

Euro BioImaging

Preparatory Phase II Project

D8.1 Procedure for implementation of training of facility staff on identified new emerging imaging technologies

Project N.	688945
Project Title	Euro-BioImaging Preparatory Phase II
Project Acronym	EuBI PPII
Associated Work Package	WP8
Associated Task	Task 8.1
Lead Beneficiary (short name)	CRG, FISABIO
Nature	Report
Dissemination Level	Public
Estimated Delivery Date (Grant Agreement, Annex I)	31/08/2016
Actual Delivery Date	25/10/2016
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Funded by the
Horizon 2020
Framework Program
of the European Union

Abstract

For the coordinated implementation and establishment of new emerging imaging technologies in Euro-BioImaging, the facility staff at the EuBI Nodes will need access to training in such new methods or technologies. This will therefore be included in the Euro-BioImaging training portfolio (in collaboration with WP7). The training offer will be modelled on the basis of two identified scenarios, identified as Case 1 and Case 2. Case 1 trainings concern new technologies that can be distributed over many sites inside Euro-BioImaging; Case 2 trainings regard new technologies that because of their technical or logistical requirements can only be offered at a few dedicated sites inside Euro-BioImaging.

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Procedure for the implementation of training of facility staff on identified new emerging imaging technologies

1. Introduction

For the coordinated implementation and establishment of new emerging imaging technologies in the Euro-BioImaging, the staff of participating imaging facilities will need to be in the first line of persons that need to be exposed to and trained in a new method or technology. They are the ones that need to have a complete understanding of the method to provide it to users and in turn to be able to train users in applying it. Facility staff act as important multipliers of know-how and are thus an important link between technology developers and the scientists that will apply the imaging method. They accordingly require access to a set of training possibilities that provide them with the necessary expertise. These need to be defined and coordinated inside

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Euro-BioImaging to provide a standardized service offer also for new technologies. A coordinated approach is especially important in the case of new methods and applications, as these will inevitably be variable in their early stages.

2. Training Formats for New Emerging Imaging Technologies

Distinct training formats offer different levels of exposure that allow a progressive familiarization with the new technology throughout the Euro-BioImaging infrastructure. The following formats can be applied to core facility staff training:

- Seminars: These can provide an initial familiarization with a new method, but lack the possibility of applied training and experience.
- Workshops and training courses: These provide a deeper understanding and practical expertise of the method in a standardized and coordinated manner
- Advanced technology training: More individualized activities aimed at a small group of participants to make them experienced users.
- Training stays at expert sites: These provide the most applied form of training under realistic working conditions.

The training activities for new technologies will be part of the general concept for training of Euro-BioImaging users and also of Euro-BioImaging core facility staff that is currently being developed by Work Package 7 (Technical preparation for coordination of training activities). This includes training for emerging technologies (deliverable 7.3 “Report on the procedure for determination of topics and frequency of CFS training on emerging technologies”).

For reasons of consistency with other topics and deliverables, the term “technology” will be used throughout the document. It should however be understood that a real definition of new developments in imaging fields needs to be more inclusive and must also cover new methods on existing instrumentation (see below cases A vs. B), new combinations of existing technologies or methods (correlative approaches) and new ways of analysis for data taken with existing imaging methods. All these can generate a level of novelty that requires specialized training dedicated to them.

Upon identification of a new imaging technology to be included into the Euro-BioImaging service offer, several cases can apply depending on the character of the new technology. This will determine the training offer. The procedure for identification of new technologies in the fields of biological and medical imaging will be defined in the upcoming deliverable 8.2 and will directly affect this item (as will deliverables 8.3 and 7.3).

