Euro-BioImaging ERIC:

Procedure for technology identification and evaluation for inclusion into Euro-BioImaging

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1. Introduction

For the last decades, the fields of biological and biomedical imaging have been characterized by continuous technological innovation. Most major technological advances in other scientific research fields (photonics, physics, chemistry, computing) found their way quickly into instrumentation or procedures applicable to biological and biomedical imaging research. This provides exciting opportunities for advances in the life sciences, but also brings with it the continuous need for adaptation of new methods and new technologies.

For a technology-driven research infrastructure like Euro-BioImaging ERIC this poses challenges in remaining at the technological front of the field while guaranteeing reliable imaging technology access that leads to high quality research. For this, workflows are needed that identify new technologies early on, assess their relevance to the biological and biomedical imaging fields and the feasibility of access provision, and regulate their inclusion into the research infrastructure.

At the Euro-BioImaging Nodes new technologies shall continuously become accessible to the visiting users, while ensuring that access to cutting-edge imaging is both reliable and supported. For putting this into practice, the following procedure has been defined in Euro-BioImaging ERIC that:

1. Identifies new technologies based on community input (=> e.g. via a continuous online survey on the Euro-BioImaging Web Portal EWP),
2. Assesses technology relevance to the biological and biomedical imaging field and the feasibility of access provision (=> showcasing), and finally
3. Tests their inclusion into the research infrastructure (=> proof-of concept study PCS).

For this purpose, Euro-BioImaging has defined that an imaging technology is regarded as “new” when it is not currently included in the portfolio of technologies offered for Euro-BioImaging user access (the list of technologies at the launch of Euro-BioImaging ERIC is available on the Euro-BioImaging Web Portal at https://www.eurobioimaging.eu/service).

This procedure focuses on new imaging technologies that require assessment of their maturity under open access conditions, before their inclusion into the existing Euro-BioImaging portfolio of imaging technologies. This procedure needs to be seen distinct from technology upgrades at Euro-BioImaging Nodes that can be implemented on existing components of the infrastructure, or technologies that are newly offered at the Node, but have already been assessed by Euro-BioImaging for access provision before.

In summary, Euro-BioImaging distinguishes

- Inclusion of new imaging technologies, which have not been assessed and offered by Euro-BioImaging Nodes before (=> procedure outlined here)
- New offer of previously assessed imaging technology from the Euro-BioImaging technology list at an existing Node, which has not been offered yet by the applying Node (=> “Update of portfolio of imaging technologies at Euro-BioImaging Node”)
- Offering an existing imaging technology on newly acquired instrumentation; or existing instrumentation is upgraded/combined with new hardware/software (e.g. detectors; light source;

software upgrades; etc.), or a new protocol/application for a given technology is developed (=> "Update of portfolio of imaging technologies at Euro-BioImaging Node")

