



Euro-Biolmaging

European Research Infrastructure for Imaging Technologies in Biological and Biomedical Sciences

WP3

Process Plan

Task 3.1

Vision of Euro-Biolmaging

Deliverable 3.1

Update of Vision of Euro-Biolmaging

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Deliverable 3.1 Update of Vision of Euro-Biolmaging**Executive Summary**

The vision of Euro-Biolmaging was described in the public document (position paper) of the Euro-Biolmaging Vision Paper. D 3.1 presents the text of this paper, which was-in close consultation with stakeholders- produced to present the opportunity, importance, benefit, substance and implementation of Euro-Biolmaging for key stakeholders such as Member States, funding agencies and decision makers.

Graphical layout and production of hardcopies was carried out by the Euro-Biolmaging work packages WP1 and WP5. A pdf of the Vision Paper was placed on the project website (<http://www.eurobioimaging.eu/>; News and Media Section) for download.

VISION PAPER

The mission of Euro-Biolmaging is to provide a clear path of access to a complete range of essential imaging technologies for every biologist and biomedical scientist in Europe. This vision paper

Added value for Europe

ACCESS TO IMAGING TECHNOLOGIES: Euro-Biolmaging will allow scientists from your country to access a broad range of cutting edge imaging technologies they require for their valuable biological or medical research. Euro-Biolmaging will guarantee that your investment in imaging infrastructure is used in the most cost-effective and efficient way by applying Euro-Biolmaging quality standards in management, access and service of imaging facilities.

TRAINING: Standardized and high quality education of tomorrow's scientists in applying advanced imaging technologies to study the single cell to the entire human being will be one of the major challenges in biology and medicine. Specific training programmes at Euro-Biolmaging facilities will complement national efforts in education and Member States will benefit from an increase in expertise.

IMAGING DATA: Biological and biomedical imaging will become one of the major data producers in the future and researchers are facing unprecedented challenges concerning image data management and analysis. The Euro-Biolmaging infrastructure will offer platforms for storing, sharing and processing biological and medical imaging data on a large scale.

ECONOMIC VALUE: Implementing the Euro-Biolmaging infrastructure with its nodes in different regions of Europe will bring new job opportunities and perspectives for researchers, engineers, administrative and related staff. These positive effects will also radiate into the surrounding areas of technology development and services.

EUROPEAN RESEARCH AREA: Euro-Biolmaging closely cooperates with all Biological and Medical Sciences Research Infrastructures to overcome the fragmentation of the European research landscape.

What is Biological and Biomedical Imaging?

For medical research, imaging includes Magnetic Resonance Imaging (MRI), X-ray Computed Tomography (CT), but also many other imaging technologies. For example, better detection of occluded blood vessels to improve the prediction of heart attack, earlier detection of growing tumours to improve the success rate in the fight against cancer, or monitoring the normal development of a foetus during pregnancy are all dependent on biomedical imaging. Medical imaging can provide insight into the function and metabolism of organs allowing the visualization of the effectiveness of new targeted therapies, e.g. in cancer patients. In biology, visualizing cells and tissues by light and electron microscopy has led to more discoveries than any other technology. We wish to see how things look. By seeing how they look, function can be extracted and comparison of how healthy cells and tissues look in comparison to their pathological state provides extraordinary insight into the molecular nature of disease. Imaging technologies are thus the central technology platform that drives fundamental research in most disciplines within the biological and biomedical sciences.

What is Euro-Biolmaging?

Euro-Biolmaging (www.eurobioimaging.eu) is a large-scale pan-European research infrastructure project on the ESFRI Roadmap¹. Euro-Biolmaging will deploy a distributed biological and biomedical imaging infrastructure in Europe in a coordinated and harmonized manner. By providing access to and training in imaging technologies, and by sharing of best practice and image data, Euro-Biolmaging will become an engine that will drive European innovation in imaging research and technologies.

Who is behind Euro-Biolmaging?

Broad European support. Euro-Biolmaging has a strong and growing supporter base. The consortium comprises 39 beneficiaries from 15 European Member States and associated countries, more than 180 associated partners from 26 European Member States and associated countries. Euro-Biolmaging is formally endorsed by over 200 universities, research councils, funding bodies, ministries, and industry partners. Euro-Biolmaging is jointly headed by the two Scientific Coordinators Jan Ellenberg (EMBL) and Stefan Schönberg (EIBIR) and administratively coordinated by EMBL.

