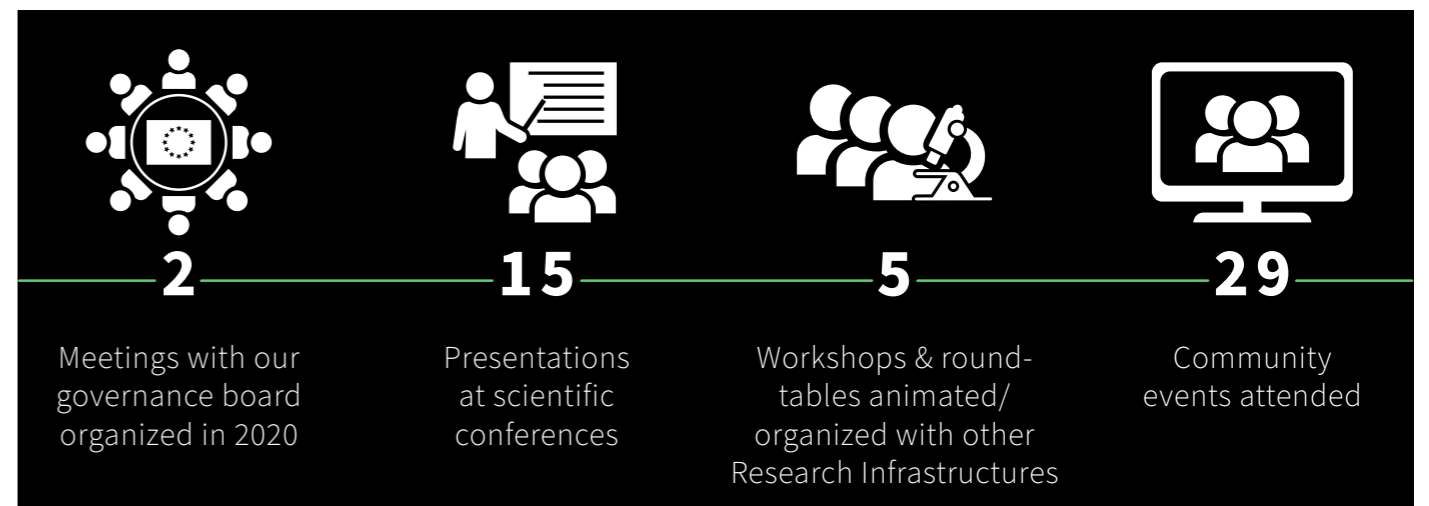


* Statistics according to the June 2021 situation

SCIENTIFIC CONFERENCES & COMMUNITY ENGAGEMENT

The Euro-BioImaging Hub Team actively promotes our research infrastructure at scientific conferences and other community events. While many events were canceled due to the pandemic in 2020, many new opportunities also arose to interact with our community virtually.

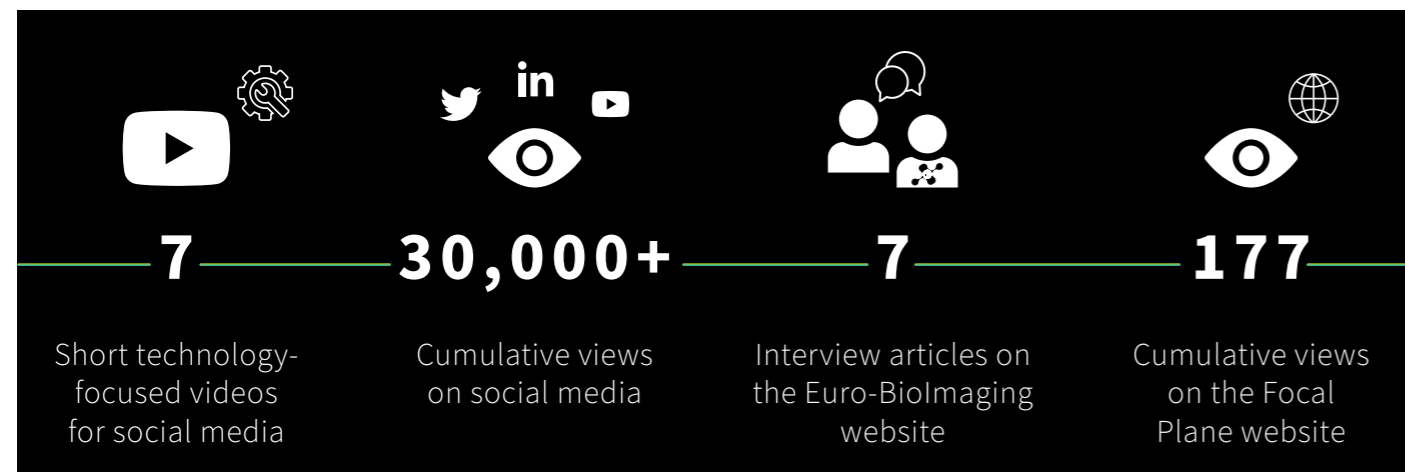
In addition to attending and animating community organized events, Euro-BioImaging also launched its own weekly meeting with Node staff and the imaging community, called the Virtual Pub.



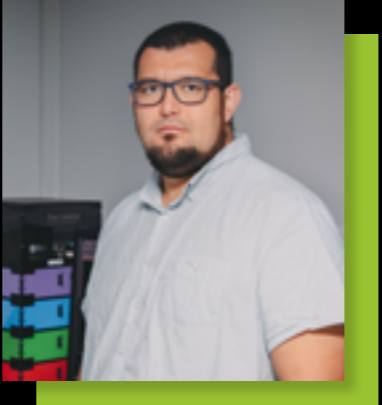
PROMOTING IMAGING TECHNOLOGIES

PROOF-OF-CONCEPT STUDY COMMUNICATION CAMPAIGN

One of our main achievements in 2020 was launching our first Proof-of-Concept study in collaboration with our Nodes. The Proof-Of-Concept studies make it possible to add new technologies to the Euro-Biolmaging technology portfolio, ensuring our infrastructure is constantly evolving to keep up with technology breakthroughs and user demand. To support this, we designed an online communication campaign to attract users to use these technologies at our Nodes. The campaign involved interview articles with Node experts, and multimedia content to promote the imaging technologies. We created short, technology-focused videos which were shared on Twitter. As a result of our campaign, multiple users applied via our portal to use these cutting-edge technologies in the final quarter of 2020, despite travel restrictions related to the COVID-19 pandemic.



“ Being part of Euro-Bioimaging means a lot to our Node because it brings to us many opportunities to develop new connections, expand our work, learn new things and secure new funding to develop our future plans.



- Camilo Guzman, Manager of Euro-Biolmaging’s Finnish Advanced Light Microscopy Node

FOCAL PLANE –TECHNOLOGY HIGHLIGHTS

We created a strategic partnership with “The Focal Plane” community website to gain additional visibility for the technologies featured in the Proof-of-Concept study. Interview articles with Euro-Biolmaging Node experts were featured on the Focal Plane every other week as part of the “Technology Highlights”series. The seven articles published accumulated 177 views.



COMMUNITY BUILDING

EXPERT GROUPS

QUALITY MANAGEMENT AT BIOMEDICAL IMAGING FACILITIES

Quality management is an important aspect in the operation of imaging facilities. Nevertheless, different facilities adopt different procedures and the level of implementation varies importantly across them.

For this reason, the Med-Hub and the biomedical imaging Nodes have set up a small dedicated working group to share best practices, agree on general common procedures and improve their own quality management plans based on exchange of experience.



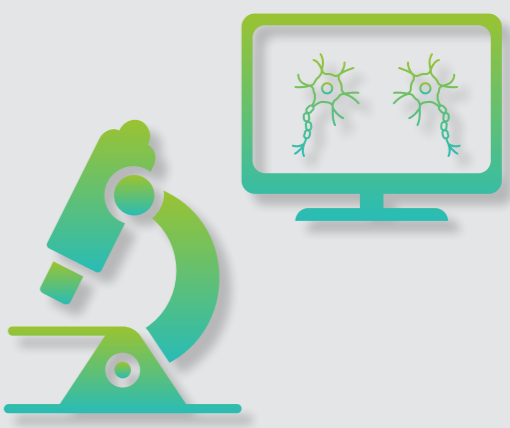
PRECLINICAL & MEDICAL IMAGING DATA MANAGEMENT

Preclinical image data management is currently quite an hard task, as it suffers from the lack of standard tools to store, process, and share large amounts of imaging data produced by scientists using many different technologies from different providers, on different types of subjects in studies involving multiple acquisitions on various subjects groups. In addition, data security and ethical issues must also be considered when dealing with medical image data.

Furthermore data sharing and usability is hampered by the great heterogeneity in data management systems adopted by the biomedical imaging facilities.

The data management working group has been created to tackle these issues. Members share expertise and tools for curating and archiving image data, and seek for common platforms to facilitate data sharing.

“ Quality and data management are key issues for imaging facilities and working together with our Nodes to properly address them is an important task to Euro-Biolmaging.



- Alessandra Viale, Scientific Project Manager, Euro-Biolmaging

EXPERT GROUPS

REMOTE ACCESS & TRAINING

Started in October 2020, the Expert Group on Remote Access and Training brings together facility staff to exchange experiences, collect resources, and identify common roadblocks. The group has 35 members, representing 25 different facilities across 11 countries

Remote Access presents many challenges - therefore a broad range of topics is covered in the Expert Group, including:

- user training
- IT requirements
- sample shipment
- remote courses and many more.