The categories of new imaging technologies that affect the training strategy are:

- A. A new imaging method based on existing instrumentation
- B. A new imaging method based on new instrumentation
- C. Imaging technology can be offered in one or a few existing Euro-BioImaging nodes
- D. Imaging technology is offered in a newly created node
- E. Method can only be offered at dedicated sites
- F. Technology is offered by commercial providers
- G. Technology is only available on custom-built instrumentation

The distinctions for instrumentation (A, B) and node existence (C, D), infrastructure requirements (E) and commercial availability (F, G) may apply in different combinations but lead to the following two basic scenarios that affect the selected training offer:

- The new technology can be distributed over many sites inside Euro-BioImaging: **Case 1**
- The new technology is incorporated only at specific sites. For very dedicated instrument-based methods, access will be limited by the instrument and expertise availability not by the knowledge about the method: **Case 2**

All offered activities are a part of the coordinated Euro-BioImaging training activities that are currently being developed in Work Package 7 and therefore are aimed at providing a defined standard of expertise inside the infrastructure and where possible by harmonized training modules. This will be challenging for emerging technologies that keep developing and need frequent assessment of the state of the art and a subsequent adaptation of the training activities. This could initially be done or aided by regular (annual) meetings of a technology committee (watch board) consisting of experts from academia and technology companies and core facility representatives, aimed at scouting for emerging technologies. New technologies will over time become established technologies and can then be handled according to the general training procedures.

3. Training Procedure for New Imaging Technology - Case 1

If the new technology can be distributed inside the infrastructure, Euro-BioImaging will offer training activities for core facility staff at three distinct levels of expertise:

- Initial familiarization: The initial familiarization is provided by seminars and talks that explain the technology and its applications. This will give participants a basic understanding of the method, possible applications and limitations and gives them the ability to consider the new technology for the projects of their users and advise them accordingly. The topics of the seminars should consist of presentations of the method

- by the technology developers and application examples by early users. This level of exposure should be aimed at all Euro-Biolmaging core facility staff in the same and in related fields to ensure a standardized level of understanding inside the infrastructure.
- Practical experience: Initial practical experience can be gained by technology workshops and practical courses. This provides a direct hands-on exposure to the new technology in a coordinated and didactic manner. This level of exposure should apply to Euro-Biolmaging core facility staff in fields directly affected by the new technology and to those that plan to offer the technology.
 - Advanced technology training: The initial practical experience can be supplemented by more individualized training activities that can be considered advanced technology training. These activities are aimed at core facility staff that will offer the technology at their sites. They serve to fully train the participants in the method and to provide a standardized level of expertise for the service offer of the infrastructure. These activities are offered to a small group of participants (max. 10) and could consist of several days of advanced introduction followed by more days of hands-on training. The training would be conducted only at expert sites selected for this activity.

The required set of training activities for a new technology will be decided by the structure responsible for the identification of training activities in Euro-Biolmaging (currently being defined in Work Package 7). Based on the decision, the EuBI Hub will then make a call for training courses and select the activities and sites suitable for the task.

The above defined points “initial familiarization” and “practical experience” can be combined into a single offered activity for this call. They can also be considered separately as this will allow to include them (especially seminars) as components of other larger activities. They should however be clearly distinguished from “advanced technology training”.

To serve their purpose, the training activities need to be fully matched to the requirements given by Euro-Biolmaging for training in new technologies. This does not mean that the activities need to be exclusively open for Euro-Biolmaging core facility staff members as long as their purpose is met. While participant selection will be made by the training organizing site, clear guidelines for selection of participants should be provided to ensure that core facility staff which will need and use the technology will have access to the training.

Additional training options for case 1:

- Depending on the technology requirements and the amount of training needed to guarantee a standardized technology offer, additional training stays of selected core facility staff at expert sites can be included in the training strategy.
- After the initial propagation of a new technology to a number of sites inside Euro-Biolmaging, an experience feedback mechanism for core facility staff can serve to exchange important insights into the technology and to provide a means to keep the

approaches harmonized and standardized over several sites. This can be easily implemented as a satellite activity of an established meeting in the field.

Euro-BioImaging Industry Board and involvement of commercial providers:

If a new technology is already commercially available, the training can incorporate existing company mechanisms for the introduction of new instruments to the market or enable other forms of participation of companies in the technology training. This possibility is currently in the process of being developed together with the Euro-BioImaging Industry Board (see community feedback below). In this context, issues of exclusivity and competing interests in the participation in training activities need to be thoroughly evaluated together with the Industry Board.