Shaping national into European communities. The Euro-Biolmaging infrastructure project is the driving force to organize the European biological and biomedical imaging. The first step in this process is the self-organization of national imaging infrastructure providers in the Member States to define their needs and capabilities. The second step is to form pan-European community of imaging infrastructure providers from the Member States that supports the Euro- Biolmaging principles of coordination and harmonized infrastructure deployment, open access and highest training standards.

Why Euro-Biolmaging?

¹ ESFRI, the European Strategy Forum on Research Infrastructures, is a strategic instrument to develop the scientific integration of Europe and to strengthen its international outreach. The competitive and open access to high quality Research Infrastructures supports and benchmarks the quality of the activities of European scientists, and attracts the best researchers from around the world. (Source: ESFRI website of the European Commission <http://ec.europa.eu/research/infrastructures/>)

- ✓ *Impact.* Euro-Biolmaging will have a profound impact on the European Research Area, European health and quality of life as well as European competitiveness in key industry sectors (imaging technologies, biotechnology, medical technologies, pharmaceutical industry). Euro-Biolmaging will maximize its ultimate impact through continuous evaluation.
- ✓ *Better return on investment for biological and biomedical imaging platforms.* A typical medical MRI instrument may be of the order of €2 million. A large cutting edge research ultra-high field MRI may cost upwards of €30 million. The latest super resolution light microscopes and state-of-the-art electron microscopes cost of the order of €2-5 million each. While a single university department may afford one or two of these instruments, not even the best-funded institutions can any longer afford the complete range of imaging technologies they need in order to remain at the forefront of their respective research field. It is therefore critical that a plan is developed for sharing the costs of deployment and providing open access to such expensive but critically important technologies in order to obtain a better return on investment. This is all the more important in times of financial austerity. By realizing the benefits of a coordinated deployment, Euro-Biolmaging will decrease expenditures and optimize cost-effectiveness. Rather than having to fund only individual request for a new imaging instruments, funding agencies will have the opportunity to supply the much lower partial costs of accessing shared Euro-Biolmaging to ensure access to imaging technologies.
- ✓ *Brain gain instead of brain drain.* Many Member States have recently had to reduce their research funding programs, with some Member States making cuts as high as 20%. The consequence of such cuts will be devastating to research and threatens to cause a new generation of brain drain, because the best young scientists will quickly move to the best international environment for their research. Euro-Biolmaging will make sure that Europe continues to offer cutting-edge infrastructure in biological and biomedical imaging to the next generation of scientific leaders and allow Europe to attract the best talent from other countries rather than losing its own.
- ✓ *Instant Access.* The time required to establish advanced and powerful imaging platforms is substantial. For example, building an ultra-high-field MRI suite can take years for the largest research magnets. Configuring, ordering, installing and putting into routine data production takes on the order of 6-12 months for the latest research level laser scanning microscope and setting up a high throughput microscopy pipeline can take years. Euro-Biolmaging will allow researchers instant access to imaging instrumentation not available at their home institution.
- ✓ *Service and training by the leading experts in the field.* Top-level expertise for many imaging techniques is hard to find and takes years of training to acquire. Euro-Biolmaging will have coordinated training programs for its infrastructure providers to ensure that the imaging technologies are supported and reinforced by world-leading expertise. Sharing expertise extends to shared best practices across Euro-Biolmaging facilities, as well as repositories of methods, tools, protocols, software

applications and image data that will make expertise widely available to the research community.

- ✓ *Better image data storage, sharing and analysis.* Image data is recorded across different biological scales, from sub-cellular structures to organs and in different biological models, from single cultured mammalian cells, via mouse to human tissues. The maturity of the ways image data is stored and used varies greatly amongst the research communities. The Euro-Biolmaging infrastructure will offer platforms for storing, remotely accessing, sharing and post-processing biological and medical imaging data on a large scale. The definition of standards on data storage, protection and analysis of images by Euro-Biolmaging will enable scientists to share image data between different scientific communities from different countries and to reuse existing data in light of new scientific questions.
- ✓ *Defragmentation, integration, and collaboration.* Different geographical areas of Europe have vastly different qualities of research infrastructure. Europe will under exploit much of its potential if a large percentage of its research community do not have access to state-of-the-art technologies and are therefore not competitive. Euro-Biolmaging will address this challenge and enable scientists coming from regions of less developed research infrastructure, to access cutting edge imaging technologies, expertise and training either by going to neighbouring regions or by setting up new infrastructure according to Euro-Biolmaging standards regionally. Our strong cooperation with the other 12 Biological and Medical Sciences ESFRI Research Infrastructures will complement these activities and together shape and strongly support the European Research Area.
- ✓ *. A platform for translational research* The scientific communities of basic biological, molecular and medical imaging work closely together in Euro-Biolmaging to integrate imaging technologies employed in basic research with those applied in medical research. Such cooperative facilities will be ideal platforms for translational research and bring innovative new imaging technologies from bench to bedside.

