

# Global Biolmaging Project

## D3.3 Publication of international recommendation: Training courses for facility staff

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## Abstract

Global Bioimaging has brought together imaging facility directors, experienced trainers in imaging technologies and core facility management from all over the world, to develop an international recommendation for 'Training courses for facility staff'. Its elaboration was based on community feedback, existing recommendations and direct responses from GBI training course participants.

The present deliverable explains the methodology followed for the preparation of the recommendation, the approved international recommendation from GBI for a general out-set of training courses for core facility staff, as well as the supporting material used to elaborate the recommendation in its Annex.

The international recommendation (Chapter 3) itself will be published on the GBI website for download, and widely distributed in the GBI community.

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## 1. Introduction

During the last two decades, facility management has developed as a new career opportunity for scientists in numerous public research institutes and universities around the globe, although a clear curriculum or educational program for facility staff is still missing in most places. In view of this, the Global BioImaging (GBI)<sup>1</sup> network of imaging infrastructures presents here a recommendation for facility staff training based on community feedback and Existing Recommendations, as well as direct responses from GBI training course participants. It has been developed together with all the international partners involved in the GBI network, including imaging facility directors and experienced trainers in imaging technologies and core facility management.

## 2. Background

The focus of this recommendation is on training courses for facility staff in management and administration of core facilities, and in image data management. These types of training courses were also offered by the H2020-funded GBI activities during project duration (December 2015 until November 2018). A recommendation on training for core facilities staff on emerging technologies has also been published by the Euro-BioImaging Preparatory Phase II consortium, and might be re-addressed by the GBI network in the future for editing it for international uptake.

The methodology for developing this international recommendation was a bottom-up approach and built on outreach to the imaging core facilities and scientific communities in the countries and continents participating in GBI, collecting their input in the form of:

- Existing Recommendations, such as “A strategy for a pan-European educational portfolio based on biomedical imaging infrastructures” (Please, for more information see Euro-BioImaging Preparatory Phase I D13.3<sup>2</sup>; EMBO guidelines on how to organize advanced training courses<sup>3</sup>)
- Community meetings addressing this topic, including GBI Exchange of Experience meetings I (Heidelberg, 2016) and III (Sydney, 2018)
- Establishment of an open and international Working Group on “Training courses for Facility Staff” which was established in June 2016
- Feedback from surveys of four GBI training courses conducted in 2016 and 2018.

NOTE: More detailed information from these different resources is included in the Annex of this deliverable.

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<sup>1</sup> <http://www.globalbioimaging.org>

<sup>2</sup> [http://www.eurobioimaging.eu/sites/default/files/D13.3.-EuBI-training\\_strategy-submitted\\_coord-21\\_11\\_2013.pdf](http://www.eurobioimaging.eu/sites/default/files/D13.3.-EuBI-training_strategy-submitted_coord-21_11_2013.pdf)

<sup>3</sup> [http://embo.org/documents/courses\\_and\\_workshops/EMBO\\_PC\\_organizer\\_guidelines.pdf](http://embo.org/documents/courses_and_workshops/EMBO_PC_organizer_guidelines.pdf)

### **3. “International recommendation for facility staff training”**

An advanced imaging core facility not only provides technical support, but also training tailored to the individual expertise and scientific needs of the end user. Thus, the quality of services in imaging technologies is determined by the highly specialized technical and scientific expert competence. To ensure that the qualified personnel of a core facility is developed to the highest level, coordinated and modular systems of advanced training is required. These training offers will qualify imaging facility staff to reach the highest technical expertise in order to exceptionally support their users.

Courses for staff and managers of imaging core facilities should focus on one topic per time, addressing for example facility management and administration; OR new imaging technologies; OR image data management training. For a given topic, GBI suggests organizing a one-week course comprising several different modules. The course could be divided for example into 2-3 modules during one week. Several modules can be offered together as a package within a one-week course, or to be taken individually in a 1-2 day course. The GBI international recommendation on training for imaging facility staff is summarized in Figure 1.

When designing the content for a course, organizers should clearly indicate their target audience and distinguish between facility staff (rather junior with 0 – 3 years experience in working as facility staff, focus on day-to-day operation and technical tasks), versus facility managers and directors (at least 3 years of working experience in a facility position, staff supervision, focus on future directions, facility metrics). This distinction is also relevant for the character of the course, as senior participants might appreciate a more interactive workshop, where they have sufficient time for exchange of experience among the participants.