The Expert Group has developed a collection of training materials, both those available from academic resources as well as from microscope manufacturers. Representatives from multiple companies represented on the Euro-Biolmaging Industry Board regularly join the Expert Group meetings and share their perspectives on remote access.

35	25	11
MEMBERS	FACILITIES REPRESENTED	COUNTRIES

COMMUNICATION

The objective of the Communication Expert Group is to multiply the collaboration and connections between Nodes & Hub in order to increase the visibility of our research infrastructure as a whole. The first step is to get to know each other better through regular meetings and exchange of experience.

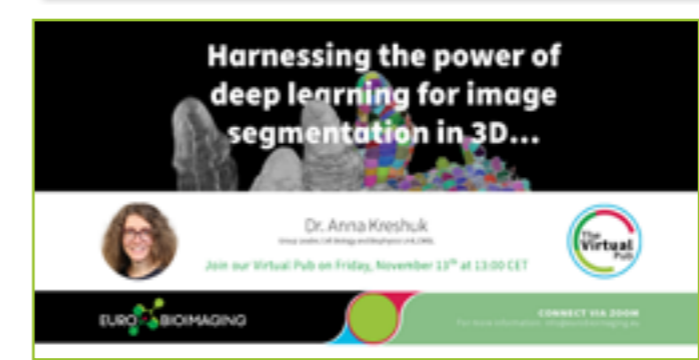
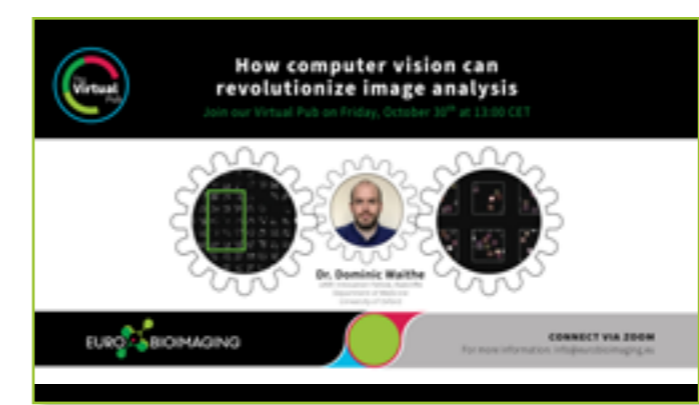
Progressively, we will work together across communication channels, share our stories and activities, and promote Euro-Biolmaging to our users and beyond.



33	17	11
MEMBERS	FACILITIES REPRESENTED	COUNTRIES

THE VIRTUAL PUB

Every Friday afternoon, Node staff and Friends of Euro-Biolmaging join with the Euro-Biolmaging Hub staff for a virtual meeting - about topics that interest us all. We showcase our Nodes' success stories and expertise, exciting science, travel grants, new technologies - and more! Started as an informal meet-up during the COVID-19 lockdown, this event has expanded to become a regular event with a following. All imaging enthusiasts are welcome to join! Learn more about the [Euro-Biolmaging Virtual Pub](#).



HIGHLIGHTS

We have many happy memories of interesting exchanges with the community at the Virtual Pub in 2020. Here are just a few highlights. Many presentations were recorded - and are available on our [Euro-Biolmaging Communication YouTube channel](#).

WATCH MORE ON YOUTUBE



30	800+	18
Virtual Pub events organized in 2020	Cumulative attendees	Presentations from Node staff

INTRODUCTION

BY DIRECTOR GENERAL



The big advances in cell biology as well as in preclinical and medical research have often relied upon the development of cutting-edge imaging technologies. These technologies helped to define the detailed structure and functional principles of cells and the structure-function relationship between cells, tissues, and the physiology of the whole organism, as well as the causalities and mechanisms underlying many diseases. Numerous Nobel Prizes have later brought fame to the scientists who have discovered these structures, principles, and mechanisms, not to mention that countless medical top innovations, drugs, and therapies are based on these findings.

EUROPEAN OPEN ACCESS IMAGING CENTERS TRANSFORM THE WAY RESEARCH IS CONDUCTED

In the early days of modern science, research equipment and technologies could only be accessed by a chosen few among all researchers, as instrument funding was often awarded to top-ranking research groups instead of whole research environments. This type of highly restricted research infrastructure access is a very inefficient way to manage expensive and intricate research equipment. With prices of equipment purchases currently reaching around hundreds of thousands, even millions of euros, it has become increasingly evident that such research instruments do not belong to individual researchers, but need to be in general use to maximize the utilization and general benefit of the instrument. As a rule, the more extensively used the research instruments are, the better the gain and the return on investment. Another important aspect is that advanced research technology services that are provided equally to all researchers need support personnel that master these highly specialized instruments. Thus, this type of equipment needs to be situated in joint infrastructure centers that have the necessary competence and expertise to maintain the instruments, provide services, and advice the users regardless where they come from.

When world-class research instruments are placed in centers operating with open access principle, the efficiency and productivity of instrument use, as well as the quality and reproducibility of the obtained data will all improve significantly. Instead of being mere service providers, imaging facilities residing

in international core facility centers are becoming pioneering and strategically led powerhouses of science and provide key resources of collaborative and open research operating at the frontiers of science.

Euro-Bioimaging joins the best imaging forces in Europe into a platform of unique capabilities and excellence. While its 25 Nodes, based on 112 imaging centers, all have demonstrated their credibility, proficiency, and scientific excellence when being evaluated by the Scientific Advisory Board of Euro-Bioimaging, the true excitement begins when all of these centers are joined together. The Euro-Bioimaging Nodes form a unified and highly-qualified network of expertise, know-how, and cutting-edge technologies, as well as an innovation platform for novel imaging modalities and principles that can be launched and tested for their capabilities much faster than ever before. Furthermore, Euro-Bioimaging provides its Nodes with excellent possibilities to link their data with the full range of European life science research.

The Node pages give some flavor of the breadth and capabilities of the Nodes and the following pages provide some highlights of how their technologies have been innovatively used to answer timely research questions, including COVID, cancer, cardiovascular research, neurology, and also marine and plant biology. Still, we are quite convinced that the really significant advances of Euro-Bioimaging are yet to be seen when the services are opened full-scale and when the Nodes are getting familiar with how resourceful this joint operation can be.

- John Eriksson

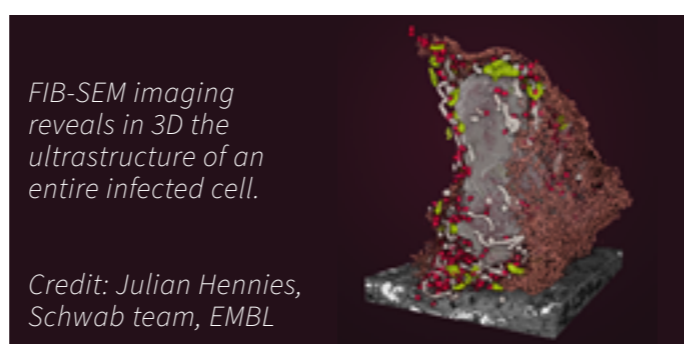
EXCELLENT SCIENCE

COVID-19

INVESTIGATING THE EFFECT OF SARS-COV-2 ON INFECTED CELLS USING ELECTRON MICROSCOPY

Understanding virus replication is a key part in the development of any therapeutic strategy to combat COVID-19. **EMBL's Electron Microscopy Core Facility**, part of Euro-Biolmaging's EMBL Node, participated in a timely study to reveal the biological mechanisms driving the SARS-CoV-2 replication cycle in human cells. This study, carried out in collaboration with the Ralf Bartenschlager Lab, University of Heidelberg, combined advanced high-throughput and high-resolution imaging technologies to create 3D reconstructions of whole cells infected by SARS-CoV-2. The impressive datasets produced in this study are publicly available via the EMPIAR database (ID 10490), giving scientists new insight into the way this novel virus behaves within human cells.

Cortese et al., Cell Host & Microbe, 2020
doi.org/10.1016/j.chom.2020.11.003



“ This study combines light and electron microscopy and image analysis to provide a comprehensive overview of the morphological organelle alteration induced in SARS-CoV-2 infected human lung epithelial cells. We could see the virus using the Endoplasmic Reticulum (ER) to create replication factories in double membrane vesicles (DMV) and the new virions forming at the ERGIC/Golgi interface.