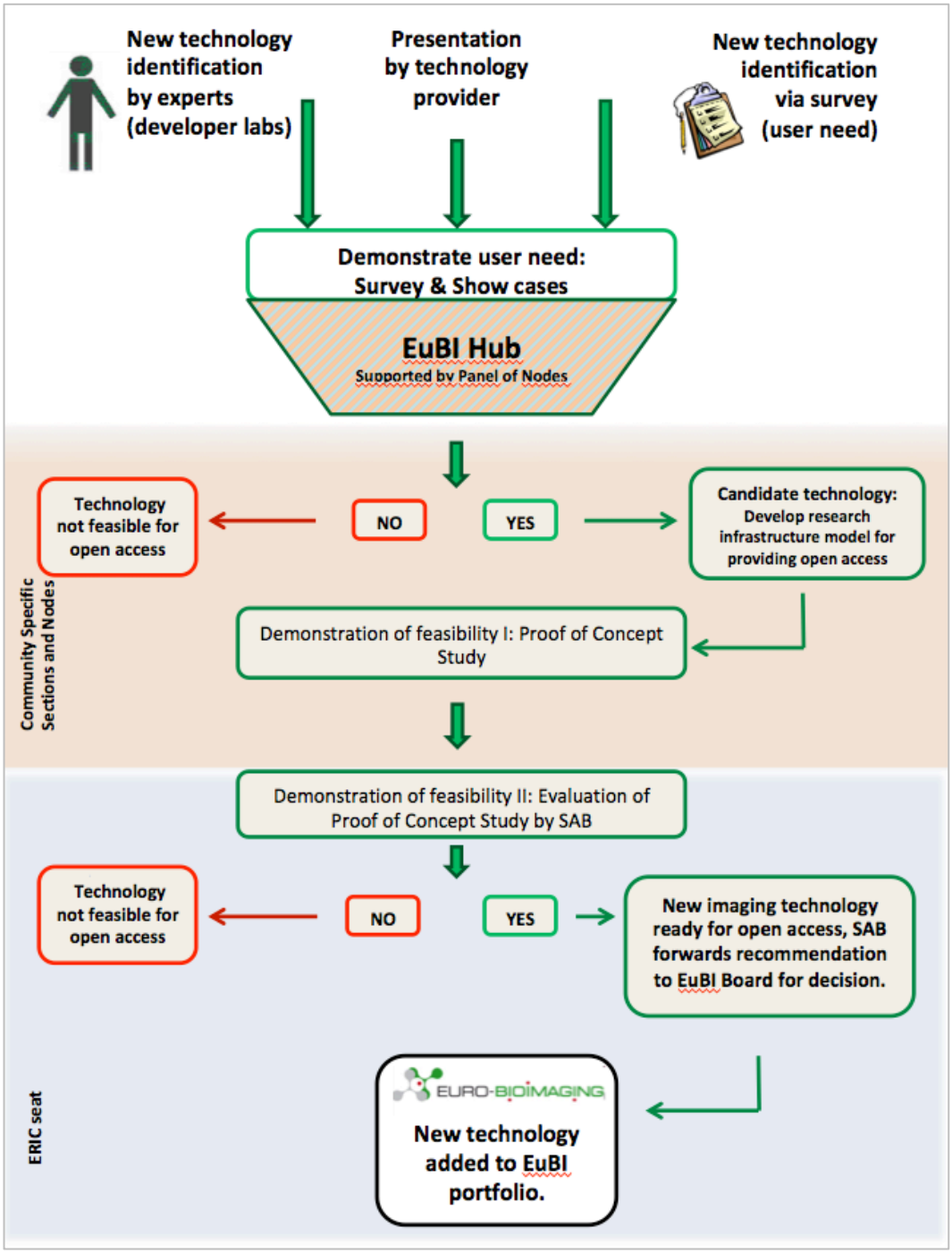

Figure 2 - Overview of new technology identification and inclusion in Euro-BioImaging. The successful procedure includes demonstrated user need and existing infrastructure model that successfully allows for open access to this technology (showcasing); demonstration of feasibility of open access in Euro-BioImaging (PCS); recommendation for inclusion by Scientific Advisory Board; approval by Euro-BioImaging Board.

2. Procedure for technology identification and evaluation for inclusion into Euro-BioImaging ERIC

This procedure deals with the identification of new technologies. The central parts of this procedure have been developed and tested successfully during the Euro-BioImaging Preparatory Phases and Interim Operation and enabled the preparation of the portfolio of imaging technologies for the 1st generation of Euro-BioImaging Nodes.

2.1 Identification of new technologies based on community input

New technologies detection will require input from different sections from the biological and biomedical imaging communities and needs instruments in place that can enable testing of feasibility under open access conditions. Technologies can be brought to the attention of Euro-BioImaging in a continuous process that can have the following components:

- Detection based on user demand or technology pull: This comprises periodical surveys of the user and stakeholder communities.
- Detection by experts in the field or by Euro-BioImaging Nodes.
- Presentation of a new technology by a technology provider (developing lab or company).

From all these groups, information can be provided in a continuously open mechanism via a reporting form on the EWP (www.eurobioimaging.eu).

2.2 Showcasing of new imaging technology

To assess the relevance to the biological and biomedical imaging field and the feasibility of access provision for a suggested new imaging technology, first showcasing of this technology will be invited. The showcase of a new imaging technology shall demonstrate:

- User need and relevance for the biological and biomedical research communities (=> documentation by technology host on successful external user access to this technology; submitted letters of interest from users; relevant research publications associated with this respective technology in general, etc.)
- An operational access model for external users to this technology (=> documentation of access model by technology host).

Based on the showcase experience, the technology provider formulates and tests an operational access model for the given technology that should include a defined service package and the protocols for provision of access. This can to a large extent be developed from the existing guidelines for biological and biomedical imaging technologies that were developed in Euro-BioImaging Preparatory Phases. The

infrastructure model and service package will then be applied and if needed further developed in the proof-of-concept study (see 2.3).