For facility management and administration, the course should be designed as a curriculum consisting of modules that address staff with increasing levels of working experience (see Figure 2). Audiences with different levels of experience also demonstrate distinct preferences regarding the modules. Young facility staff members appreciate training in soft skills (e.g. time management, user communication, conflict management), whereas experienced facility managers emphasize the importance of budget administration, negotiation skills with leadership and demonstration of facility impact. Participants from previous training courses which apply for the next course level (e.g. from “Beginners’ level” to “Intermediate level”) should be informed timely about upcoming training opportunities and their previous participation should be considered in the evaluation of the application.

In more advanced courses the audience could be divided for some parts of the course into parallel sessions which address questions that are more specific for biological or biomedical imaging facilities (e.g. new imaging technologies, regulatory affairs, etc.).

Figure 1: Recommended general out-set of training courses for imaging core facility staff.

**Recommended general out-set of training courses for imaging core facility staff**

- The course should focus on one overarching topic (e.g. facility management OR image data management OR emerging technologies).
- Duration: 3-5 days depending on topic, level of detail and type of modules.
- Hands-on versus theoretical training should be well balanced (if possible: 50:50).
- Split into different courses for facility staff (junior) and facility managers (senior).
- Structured into a course series of increasing levels of detail and complexity.
- Maximum 25 participants per course.
- Openly advertised application process with evaluation of incoming proposals for their suitability and excellence.
- International courses aiming at participation from around the globe shall be taught in English\*.
- Senior trainers should stay at least for a full day during the course to be available for questions and networking, and are encouraged to participate in the entire course.
- The value of networking should be emphasized and course participants should be given the opportunity to introduce themselves, their facility and work (e.g. via flash talks or posters).
- It is recommended that trainers should provide course participants with training material for preparation upfront to increase training efficiency.
- To optimize course organization and measure impact of specific training modules, feedback from course participants should be collected. This could take place a) in person directly at the end of the course; b) in online surveys after the course is concluded; c) e.g. 6 months after the course to understand what the participants actually used from the course to improve their practices in their own imaging core.

*\* Courses with only national or regional participation can be conducted in the local language if feasible.*