- Yannick Schwab, Head of the Electron Microscopy Core Facility

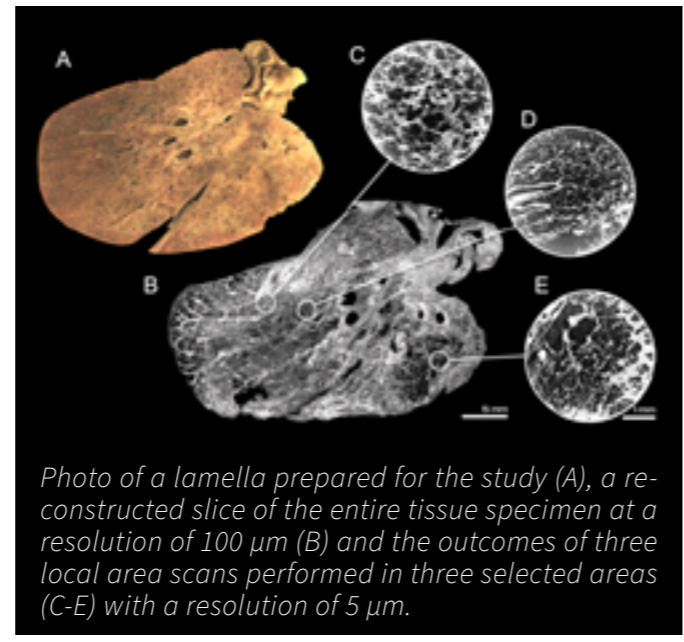
COVID-19

MULTISCALE IMAGING OF COVID-19 LUNG INJURY PATTERNS BRIDGES THE GAP FROM CLINICAL CT TO HISTOPATHOLOGY

The lung is the organ most affected by COVID-19. COVID-19 pneumonia creates a characteristic heterogeneous image pattern in clinical thin-layer computed tomography. Clinical CT is used as a diagnostic tool in patients with suspected COVID-19 pneumonia, and in confirmed COVID-19 patients, during the disease course to reassess lung structure in the event of respiratory symptoms worsening. In this context, a number of typical clinical radiological patterns caused by the SARS-CoV2 infection can be depicted, the exact correlate of which, at the tissue level, remain unclear. At the **Phase Contrast Imaging Flagship Node Trieste**, a study was performed aimed at scaling back the injury patterns from tissue- to organ scale.

Multiscale CT studies have been performed on tissue lamellas from formalin fixed lung lobes. Reconstructed images confirmed the high heterogeneity of tissues affected by COVID-19 injuries, showing the presence of different alterations in the same lamella.

Work still in progress



CANCER

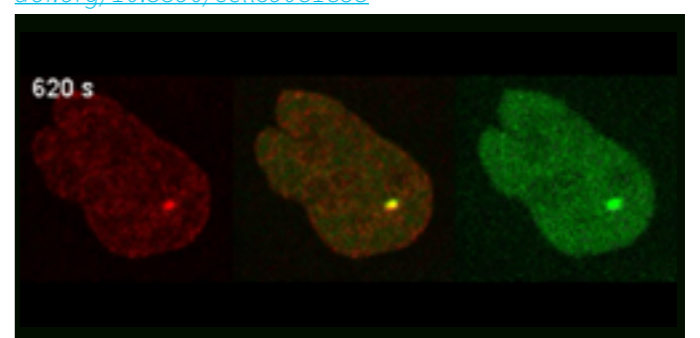
UNDERSTANDING DNA REPAIR USING SPINNING DISK MICROSCOPY

Every DNA molecule in a living being is constantly being damaged, by both external and internal mutagens. To allow the cells to continue their normal functions despite these constant damages, DNA repair is a crucial process for survival and cell health. Aberrations in the DNA repair process can lead to cancer and slower DNA repair is a key cause of cellular aging. The research work at the **Sofia Biolmaging Node** in Bulgaria focuses on the molecular and cellular biology of DNA replication, repair, transcription, and chromatin dynamics.

To understand the processes of DNA repair, researchers at the Node combine live-cell recordings using spinning-disk microscopes with laser ablation to induce DNA damage. This control over when and where DNA damage arises, allows them to study

how specific fluorescently-labelled proteins respond to DNA damage and interact with each other following damage. This set of tools and expertise gives the Sofia Biolmaging Node unique capabilities in screening substances for their impact on DNA repair, a topic of fundamental interest for cancer research. The large and complex protein dynamics data sets produced by these experiments led to the development of a dedicated image analysis and data visualisation software, CellTool, and the DNAREPAIRK Database.

Aleksandrov et al., Cells, 2020
doi.org/10.3390/cells9081853



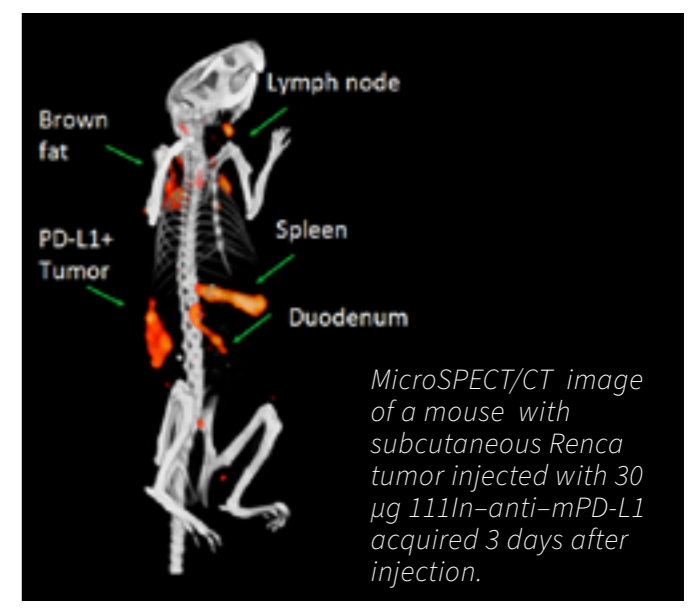
CANCER

USING MICROSPECT/CT IMAGING TO DETERMINE THE IN VIVO DISTRIBUTION OF A RADIOLABELED ANTI-PD-L1 ANTIBODY IN TUMOR-BEARING MICE

Antibodies that block the interaction between programmed death ligand 1 (PD-L1) and PD-1 have shown impressive responses in cancer patients. At the **Preclinical Imaging Centre (PRIME) - Molecular Imaging Dutch Node**, PD-L1 micro single-photon emission tomography/computed tomography (microSPECT/CT) using radiolabeled PD-L1 antibodies was used to (i) measure PD-L1 expression in two immunocompetent tumor models and (ii) monitor therapy-induced changes in tumor PD-L1 expression. It was shown that radiolabeled PD-L1 antibodies accumulated preferentially in PD-L1+ tumors, despite considerable uptake in certain normal tissues expressing physiological

levels of PD-L1. Radiotherapy-induced upregulation of PD-L1 expression in murine tumors could also be monitored with microSPECT/CT imaging. In the future, this technique may enable patient selection for PD-1/PD-L1-targeted therapy.

Heskamp et al., Cancer Immunol. Res. 2019
doi.org/10.1158/2326-6066.cir-18-0280



NEUROLOGY

EVALUATION OF DRIVER REHABILITATION BY FUNCTIONAL MRI

The vast majority of road-traffic accidents are caused by drivers themselves, and so further improvements in road safety require developments in driver training and rehabilitation. At the **Advanced Light Microscopy and Medical Imaging Node Brno CZ**, functional MR neuroimaging was applied to a group of n 27 drivers whose licenses had been revoked after serious traffic offences, in order to evaluate a novel approach to driver rehabilitation, specifically empathy induction as a means of changing attitudes towards risky driving. It was shown that risky drivers exhibited weaker brain responses to socio-emotional stimuli compared with control drivers prior to the program, but this difference was reversed after empathy induction, suggesting that empathy induction is an effective form of driver rehabilitation.

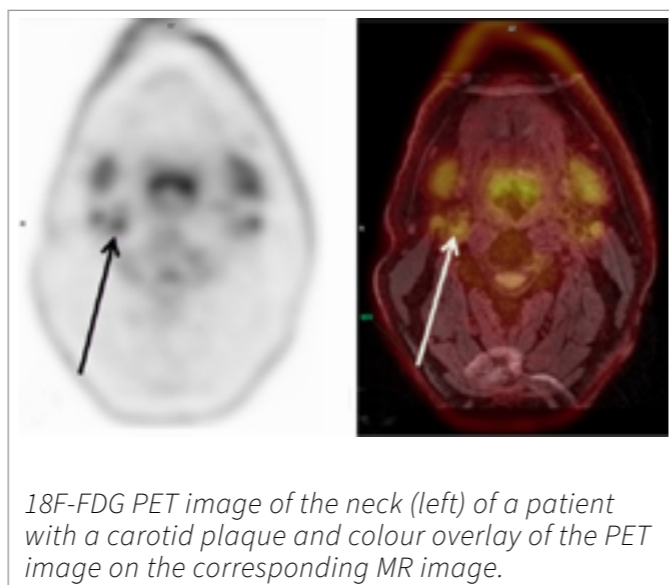
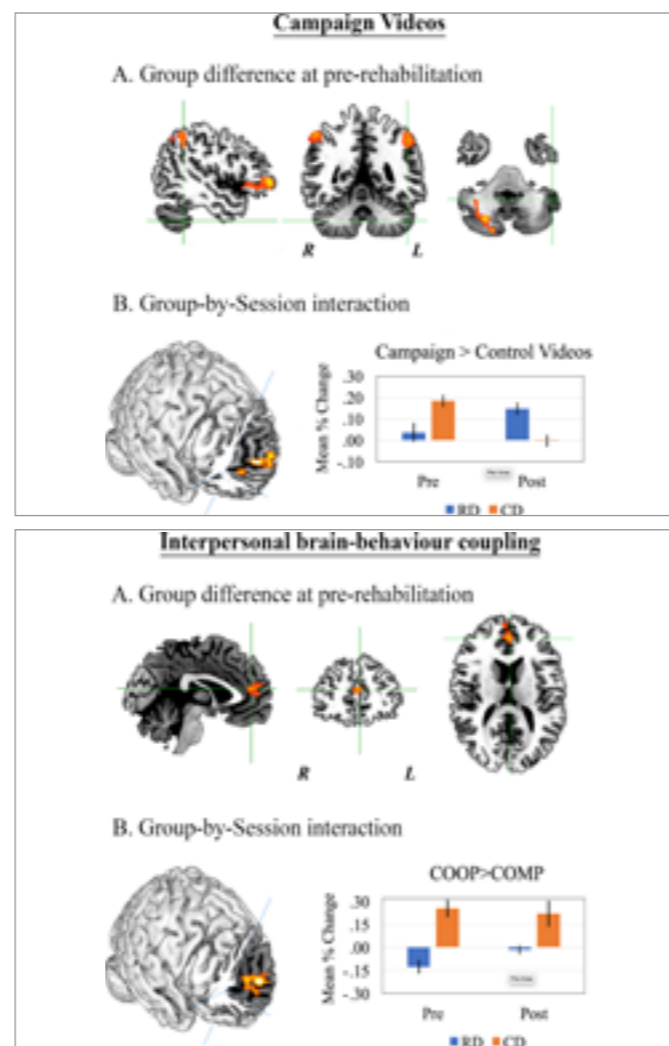
Shaw D.J. et al. PLOS ONE 2020
doi.org/10.1371/journal.pone.0232222