As stated in the section of community feedback below, there is a need for training specifically aimed at technology operators and providers, which needs to be set apart from general user training. In the effort to provide robust user-friendly systems, companies tend to train very well at the level of end users and on using a given instrument, while not aiming at a deeper understanding of the interior components of the equipment and the involved technologies. This needs to be adapted for a thorough understanding that allows facility to efficiently propagate, evaluate and troubleshoot the new technology.

4. Training Procedure for New Imaging Technology - Case 2

In the case of a new technology that because of its technical or logistical requirements can only be offered at a few very dedicated sites inside Euro-BioImaging, the training strategy needs to be varied accordingly.

- To provide proper exposure inside Euro-BioImaging, initial familiarization should be provided in the form of seminars and talks that cover the basics of the technology and its applications. Like for case 1, the topics of the seminars should consist of presentations of the method by the technology developers and application examples by early users. This level of exposure should be aimed at all Euro-BioImaging core facility staff in the same and in related fields to ensure a standardized level of understanding inside the infrastructure. The level of knowledge should allow core facility staff to consider the new technology for the projects of their users and advise them accordingly.
- If a technology is not likely to be directly available to core facility staff in most sites, initial practical experience as can be provided by practical courses and workshops is not so relevant and doesn't need to be a major focus of training,
- To efficiently establish and standardize the new technology inside Euro-BioImaging, advanced technology training will be very important to be shared between the sites that have already established the technology and sites in the process of establishing it.

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- To maximize the training and knowledge transfer inside Euro-BioImaging advanced technology training should be supplemented by training stays of core facility staff at selected expert sites that have established the technology. This activity also contains aspects of technology transfer between Euro-BioImaging sites, especially in the case of custom instrumentation.

5. Adaptation and standardization of the training offer

Frequent reassessment and adaptation of this training offer will be performed by the Euro-BioImaging infrastructure in order to ensure its quality and standardization in such an active field (technological and methodological). As a technology transitions over time from an emerging to an established methodology the frequency of assessment and training adjustments can decrease until it converges to the rate generally applicable to established technologies and fields. The duration of this process and the required frequency for adaptations may vary between fields and this will be evaluated and set by the Euro-BioImaging infrastructure.

6. Community feedback

Several recent activities helped to discuss and subsequently finalize the procedure:

- 6th Leica Super-resolution User Club (September 20th to 22nd 2016 in Barcelona as an activity in a defined emerging field that was specifically aimed at core facility personnel. It allowed the discussion of training requirements and feedback from a technology providing company (member of the Euro-BioImaging Industry Board).
- Two teleconferences with 24 representatives from Node and Hub candidates (20 institutions) on September 26th and 27th 2016. These teleconferences also served to present the considerations in WP8 and to collect feedback.
- The Euro-BioImaging WP7 Core Facility Staff Meeting September 30th 2016 in Seignosse, France (Satellite meeting of the School of Functional Microscopy in Biology, MiFoBio) with 26 participants. A part of the schedule was set aside for a plenary presentation and discussion and a roundtable session on training in new technologies.

In the teleconferences and the WP7 core facility staff meeting a preliminary version of the procedure was presented and discussed. It seems to be in line with the requirements voiced in the field and matches the character and logic of some of the existing training activities, specifically in the French BioImaging community.

In all three events similar points and needs were stated. Some should be specifically mentioned:

- Continuous training in new fields is needed for facilities and is already currently taken in the existing formats.

- Training for facility staff needs to consolidate and extend the existing expertise and is in its nature different from introductory training. This training needs to be specifically matched to technology operators and providers and needs to be set apart from more general user training. This will require a stringent selection of participants with the right profile. Especially for commercial providers of new technology it will be important to develop a training offer aimed at specialists in facilities, in addition to the existing formats for clients and users. This need was communicated to the participating Industry Board representative.
- “New and emerging technologies” covers a wide variety of cases and should be considered as “emerging technologies and/or methodologies”.