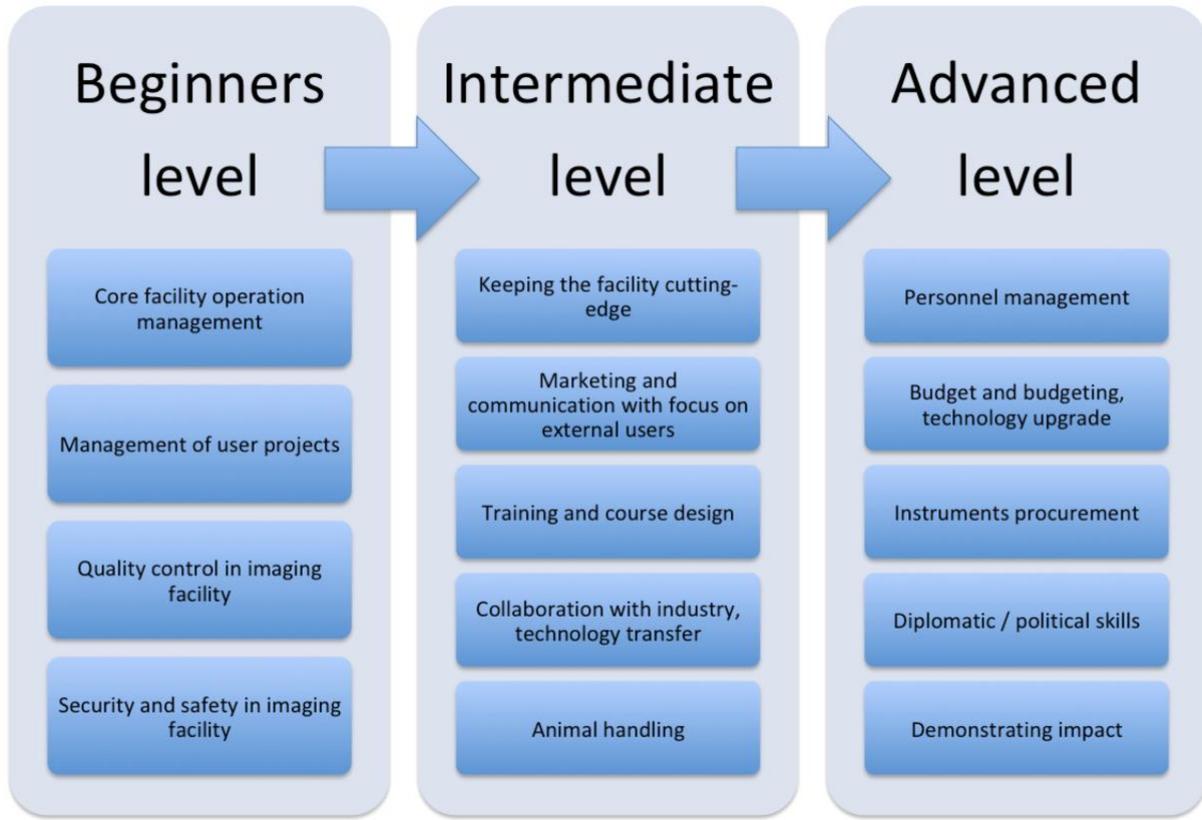


Figure 2: GBI recommends having three increasing levels of training courses addressing the topic of “imaging facility management and administration”. For each level, GBI suggests different modules for developing the course content.

## **4. Conclusions**

The Global Bioimaging community recommends that training courses for facility staff and managers become part of their continuous professional development. As successfully demonstrated by GBI WP5, complementing training courses with staff exchange programmes (“facility shadowing”) for imaging facility managers and staff can be very beneficial for both, visiting staff and hosting institution. Therefore, GBI will continue organizing its own and advertising its partners’ training courses, and continue the international facility shadowing program also beyond GBI project duration.

## ANNEX

### A1. Feedback from GBI training courses for facility staff

During the three years of H2020-funded GBI project duration, five training courses were organised by WP3 and WP4 for imaging core facility staff. WP3 offered two training courses in facility management and administration, and WP4 offered three training courses in image data management. At the end of each course the WP3 and WP4 leads conducted online surveys to gather feedback from all course participants, to understand if the courses had met their expectations and been useful to apply the learnt skills in their daily work as facility staff or managers. Detailed feedback on the first round of training courses can be found in GBI D3.1 *Report on 1<sup>st</sup> international training course for facility staff<sup>4</sup>* and GBI D4.1 *Report on 1<sup>st</sup> international training course for facility staff on image data tools*.

*Table A1: GBI Training courses in facility management (WP3) and image data management (WP4)*

First 'Training course in facility management' (WP3)	16-18 November 2016 in Heidelberg; user survey conducted; results summarized in D3.1
First 'Training course in image data management' (WP4)	13-15 November 2016 in Heidelberg; user survey conducted; results summarized in D4.1
Second 'Training course in facility management' (WP3)	17-19 September 2018 in Sydney; user survey conducted.
Second 'Training course in image data management' (WP4)	19-21 September 2018 in Sydney; user survey conducted.
Third 'Training course in image data analysis and management for experimental biologists' (WP4)	1-4 November 2018 in Okinawa;

#### *A1.1 Feedback from first Training course in facility management (WP3)*

From November 16 to 18<sup>th</sup>, 2016, the first advanced training course in facility management was organized with two main purposes: 1) enabling facility managers and staff – including the ones working at the Euro-BioImaging Node Candidates – to optimally support users; 2) attracting young and talented facility staff from all around the world and promoting international knowledge exchange. This ultimately should result in more discoveries in interdisciplinary scientific areas, more high-impact publications, a greater number of innovations and technology developments, and extensive collaborations between researchers from all over Europe with their international counterparts. In this course, the following topics were covered:

- Imaging facility set-up,
- Soft skills targeted at issues relevant for facility staff (with a focus on user communication and conflict management),
- Facility administration and management (e-management, Quality Management and metrology),
- e-learning and virtual platforms
- Visit of some imaging manufacturers centers.