CARDIOVASCULAR

MRI-PET OF ATHEROSCLEROTIC PLAQUES

For imaging carotid atherosclerosis, 18-fluorodeoxyglucose (18F-FDG), a glucose analog, is often used as a surrogate marker for inflammation. At the **Facility of Multimodal Imaging - AMMI Maastricht**, a study on the PET visualization of carotid artery plaques is currently ongoing, showing 18F FDG uptake in the symptomatic carotid plaque, while hardly any uptake is shown in the contralateral asymptomatic carotid artery. An example has been recently discussed in an overview of PET and MRI acquisition techniques for imaging of atherosclerosis.

M. Aizaz et al, Cardiovasc Diagn Ther 2020
doi.org/10.21037%2Fcdt.2020.02.09



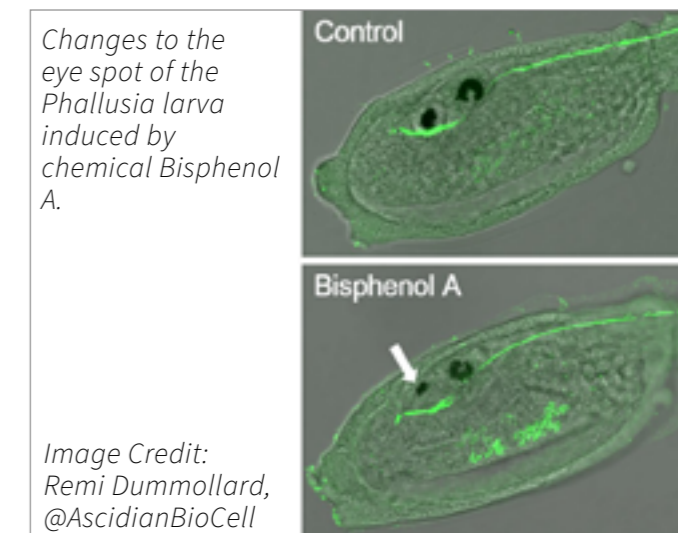
MARINE BIOLOGY

SCREENING FOR TOXIC EFFECTS OF CHEMICALS ON MARINE INVERTEBRATES USING ADVANCED IMAGE ANALYSIS TECHNIQUES

Our surface waters have become increasingly contaminated with man-made chemical compounds, such as pesticides. The effect of these chemicals on humans as well as marine vertebrates has been characterised in a number of studies. Their impact on the development of invertebrate marine organisms, such as crabs, jellyfish, sea urchins and octopus, is less well known. The team around Remi Dumollard from the Ocean Observatory at Villefranche sur-mer worked with the experts at the BioEmergences Lab, part of the **French BioImaging Node**, to develop the tools needed to tackle this question. They developed semi-automatic image analysis algorithms to allow the large scale quantification of developmental defects in the sea squirt embryos, caused by exposure to different chemicals. The study provides

tools and standardised protocols that can be used for large scale screening efforts. Their first pilot screen showed that while some compounds were not toxic to the Phallusia embryos, others either delayed embryo development or led to malformation of either the entire embryo or specific body parts.

Gazo et al., Aquat Toxicol, 2021
doi.org/10.1016/j.aquatox.2021.105768



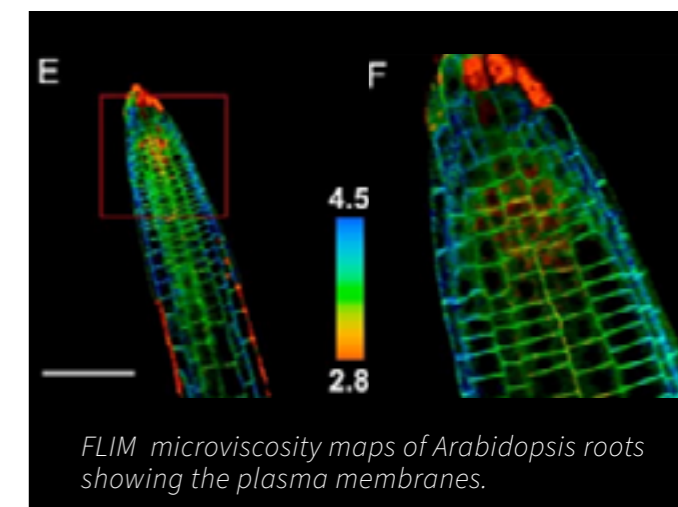
PLANT BIOLOGY

INVESTIGATING PLANT CELL MECHANICS USING FLUORESCENCE-LIFETIME IMAGING MICROSCOPY

Characterising the mechanical properties of plant cells is an important aspect of studying plant resilience. That is why a team at Wageningen University, host of **Euro-BioImaging's Advanced Light Microscopy and Molecular Imaging Node Wageningen**, developed a new method to measure the viscosity in individual parts of plant cells using Fluorescence Lifetime Imaging Microscopy (FLIM). Professors Dolf Weijers and Joris Sprakel of Wageningen University combined FLIM imaging with a new class of fluorescent molecular sensors they developed, whose optical signature changes in response to changes in the viscosity of the material surrounding the probe. The molecules were designed to locate themselves

to specific parts of the plant cell, which allowed local mechanical measurements in these areas. The use of these molecular reporters, in conjunction with quantitative FLIM, enabled the construction of the first microviscosity maps of plant cells and tissues.

Michels et al., PNAS, 2020
doi.org/10.1073/pnas.1921374117



FROM OUR NODES

PREAMBLE

Euro-Biolmaging provides the gateway to biological and biomedical imaging centers throughout Europe. By becoming part of Euro-Biolmaging, these facilities agree to provide Open Access to technologies, services and expertise to all Euro-Biolmaging users, independent of where the users come from, their field of research or their level of expertise.

As such, Euro-Biolmaging is a distributed infrastructure - our central activities are coordinated by our 3 Hub sites, but services are provided in the imaging facilities that are part of the Euro-Biolmaging family. These facilities are organised in Nodes. And Euro-Biolmaging Nodes are very diverse.

- We have small Nodes that consist of only a single facility with a few members of staff
- We have large Nodes that bring together the unified imaging infrastructure of a country and represents many facilities in different geographic locations and with 100s of staff members.
- We have Nodes that are Flagships for a certain technology and offer highly specialized services around that technology.
- We have Nodes that offer a very broad spectrum of different technologies in one place.
- We have Nodes that offer only biological imaging tools, Nodes that offer only biomedical imaging tools, and some Nodes that offer both.

No matter how different our Nodes are, what they have in common is their dedication to high-quality imaging technologies and supporting their users in their research.



DID YOU KNOW?

To become a Euro-Biolmaging 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:

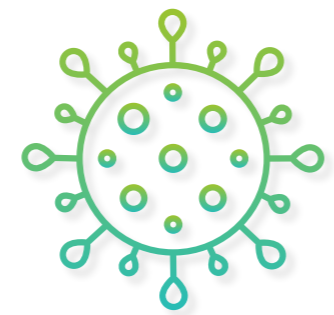
- ✓ Scientific and technical excellence
- ✓ European and National significance
- ✓ Technology maintenance and updates
- ✓ Access and service package

- ✓ Quality assurance
- ✓ User training
- ✓ Other technology-specific factors

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

EURO-BIOIMAGING NODES AND USERS

HOW DOES AN INFRASTRUCTURE BASED ON TRANSNATIONAL ACCESS FUNCTION IN A GLOBAL LOCKDOWN?



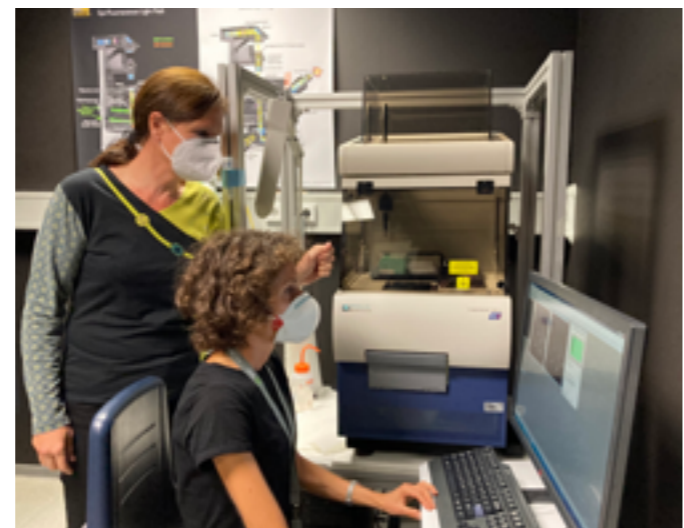
When Euro-BioImaging started in late 2019, both the Hub team as well as the Euro-BioImaging Nodes were geared up and excited to support users who travelled across the continent in pursuit of the best imaging technologies to answer their scientific questions. And then came the pandemic ...