Templates for the documentation are provided for download by Euro-BioImaging on its Web Portal. As soon as completed, the documentation on a showcase can be submitted to the Euro-BioImaging Hub for evaluation. Supported by the Panel of Nodes, the Hub will evaluate and decide if the technology is mature for open access and if user need has been demonstrated sufficiently. If evaluated positively, the technology will be suggested for the proof-of-concept studies at Euro-BioImaging Nodes.

A showcase can be conducted by any technology developer/provider/Node or imaging facility at a public research institution/university in Europe, which is offering the new technology and hosts external users to apply this technology in their research. The showcase is concluded when the host provides the documentation as described above to the Euro-BioImaging ERIC Hub for evaluation. Although (in addition to Euro-BioImaging Nodes) any imaging facility located in a Euro-BioImaging member country as well as in non-member countries can host a showcase, this does not change their status in regards to Euro-BioImaging participation. Participation in Euro-BioImaging is a national decision by each country. If an imaging facility aims to become a Euro-BioImaging Node, they need to communicate with their national representatives for ESFRI research infrastructures, engage the national imaging community, and apply to the next Open Call for Euro-BioImaging Nodes. This engagement process is independent from the showcasing of technologies described here.

2.3 Proof-of-concept study of new imaging technology

For a successful infrastructure operation it is essential that the feasibility of open access and service provision to the new technology is tested with external, naïve users. This will ensure that a new technology is mature enough before inclusion into the Euro-BioImaging research infrastructure.

Technologies with mature access models and user need as demonstrated by their showcasing (see above) will be included in the next round of proof-of-concept studies (PCS) conducted by the Euro-BioImaging ERIC. For the PCS, the Euro-BioImaging Hub will advertise a call for users and invite them for online application via the EWP. The PCS will be conducted in a defined time frame and coordinated by the Euro-BioImaging Hub in the same manner as the usual user access to the Euro-BioImaging Nodes. The PCS will be conducted by those Euro-BioImaging Nodes hosting the new technologies. If the new technology is not available for PCS at any Node, and it has been successfully showcased by a facility which is not a Node, the facility is encouraged to apply to become a Node in the next open call for Nodes. If no such call is reasonably available, the situation will be evaluated by the Hub on a case-by-case basis. The PCS will resemble a concept of ‘new technology under probation’ as part of the typical open access Euro-BioImaging service offer to the research community at large, and users apply to use a technology undergoing PCS in the same way as they would apply to other technologies via the EWP.

The Proof-of-Concept Studies that were executed in the Euro-BioImaging preparatory phase were very successful to evaluate the initial round of technologies that were included in the first open call for nodes (https://www.eurobioimaging.eu/service).

The main requirements to prove feasibility are:

- The technology is mature enough to be made accessible to a broad range of external, naïve users.
- The access possibility is announced in an open call and offered to the selected users based on the scientific merit of the project.
- Existence of a service package and of protocols for physical access and service provision: The offered services are clearly defined for Euro-BioImaging users and the form in which the services can be accessed and executed is established.
- Demonstration of user benefit: This is gauged by the successful execution of the proposed visitor experiment, i.e. execution within the planned timeframe, collection of relevant data that can be used for publication.

These requirements will then be evaluated using a standardized questionnaire provided through the EWP, to be filled by the Node, and feedback from the technology users. The proof-of-concept study will then be evaluated by the Euro-BioImaging Scientific Advisory Board (SAB), which forwards their recommendation to the Euro-BioImaging Board.

In case there is more than one technology eligible for PCS within a given period, testing periods will be synchronized as well as possible. In this way, the open calls can be promoted by Euro-BioImaging more efficiently and more exposure is generated for the test sites. Evaluation of PCS results by the Euro-BioImaging SAB is also facilitated by such coordination.

2.4 Inclusion of a new technology

If positive, the Hub will forward the SAB recommendation on a given technology to the Euro-BioImaging Board for approval, for inclusion of this technology into the Euro-BioImaging technology portfolio. Finally, the Euro-BioImaging Hub will invite Euro-BioImaging Nodes (and new Node applicants in the next Call for Nodes) to offer this technology for open user access in the framework of the Euro-BioImaging research infrastructure. In parallel, the Euro-BioImaging Hub together with the Euro-BioImaging Panel of Nodes will address the training requirements for facility staff and users for the new technology and assess the potential impact of the inclusion of the new technology on other technologies in the portfolio in aspects of possible redundancy and for interoperability inside correlative workflows.