When will Euro-Biolmaging be launched and its benefits realized?

- ✓ *Preparatory Phase: 2010-2013.* A construction plan for a pan-European research infrastructure for biological and biomedical imaging technologies is developed. The legal, governmental and financial framework for implementation of the Euro-Biolmaging infrastructure is being established. Costs are €7.9m with €5.2m funded by an EU Framework contract.
- ✓ *Construction Phase: 2014-2017.* The Euro-Biolmaging infrastructure will be deployed by either major upgrades of existing or newly constructed facilities funded mainly by Member States. Total anticipated costs are of the order of several €100m, but due to the modular nature of Euro-Biolmaging infrastructure nodes, investment can be scaled to national needs and capabilities.
- ✓ *Operational Phase: 2017 onwards.* Euro-Biolmaging will provide training programmes in and access to state-of-the-art imaging technologies in a distributed infrastructure of imaging facilities throughout Europe. Operating costs will be approximately 20% of

construction cost per year to ensure continuous technology upgrades and the provision of highly trained staff. Quality of service will be continuously reviewed. Funding mechanisms through a mix of European and Member State measures will be laid out in the Preparatory Phase Business Plan.

How will the goals of Euro-Biolmaging be achieved?

Euro-Biolmaging Eligibility Criteria. An important element of the implementation plan for the Euro-Biolmaging infrastructure, are eligibility criteria for imaging facilities that wish to become part of Euro-Biolmaging. The overarching principles for these criteria will be technical and scientific excellence, open access to imaging technology, and highest quality service staff and user training. Already during the Preparatory Phase, Euro-Biolmaging proof-of-concept studies are testing criteria and guidelines for best practice.

Certificate of Excellence. Euro-Biolmaging will award research infrastructures that meet the highest quality standards a certificate of excellence. In order to achieve and maintain this certification, research infrastructures will be evaluated according to defined quality criteria. Obtaining the Euro-Biolmaging certificate of excellence is expected to have a strong influence on funding decisions by national authorities and funding agencies.

Operational Models. Euro-Biolmaging will develop European operational models that can be adjusted to the legal and administrative environments of the different Member States. Already existing funding mechanisms and measures on various levels (local, regional, national etc.) will be taken into consideration to implement Euro-Biolmaging.

How can you support Euro-Biolmaging?

Become involved now. The Euro-Biolmaging Consortium invites ministries, research councils, and all national as well as regional funding agencies from the ESFRI Member States to actively participate in the Preparatory Phase to help shape the legal and financial framework for the infrastructure. The earlier you become involved the easier it will be to make sure Euro-Biolmaging serves your needs and its Business Plan matches your expectations and capabilities. At the same time, Euro-Biolmaging is actively engaging with policy makers at the European level to advocate sustainable investment into Europe's future imaging infrastructure.

Specifically we invite you to join the Euro-Biolmaging Working Groups "Legal, Governance and Ethical Issues" and "Finance Planning". These groups already involve representatives coming from research councils and funding organizations from different ESFRI Member States.

Funding models tailored for you. The modular nature of Euro-Biolmaging as a distributed infrastructure with complementary imaging technologies, allows attractive investment models tailored to the national needs and capabilities. The Euro-Biolmaging Business Plan will make specific investment models, funding measures as well as example budgets available to the national funding agencies. This provides different options, for how best to support imaging infrastructure and open access facilities. Given the prominence of biological and biomedical imaging on most national infrastructure roadmaps, we anticipate that a significant part of

national budgets of European Member States will be earmarked for biological and biomedical imaging facilities. The specifics as well as the amounts will be defined in detailed consultation and close partnership with the national funding agencies. Wherever possible, the investment models will take European funds for infrastructure in convergence regions into consideration.

Submit a Letter of Intent to become an Associated Partner of Euro-Biolmaging.

If your institution wants to express its interest in the Euro-Biolmaging project we invite you to submit a Letter of Intent at any time. Please find respective templates at www.eurobioimaging.eu.

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