Faced with unprecedented restrictions and challenges in 2020, we witnessed the remarkable resilience of our Nodes, as they quickly adapted to the situation in order to continue to provide user services and contribute to scientific discovery. We were also struck by the perseverance of our users, many of whom performed their experiments remotely, or traveled in uncertain conditions for the sake of science. Despite the lack of in-person events, new ways of interacting arose within the community, and many Nodes implemented online training programs for users.

So while the pandemic could have been a serious blow to our infrastructure, it actually led to many innovations, and pushed our infrastructure to

develop a broader and more inclusive service offer for the future.

Some user projects were interrupted in March 2020, such as the project of Roberta Ranieri, who was just visiting the EMBL Node from her native Italy to perform high-throughput screening experiments to find new drugs for leukemia treatments, when Germany went into lockdown. Undeterred by a double quarantine, Roberta returned to EMBL in August 2020 to complete her work. Her persistence was well rewarded with promising results that are guiding her next experimental steps. Roberta found her visit to the Euro-BioImaging EMBL Node to be very valuable:



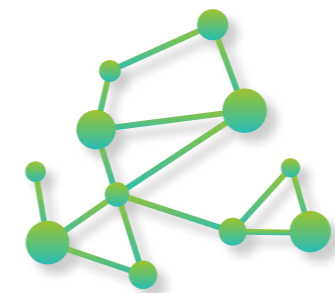
“ The EMBL team helped me so much with sample preparation and image analysis. I had no experience in either of these fields. Being able to travel to EMBL as a Euro-BioImaging user was important because the instrument I used at EMBL is very powerful, we don't have this capability in our lab.

- Roberta Ranieri, Euro-BioImaging User, University of Perugia

For some of Euro-BioImaging Nodes, the travel restrictions meant adapting the service they provided. For example the facility staff at the Phase Contrast Imaging Node Italy started receiving shipped samples and performing the image

“ Remote experiments require increased collaboration with our users' groups and a higher knowledge of the specific scientific case from our side, since we are undertaking the experiment instead of just providing the users with access to our technology. We become users ourselves.

- Dr. Giuliana Tromba, Beamline Coordinator, Phase Contrast Imaging Node Italy



Many Euro-BioImaging Nodes began offering remote access services during the pandemic. For instance, Euro-BioImaging user Jonas Bagge couldn't travel from Denmark to the EMBL Node in Heidelberg as planned, but his shipped samples had already arrived at the facility. So Scientific Officer

“ This was the first remote experiment with someone outside of EMBL, and it was a clear success. One important factor in this was the quality of the sample that Jonas sent. Not all kind of samples would have allowed remote access, but Jonas' project perfectly matched the prerequisites.

- Marko Lampe, Scientific Officer, Advanced Light Microscopy Facility, EMBL

acquisition for the users rather than providing the users access to the machine and training in their use. This meant a change in perspective and developing new ways of working, as Dr. Giuliana Tromba, Beamline Coordinator at the Node reports:



Marko Lampe, with the help of a cell phone and zoom, designed a collaborative set-up for STED imaging so Jonas could study his samples remotely. The results gathered in this unusual configuration help Jonas to understand how DNA repair processes interact with cell division.



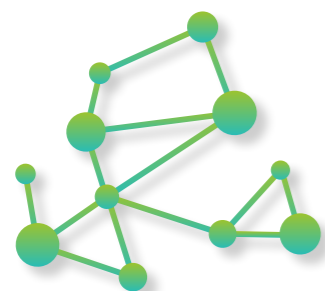
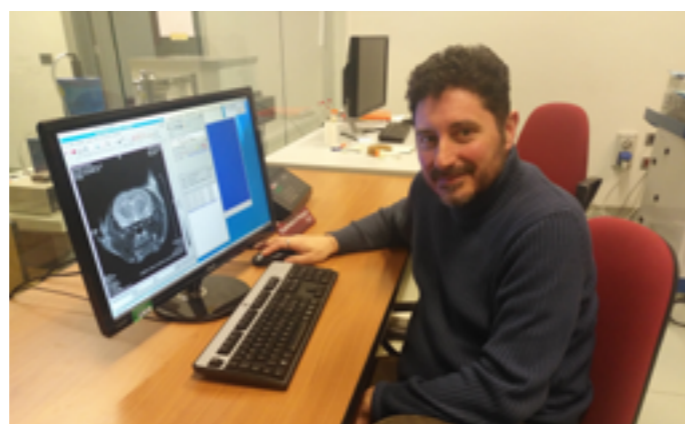
Photo copyright: EMBL/Kinga Lubowiecka

Other Nodes had been offering remote access already before the pandemic. This was the case for the Multimodal Molecular Imaging Node in Italy,

“ At Euro-Biolmaging’s Multimodal Molecular Imaging Node, remote access is business as usual. Detailed specification and close communication with the user from the onset of a study are key.

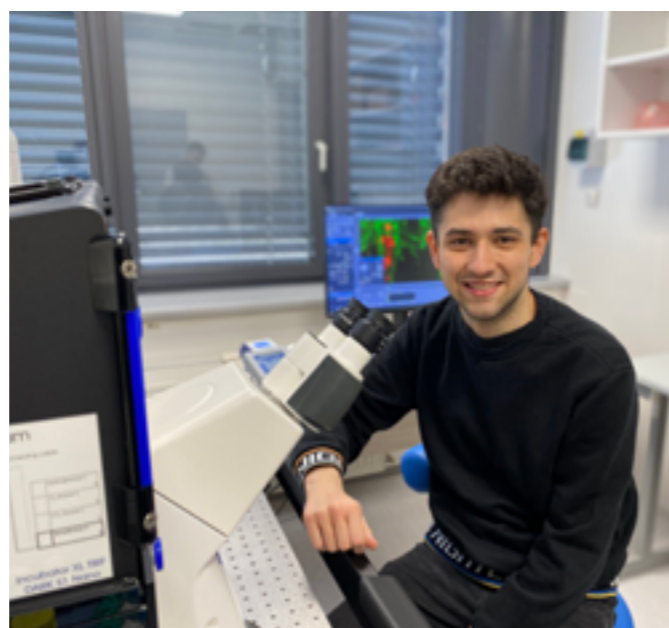
- Enzo Terreno, Coordinator of Euro-Biolmaging’s Multimodal Molecular Imaging Italian Node

where coordinator Enzo Terreno shared his experiences for what it takes to make remote access successful:



Training in different microscopy techniques is a service the Nodes offer to the Euro-Biolmaging users and key to our mission. These training activities were of course also disrupted in this year, but they did not stop but rather continue in different ways. Some students were still able to undertake “Study abroad” programs, such as Marcos López, who

normally studies in Madrid but travelled to Czechia in autumn 2020 to pursue his Masters thesis at Masaryk University in Brno. Marcos studies dental regeneration and became a Euro-Biolmaging user at the CELLIM imaging facility, where he received training in different microscopy techniques.



“ Being able to work in the CELLIM facility alongside other experts has been an extremely rich experience – even against the backdrop of COVID-19. The state-of-the-art equipment available at the CELLIM imaging facility is crucial to my work – and the competent and friendly staff have been particularly supportive of my project.

- Marcos González López, Master’s student Euro-Biolmaging user at our Advanced Light Microscopy and Medical Imaging Node Brno CZ

The crucial role that good communication plays in making remote access successful was also stressed by Eija Jokitalo, from the Electron Microscopy unit at the University of Helsinki, part of the Finnish Advanced Light Microscopy Node.

“ We have cameras on every instrument used during trimming and sectioning, so we can share every step with the user, and get their feedback remotely.

- Eija Jokitalo, Research Director, Finnish Advanced Light Microscopy Node

And this communication requires the right tool. The facility therefore adapted their instruments to allow the users to see the different steps of the sample preparation process:

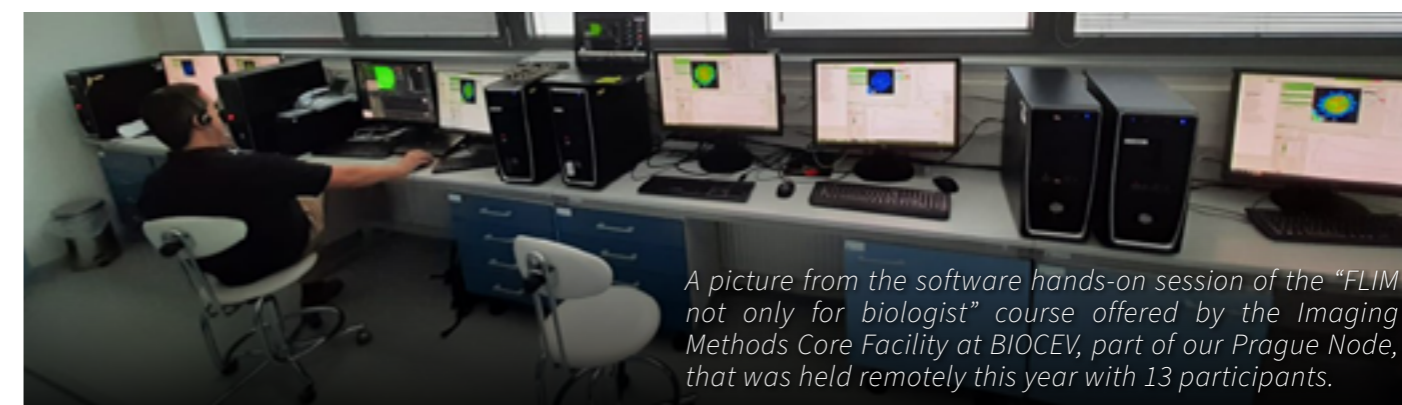


Designing virtual training courses to replace the hands on, in-person training courses that our Nodes normally offer was also a challenge. Introducing new users to the practical aspects of imaging systems remotely requires lots of creativity

as well as the development of new skills - such as video production. Overall, our Nodes reported that developing material for online courses was time-consuming, but virtual courses proved to be effective.