<sup>4</sup> [http://www.eurobioimaging.eu/sites/default/files/D3.1\\_Report on 1st international course for CFS.pdf](http://www.eurobioimaging.eu/sites/default/files/D3.1_Report%20on%201st%20international%20course%20for%20CFS.pdf)

The overall rating of the course was very good, with 76 % of participants rating it as excellent and 24% rating it as good, and all declaring that they would recommend this course to others (52.9% highly recommended). Most of participants appreciated the diversity of the topics, the organization and the possibility of fruitful discussions with other peers and teachers. Even those who were already experienced declared to have taken advantage from the course, mainly because of the wide variety of items that were discussed, giving a good overview of the complex operation of an imaging facilities. The vast majority of the participants (88%) indicated that they will use the tools/resources covered in the course in their future.

The most appreciated sessions were those related to e-learning and to soft skills, followed by the visits of imaging centers/company sites and the session on administrative skills. Regarding the soft skills session, some participants suggested to dedicate a longer time to it in future courses, to better develop the subjects of conflict management and user communication in particular. Both e-learning tools presented (MyScope and Olympus) were considered useful potential alternatives to hands-on training of users. The session on administrative skills and quality management was particularly well received by the participants and generally considered to be useful for their daily work in the facility. Finally, visits to imaging centers/companies were judged interesting by most of the course attendees, nevertheless it was noted that providing more information in advance of the visits would have been beneficial in helping the participants choosing the visit of most interest to them. A number of participants pointed out that too much time was spent on “how to set-up an imaging facility” (also because most of them came from already set-up facilities).

#### *A1.2 Feedback from first Training course in image data management (WP4)*

Immediately after the training in facility management, the WP4 course about ‘Challenges on data management and image analysis’ took place, in order to allow facility staff interested in both topics to attend the two courses while minimizing travel. The goal of this course was to present the capabilities and technologies currently available in the field of image data management and analysis, to raise awareness on the current challenges in the field and to provide the course participants with a new set of tools (and references) that can be used to tackle such challenges and improve their own facility’s working life.

The course included topics and involved speakers across the broad domain of biological and medical imaging in order to (i) build connections and identify points of synergy between the members and technologies of these two communities and (ii) share experience, know-how and best practice in image data management and analysis.

The course consisted of 6 sessions: (1) Data management, anonymization, provenance and curation; (2) Segmentation, Image filtering and pre-processing; (3) 3D Rendering and Visualization, Registration and Quality Control; (4) Object tracking, signal quantification, statistics and feature extraction; (5) Cloud-based analysis, compression and storage; (6) Ethics and Data Publication.

The course was extremely well received, both in terms of content and organization (>90% rating Good or Excellent). Moreover, 100% participants felt that all topics were adequately covered and were pleased with the balance between lectures and practical sessions. Several participants praised the inclusion of both medical and biological imaging, and the introduction of advanced technology for image processing and analysis.

Some participants found it quite challenging to follow the hands-on sessions, particularly as

they required a wide range of software tools. Most speakers brought virtual training environments that included installed software and demo datasets to the course. This eliminated the need for participants to install software and allowed them to access the learning environment after the course, also to reproduce back at home what had been done in the classroom. This helped the course cover a broad range of tools and technologies, but also exposed students to a range of operating system and application environments. For future editions of the course we will aim to simplify this approach and create a single virtual training environment, or virtual machine (VM), with all software tools required. This will reduce the participants' confusion due to having to access multiple VMs, not connect to each other. Additionally, we will circulate some pre-course materials well in advance to allow participants to familiarize themselves with Unix and/or any other programming language to be used during the course. It will help those that have little familiarity with command line and scripting. Finally, the breadth of this program was quite ambitious and many students suggested lengthening the course by 0.5-1.0 days to allow to explore the practices in more detail. Consequently, for future editions of the course we will aim at improving the overall program balance, considering the feedback received on individual sessions, and allocate 0.5 – 1.0 additional days for the hands-on sessions to allow participants to run data analysis workflows.