“ Facing the pandemic, France Biolmaging facilities organized remote user training and offered online training courses on image reconstruction and analysis. Given the success of online courses, we plan on offering them more often after the pandemic and we are currently building an e-learning program on biological imaging to offer an alternative to on-site training.

- Caroline Thiriet, External Relations Manager, France Biolmaging



A picture from the software hands-on session of the “FLIM not only for biologist” course offered by the Imaging Methods Core Facility at BIOCEV, part of our Prague Node, that was held remotely this year with 13 participants.

OUR FAMILY OF NODES

The testimonies we gathered in the Euro-Biolmaging Nodes and Users section of this Annual Report is just an overview of activity from our Nodes. It represents only a small part of what was accomplished in 2020 within the Euro-Biolmaging family. As it would be impossible for us to tell all of the stories from our

Nodes here, we invite you to visit our website and the website of our Nodes to learn more. In this next section, entitled Our Family of Nodes, we give you a closer look at the individual Nodes of Euro-Biolmaging, with some key figures and highlights.

“ Euro-Biolmaging is not just imaging machines but also people working together to boost the productivity and impact of research across Europe.

- **Silvio Aime,**
Med-Hub Interim Section Director

“ The heart of Euro-Biolmaging beats at its Nodes.

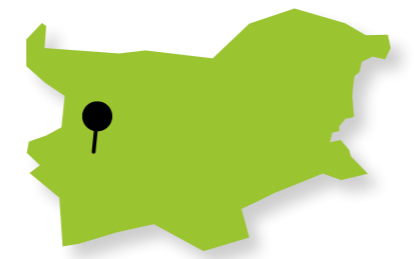
- **Antje Keppler,**
Bio-Hub Section Director

BULGARIA

SOFIA BIOIMAGING NODE - ADVANCED LIGHT MICROSCOPY NODE) - SOFIA

Node contact: Stoyno Stoynov, stoynov@bio21.bas.bg

Website: dnarepair.bas.bg/eurobioimaging.bg/site



HIGHLIGHTS

- Purchase of a new confocal microscope with super-resolution capability.
- Development of DNarepairK - a unique interactive database which contains the kinetics of recruitment and removal for 70 different fluorescently-tagged DNA repair proteins to UV laser-induced DNA damage.
- The DNarepairK database will be a valuable instrument to scientists, physicians, and drug developers for the fundamental exploration of the DNA repair process as well as the development and evaluation of novel DNA repair-targeting anticancer drugs.

 1 FACILITIES	 3,952 USAGE HOURS
 8 STAFF INVOLVED	 0 EXTERNAL TRAINING COURSES

CZECHIA

ADVANCED LIGHT AND ELECTRON MICROSCOPY NODE PRAGUE CZ

Node contact: info.praguenode@czech-bioimaging.cz
Website: www.czech-bioimaging.cz/euro-bi



HIGHLIGHTS

- EM facility at IMG had an opening event of their reconstructed rooms with two new microscopes Jeol JEM-F200 “F2” and Jeol JEM-1400 FLASH and started a collaborative project with Tescan Orsay Holding and Leica Microsystems companies.
- IMCF at BIOCEV extended its EM part by Jeol JEM 2100Plus
- Renowned LEM facility at Biology Centre CAS České Budějovice, joined Prague Node
- EM services were broadened by elemental analysis and mapping by TEM-EDS, STEM, microED and popular cryo-TEM
- Available confocal and FLIM services were further extended by purchase of Leica STELLARIS 8 FALCON at LM facility at IMG
- Introduction of user-friendly AI based image processing (NIS-Elements).

 6 FACILITIES	 36,134 USAGE HOURS
 27 STAFF INVOLVED	 6 EXTERNAL TRAINING COURSES

CZECHIA

ADVANCED LIGHT MICROSCOPY AND MEDICAL IMAGING NODE BRNO CZ

Node contact: Michal Mikl, michal.mikl@ceitec.muni.cz

Website: www.czech-bioimaging.cz/euro-bi/index.php?page=brno



HIGHLIGHTS

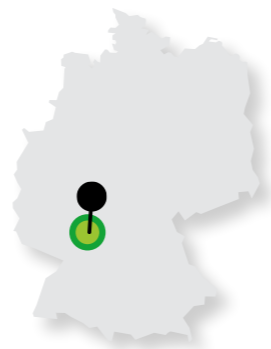
- **Biological imaging:** We acquired a new super resolution fluorescence microscope Zeiss Elyra 7 with several imaging modalities, e.g. Apotome and lattice SIM; STORM, PALM; total internal reflection -TIRF. We also worked on QPI technique based on holography with incoherent light source. Specialized 3D-printed chambers and stage holders were introduced. Dedicated image processing and data analysis software was developed.
- **Medical imaging:** We acquired a new eye-tracking system for human functional MRI studies, new mouse-brain cryoprobe for 9.4T MR animal scanner, MR compatible focused ultrasound for small animals.

 4 FACILITIES	 15,040 USAGE HOURS
 23.9 STAFF INVOLVED	 5 EXTERNAL TRAINING COURSES

EMBL EURO-BIOIMAGING EMBL-NODE

Node contact: Rainer Pepperkok,
EuBI-EMBL-Node@embl.org

Website: www.eurobioimaging.eu/nodes/advanced-light-microscopy-facility-embl



HIGHLIGHTS

- Several new technologies were incorporated: Zeiss Gemini SEM with Gatan 3View for 3D volume CLEM workflows (EMCF), Nikon A1R HD25 resonant confocal scanner with large field of view and integrated automation capabilities, enabling tracking and time-lapse acquisition of moving animal (Nematostella, ALMF), Olympus iXplore SPIN SR spinning disk with 2 sCMOS cameras and SORA SR module enabling fast confocal imaging (ALMF)
- We contributed to a number of SARS-COV-2 research papers (see p. 54)
- Staff member, Christian Tischer, received the prestigious Chan Zuckerberg Initiative Imaging Scientists grant



3

FACILITIES



59,948

USAGE HOURS



17

STAFF INVOLVED



11

EXTERNAL TRAINING COURSES

FINLAND FINNISH ADVANCED LIGHT MICROSCOPY NODE

Node contact: Camilo Guzmán,
contact-FiALM@eurobioimaging.fi

Website: www.eurobioimaging.fi/FiALM



HIGHLIGHTS

- One of the highlights was the Node upgrade, incorporating the High Content Imaging and Analysis Unit (FIMM-HCA) at the Institute for Molecular Medicine Finland (FIMM), at the University of Helsinki, Finland. This upgrade allows us to offer new expertise in High-Throughput Microscopy.
- New technologies were also incorporated such as Coherent Anti-stokes Raman Scattering (CARS), Traction Force Microscopy (TFM) and Atomic Force Microscopy (AFM, this as proof of concept).
- Our Node also made pioneer work to provide remote access to our users that could not travel due to the pandemic situation in 2020.



6

FACILITIES



60,000

USAGE HOURS



35

STAFF INVOLVED

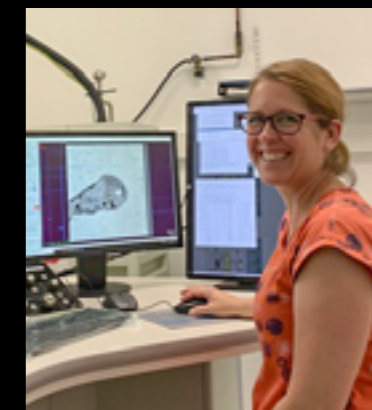


21

EXTERNAL TRAINING COURSES

“ Being part of Euro-Biolmaging means being able to network easily with more imaging facilities throughout Europe and develop workflows together using different imaging modalities.

- Rachel Mellwig,
Operations Manager,
EMBL Electron Microscopy Core Facility



“ Being part of Euro-Biolmaging means being a member of an exquisite family of imaging facilities across Europe. It allows users to find the facility that suits them best, but also improves interactions between Nodes. Euro-Biolmaging initiates a new era in imaging.

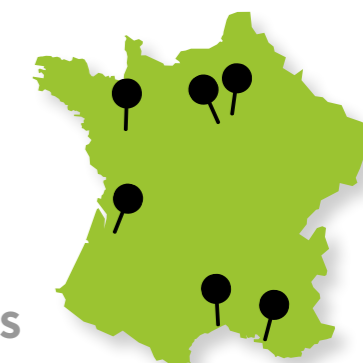
- Prof. Dr. Marc A.M.J. van Zandvoort,
AMMI Maastricht Node Coordinator,
University of Maastricht



FRANCE FRANCE BIOIMAGING NODE

Node contact: contact@france-bioimaging.org

Website: www.france-bioimaging.org



HIGHLIGHTS

- France Biolmaging is broadening its technical and scientific expertise offer with the integration in 2020 of the Bretagne-Loire Node whose service offer is focused on microscopy for preclinical research.
- France Biolmaging is offering to Euro-Biolmaging users a waiver of the costs of instrument access (up to 750€ per week) on its facilities.
- In 2020, France Biolmaging strengthened its communication outreach with the launch of its Twitter account @Fr_Biolmaging and of the new edition of the France Biolmaging newsletter.
- France Biolmaging was allocated a new 5-year grant in 2020 (3,2M€).



24

FACILITIES



>350

SET UPS



>300

STAFF INVOLVED



28

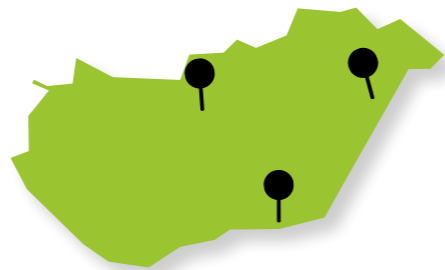
EXTERNAL TRAINING COURSES

HUNGARY

CELLULAR IMAGING HUNGARY

Node contact: Szöllősi János
szollo@med.unideb.hu

Website: www.eurobioimaging.eu/nodes/cellular-imaging-hungary



HIGHLIGHTS

- SPIM-FRET-FCCS instrument was acquired from DKFZ (Heidelberg). This is a unique instrument for 2D mapping of molecular (co)mobility by FCCS and proximity by FRET.
- Earlier instrument acquisitions (TCSPC microscope, FLIM) resulted in the first publications in JBC, Anal Chem, Front Cell Dev Biol, etc.
- Our strengths & expertise include: Lifetime- and intensity-based FRET imaging, FCS/FCCS, Differential polarization LSM, re-scan LSM, ultrafast multiphoton microscopy applied to live neuron imaging, optical tweezers.



HIGHLIGHTS

- **Naples:** The service requests of Euro-BioImaging were attended to by receiving the samples from users by post. Facility personnel processed the samples, acquired and analysed the images and sent the data to the users.
- **Milan:** All the workstations with the sw for image analysis were made available online. Service activity was offered remotely. Several events (Schools, courses etc.) were postponed or organized online. We introduced an Image analysis service.
- **Florence:** Important results have been confirmed in the 3D reconstruction of brain and heart samples from humans and mice using clearing techniques and in the observation of mouse and zebrafish brain functions, as well as real-time multi-spectral detections with a fiber probe. 11 publications.

ITALY

MMMI - MULTI MODAL MOLECULAR IMAGING ITALIAN NODE

Node contact: Enzo Terreno,
enzo.terreno@unito.it

Website: www.mmmi.unito.it



HIGHLIGHTS

- The portfolio of preclinical imaging instrumentation offered by MMMI Node has been implemented with a new 7T MRI scanner (with 1H cryoprobe), a trimodal PET/SPECT/CT imager, and a dual NIRF/BLI X-ray imager with a total investment of 2.2 M€.
- SDN facility performed imaging analysis of low dose CT scans from patient affected by COVID 19.
- The mouse insert hotel for PET-CT simultaneous acquisitions (4 mice) purchased at the end of 2019 was put into operation in 2020: setting of acquisition, reconstruction and data quantification protocols.
- We have built a new atlas toolbox for mouse brain quantification compatible with SPM analysis and Allen brain atlas common coordinate framework.
- The activities within the MMMI Node have been disseminated in several meetings at national level.

ITALY

ADVANCED LIGHT MICROSCOPY ITALIAN NODE

Node contact: Seetharaman Parashuraman,
raman@ibbc.cnr.it

Website: www.eurobioimaging.eu/nodes/advanced-light-microscopy-italian-node

ITALY

PHASE CONTRAST IMAGING FLAGSHIP NODE TRIESTE

Node contact: Giuliana Tromba,
giuliana.tromba@elettra.eu

Website: www.eurobioimaging.eu/nodes/phase-contrast-imaging-flagship-node-trieste



HIGHLIGHTS

- In 2020, we implemented remote experiments for the first time. Main achievements: improvement of the experimental set-up control system with a better user interface, implementation of an automatic system for CT set-up alignment, "remotization" of all the workstations handling the data acquisition and data reconstruction, set-up of continuous Zoom sessions for interaction with users during remote experiments.
- The pandemic forced the Node staff and the users to organize the experiment more efficiently, from sample preparation, to the experiment phase to the final data reconstruction and the return shipment of samples.



4

FACILITIES



6

STAFF INVOLVED



12,000

USAGE HOURS



0

EXTERNAL TRAINING COURSES



5

FACILITIES



18

STAFF INVOLVED



72,278

USAGE HOURS



2

EXTERNAL TRAINING COURSES



8

FACILITIES



25

STAFF INVOLVED



1,680

USAGE HOURS



1

EXTERNAL TRAINING COURSES



1

FACILITIES



2

STAFF INVOLVED



1,000

USAGE HOURS



3

EXTERNAL TRAINING COURSES

NETHERLANDS

CHALLENGES FRAMEWORK FLAGSHIP NODE

Node contact: Bram van Ginneken, (bram.vanginneken@radboudumc.nl)
Ajay Patel (ajay.patel@radboudumc.nl),
James Meakin (james.meakin@radboudumc.nl)

Website: www.grand-challenge.org



HIGHLIGHTS

- Communication activities: since 2020 we are publishing blog posts on the website about new features, developments and instructions for node users.
- Strengths & Expertise: In March 2020 it was hypothesized that CT imaging could play an important role in the diagnosis and assessment of COVID-19, the Dutch Radiological Society rapidly proposed a standardized assessment scheme for CT scans of patients with suspected COVID-19 called CO-RADS. We developed online training tools to teach radiologists how to assess a CT scan using CO-RADS.



1

FACILITIES



40,262

USAGE HOURS



5

STAFF INVOLVED



N.A

EXTERNAL TRAINING COURSES

NETHERLANDS

CORRELATIVE LIGHT ELECTRON MICROSCOPY (CLEM) DUTCH FLAGSHIP NODE

Node contact: Judith Klumperman
J.Klumperman@umcutrecht.nl

Website: www.cellbiology-utrecht.nl



HIGHLIGHTS

- At LUMC the purchase of a Talos Arctica cryo-EM has enabled a new cryo-CLEM pipeline. Important data were obtained with cryoEM of Sars-2 coronavirus, showing a molecular pore in replication organelles.
- At UMCU the throughput of on-section CLEM was greatly improved. It now allows quantitative studies on the distribution of fluorescent labeled proteins at ultrastructural resolution. In addition a novel workflow for live-cell CLEM using 3D confocal fluorescence and FIB-SEM was developed.
- At UMCG the Multibeam FAST-EM developments are ongoing, and a national team is in place for the pilot phase for Data management for Cellular EM.



3

FACILITIES



22,200

USAGE HOURS



8.6

STAFF INVOLVED



3

EXTERNAL TRAINING COURSES

NETHERLANDS

ERASMUS OIC - ADVANCED LIGHT MICROSCOPY ROTTERDAM NODE

Node contact: Gert-Jan Kremers
G.kremers@erasmusmc.nl

Website: www.erasmusoic.nl



HIGHLIGHTS

- Starting in 2019 Luxendo InViSPIM lightsheet, Leica SP8 TauSTED, Leica SP8 equipped with 266 and 355 UV-laser for DNA damage, Leica Stellaris 5 LIA, Leica SP8LIA in radioactive lab, Metafer slide



1

FACILITIES



19,500

USAGE HOURS



7

STAFF INVOLVED



1

EXTERNAL TRAINING COURSES

NETHERLANDS

FACILITY OF MULTIMODAL IMAGING - AMMI MAASTRICHT

Node contact: Marc A.M.J. van Zandvoort,
mamj.vanzandvoort@maastrichtuniversity.nl

Website: www.eurobioimaging.eu/nodes/facility-of-excellence-in-imaging---alm-and-molecular-imaging-node-maastricht



HIGHLIGHTS

- Due to Corona and the consequent travel ban, there was not much external activity. We therefore focused mostly on internal users in all facilities.
- We established several online courses (e.g. AI4imaging, MMM2021).
- We also focused on the extension of our Node with Mass Spectroscopy Imaging (MSI).



1

FACILITIES



2

EXTERNAL TRAINING COURSES

NETHERLANDS HIGH THROUGHPUT MICROSCOPY DUTCH FLAGSHIP NODE

Node contact: Sylvia Le Dévédec
s.e.ledevedec@lacdr.leidenuniv.nl

Website: www.eurobioimaging.eu/nodes/high-throughput-microscopy-dutch-flagship-node



HIGHLIGHTS

- The two sites successfully concretized their partnership through the creation of a high content screening platform dedicated for cancer research named ScreeninC. Financial support is provided by the Dutch Cancer Research foundation to support financially external Dutch users to conduct their screen at the node.
- Furthermore both sites successfully completed several screens using either genetic or compound libraries which were published in several journals.
- Related to the management of the screening data, one of the sites successfully deployed the OMERO database and is very active in creating dedicated work flows in order to ease the publication in public repositories.



2
FACILITIES



13,000
USAGE HOURS



4
STAFF INVOLVED



0
EXTERNAL TRAINING COURSES

NETHERLANDS POPULATION IMAGING FLAGSHIP NODE ROTTERDAM

Node contact:
population.imaging@gmail.com

Website: www.populationimaging.eu



HIGHLIGHTS

- HPC facilities were expanded with GPU's to facilitate large scale training and application of Deep Learning models. Started working towards a federated image analysis infrastructure. XNAT will be used as a central medical imaging storage in the H2020 EuCanImage project.
- Number of projects, users, subjects and imaging sessions on the XNAT archive: 212 projects, 18446 subjects, and 52382 imaging sessions, 413 users



1
FACILITIES



1,400
USAGE HOURS



15
STAFF INVOLVED



5
EXTERNAL TRAINING COURSES

NETHERLANDS PRECLINICAL IMAGING CENTRE (PRIME) - MOLECULAR IMAGING DUTCH NODE

Node contact: Amanda Kiliaan (amanda.kiliaan@radboudumc.nl),
Wilma Janssen (wilma.janssen@radboudumc.nl)

Website: www.radboudumc.nl/en/research/radboud-technology-centers/imaging/preclinical-imaging-center



HIGHLIGHTS

- Application new PET/ SPECT instruments participation data management/communication working group.
- Ex-vivo sampling human tissue on 11,7T /7T MRI scanners*.
- A new pre clinical cardiac imaging center with in vivo MRI measurements available in PRIME.
- Combination of imaging facilities with fully equipped behaviour rooms.
- * PMID: 33721766, PMID: 31219996, PMID: 33156126



1
FACILITIES



1,500
USAGE HOURS



7
STAFF INVOLVED



4
EXTERNAL TRAINING COURSES

NETHERLANDS THE VAN LEEUWENHOEK CENTER FOR ADVANCED MICROSCOPY (LCAM) - FUNCTIONAL IMAGING FLAGSHIP NODE AMSTERDAM

Node contact: Mark Hink,
m.a.hink@uva.nl

Website: www.lcam.nl



HIGHLIGHTS

- LCAM has become a EuroBioImaging Node for Functional Imaging. We installed a Leica Stellaris 8 system and entered a new collaboration agreement with Leica to develop on-demand imaging tools for large-scale screening.
- We completed our first functional-imaging screen, a FLIM-screen for cAMP regulating enzymes. Following the installation of a Digital Light Sheet and a Falcon FLIM setup we started to build and implement an easy-to-use pipeline for demarcation and analysis of features in biological images powered by state-of-the-art neural networks.



3
FACILITIES



38,235
USAGE HOURS



10.2
STAFF INVOLVED



0
EXTERNAL TRAINING COURSES

NETHERLANDS

WAGENINGEN IMAGING AND SPECTROSCOPY HUB (WISH) - ALM AND MOLECULAR IMAGING NODE WAGENINGEN

Node contact: Johannes Hohlbein, johannes.hohlbein@wur.nl

Website: [www.eurobioimaging.eu/nodes/wageningen-imaging-and-spectroscopy-hub-\(wish\)-alm-and-molecular-imaging-node-wageningen](http://www.eurobioimaging.eu/nodes/wageningen-imaging-and-spectroscopy-hub-(wish)-alm-and-molecular-imaging-node-wageningen)



3
FACILITIES



4
STAFF INVOLVED



20,000
USAGE HOURS



50
EXTERNAL TRAINING COURSES

HIGHLIGHTS

- In 2019/2020, we added a Leica Multiphoton (Leica SP8Dive, FLIM) and a Raman microscope (Witec Alpha300R+) to our portfolio. A Yokogawa-Nikon Spinning Disk Confocal System received a 85,000€ upgrade including a CMOS camera, new lasers, alignment box and laser safety electronics. Recent highlights include the use of imaging to determine forces acting in plants (www.eurobioimaging.eu/news/understanding-how-mechanical-forces-act-in-plant-cells/).

NORWAY

NORMIC OSLO - ADVANCED LIGHT MICROSCOPY NODE OSLO

Node contact: Oddmund Bakke, oddmund.bakke@ibv.uio.no

Website: www.mn.uio.no/ibv/english/research/infrastructure/facilities/life-science/imaging/normic



1
FACILITIES



5
STAFF INVOLVED



12,560
USAGE HOURS



1
EXTERNAL TRAINING COURSES

HIGHLIGHTS

- New high-tech equipment purchased in 2020 includes: A NIKON SoRa High Content Imaging system - 2 of 3 modules are installed, while installation of the super-resolution mode is delayed due to COVID, a NIKON Image analysis workstation for High content imaging analysis, a custom build ASI single-objective light-sheet microscope, a NIKON Ti2 epifluorescence microscope for cell observation.

NORWAY

NORMOLIM, NORWEGIAN MOLECULAR IMAGING INFRASTRUCTURE

Node contact: Olav Haraldseth, olav.haraldseth@ntnu.no

Website: www.eurobioimaging.eu/nodes/normolim-norwegian-molecular-imaging-infrastructure



3
FACILITIES



8.4
STAFF INVOLVED



2,534
USAGE HOURS



2
EXTERNAL TRAINING COURSES

HIGHLIGHTS

- All three sites have invested in hybrid micro PET-MR systems. NORMOLIM work constantly to establish new and particular specialities and expertise. Some successful experiments with new technology applications carried out in 2020 were: combined PET and MR techniques for imaging of cardiac fibrosis, image guided surgery in combination with fluorescent probes, and focused ultrasound combined with MR cryo-probe to improve drug delivery to the tissue as well as enabling drugs to cross the Blood Brain Barrier.

“ Being a member of Euro-BioImaging gives us access to a network of great experts in the field of bioimaging and in particular in the field of imaging data management which we use avidly every day.



- Sylvia Le Dévédec,
Core Facility Manager,
High Throughput Microscopy Dutch Flagship Node

FINANCIAL INFORMATION

INCOME & EXPENSES

Euro-Biolmaging ERIC is financed by the annual membership contributions from the ERIC members. Due to the establishment of the ERIC in late 2019, Euro-Biolmaging ERIC Board decided that the membership contributions for 2019 are 50% of the first year annual contributions. For 2020, the contributions are according to the full annual contribution. 'Income', shows the total membership contributions for the financial period (Oct 29, 2019 - Dec 31, 2020). Euro-Biolmaging Statutory Seat

collects the annual membership contributions of Euro-Biolmaging ERIC. 'Budget transfer' indicates the agreed budget shares transferred from the Euro-Biolmaging Statutory seat to the Bio-Hub and Med-Hub sections, respectively. Together, the Statutory seat, the Bio-Hub and the Med-Hub form the Euro-Biolmaging Hub. Funds available at each Hub section are indicated separately.

INCOME (€)	STATUTORY SEAT	BIO-HUB	MED-HUB	THROUGH THE ERIC
Membership Contributions Oct 29, 2019 - Dec 31, 2020	2,019,506			2,019,506
Budget Transfer (Bio-Hub)	-753,482	753,482		
Budget Transfer (Med-Hub)	-309,795		309,795	
Available funds	956,229	753,482	309,795	2,019,506

'Expenses' show the actual realized expenses by cost category during the financial period at each Euro-Biolmaging Hub Section. 'Unspent funds' indicate the funds that are available after the expenses for the financial period.

EXPENSES (€)	STATUTORY SEAT	BIO-HUB	MED-HUB	THROUGH THE ERIC
Human resources		242,898	237,044	479,942
External services (human resources*)	186,198			186,198
Travel		18,432	7,140	25,572
Services	1,992	11,932	1,992	15,917
Financial and administration expenses	2,565			2,565
Other		72,869	56,440	129,309

* Human resource expenses incurred at the University of Turku and billed to the Euro-Biolmaging ERIC Statutory Seat

SURPLUS FUNDS (€)	STATUTORY SEAT	BIO-HUB	MED-HUB	THROUGH THE ERIC
Oct 29, 2019 - Dec 31, 2020	765,474*	407,351	7,179	1,180,005

* Includes 25,051 Euros of Med-Hub surplus funds from 2019

Euro-Biolmaging benefits from funding from a number of European projects in which it has been involved since the Interim phase, prior to becoming an ERIC. The external funding sources at each Euro-Biolmaging Hub section were as indicated in the table below.

EXTERNAL FUNDING SOURCES (€)	STATUTORY SEAT	BIO-HUB	MED-HUB	THROUGH THE ERIC
ERIC Forum	3,050	1,950		
EOSC Life	4,614	181,237	21,804	
CORBEL		388,164*		
Host premium contribution: Euro-Biolmaging ERIC HQ - launching of operations**	441,512			
In-kind		0.5 FTE (EMBL)	67,817	

* Includes funding for CORBEL user projects in WP4

** For the period of 2019-2021



“ Great to be part of Euro-Biolmaging to share experiences and learn from others in new endeavours ranging from new projects, machines, management and data handling in a united manner.

- Judith Klumperman,
Professor of Cell Biology,
UMC Utrecht, Correlative Light Electron
Microscopy (CLEM) Dutch Flagship Node

“ It's important to be part of Euro-Biolmaging, it enhances our visibility and it contributes to our open-access and open science policy.

- Prof. Dr. TWJ Gadella,
Van Leeuwenhoek Center for Advanced
Microscopy (LCAM) - Functional Imaging
Flagship Node Amsterdam



A new beacon lights up the long winter nights at the BioCity building in Turku, Finland. Finland hosts Euro-Biolmaging ERIC, and the Finnish section of the Euro-Biolmaging Hub is located in this building.

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This document is a tribute to your remarkable resilience, energy and passion for imaging even in a very challenging first year of operations.

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