### **Resources for Image Data Management**

GBI's "Challenges in Image Data Management" courses were quite popular, with applicants from many countries. For implementing the course for international participants with a range of technical experience, the realities of working with different image processing and analysis platforms and many test datasets, several GBytes in size, made it impractical to depend on successfully downloading and installing distinct software packages and datasets onto participants laptops: for example, they didn't have full administrative privileges on their computers and installation of some course software requires more advanced skills in systems administration. In addition, even if participants are provided detailed instructions on software installation and data download, we found a significant number arrive without software installed, causing delays at the beginning of the course as instructors have to devote time to completing installation and preparing individual student laptops.

To minimise the burden of software installation for all participants and course instructors, GBI used cloud-based resources for the practical portions of its course. Participants were given a remote desktop accessible by a student-specific login with access to all course software and datasets. Setup of these desktops, software installation and creation of user accounts for students and course instructors required substantial work before the course by systems admin staff donated by the host institution. The resulting systems worked well where instructors supplied software and datasets in advance. For most of the practical sessions, the environments worked well and the fact that they were established and ready to go meant that participants and instructors focussed on the didactic parts of the practices, and did not lose time worrying about software installation and configuration. However, in both courses, at least one instructor failed to properly specify or test the software in the virtual environments, leading to delays and poor student experiences.

Running cloud-based, virtualised resources for training programmes for image data processing and management requires significant computational and systems support resources, which are

not available at all institutions. We conclude that the GBI data management courses have shown the value of using such systems, but that a national or international resource should be constructed that can be remotely accessed using ORCID, Elixir AAI or other distributed identifiers and that contains tested, validated software tools and datasets. Such a resource should be available in by remote access from an international resource, but also from with a Docker or other container for deployment at individual institutions. Use of remote resources via URLs worked quite well in the GBI courses, and would provide a novel, standardised, validated globally accessible resource for international training courses for facility staff.

## A2. EMBO Recommendations for the Practical Courses

EMBO<sup>5</sup> provides a granting scheme for practical courses<sup>6</sup> whose aim is to promote transfer of new methods and emerging techniques to scientists. A course applying for an EMBO grant should be consistent with the following EMBO recommendations for the organisers:

- More than one organizer.
- Topic that is demanded by the research community and not covered by many courses.
- Sufficient duration to cover the topic in depth.
- Venue with suitable facilities and accommodation onsite.
- Max 25 participants for a practical course, max 120 participants for a workshop.
- Max 15% participants from the host country.
- No pre-defined participants.
- Sufficient time for discussion and interactions between participants.
- Poster sessions desirable.

The applicant submits an electronic application. The application is evaluated by two members of the EMBO Course Committee. The final selection of projects to be funded is made by the committee. Participants of a course are transparently selected based on their CV, abstract describing their research and explanation of the importance of the course for their research work. Preference should be given to early-career researchers. Regional and gender balance should be also assured. After the course finishes, the participants evaluate the course and give feedback by using an EMBO standardised on-line evaluation tool. The anonymised results of evaluation together with EMBO recommendations for improvement of the course are sent to organizers to improve the next run of the course.

This recommendation was part of the deliverable EuBI PPII D13.2<sup>7</sup>, which was also used as one conceptual starting point when the first round of training courses was drafted in GBI (e.g. open application with evaluation of excellence of applicant's proposal including suitability of course content and level for the applicant).

## A3. Training for imaging facilities' staff

The Euro-BioImaging (EuBI) Preparatory Phase I consortium (PPI was funded by EC FP7 in 2010 – 2014) had drafted a training strategy in imaging technologies as EuBI service, including training for facility staff<sup>8</sup>. During the Euro-BioImaging stakeholders' meetings the imaging community expressed interest in training for imaging facility staff and invited the PPI WP 13 to develop a training strategy for the imaging facility staff. They prepared a training strategy in D13.3 that is primarily intended for the Euro-BioImaging Nodes staff but it is also open to the staff of other imaging core facilities because of the aim is to address the needs of the whole imaging community independent of location.

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<sup>5</sup> <http://www.embo.org>

<sup>6</sup> <http://www.embo.org/programmes/courses-workshops/practical-courses.html>

<sup>7</sup> [http://www.eurobioimaging.eu/sites/default/files/D13.2\\_Proposal\\_for\\_rules\\_and\\_requirements\\_for\\_the\\_training\\_program\\_in\\_biomedical\\_imaging\\_0.pdf](http://www.eurobioimaging.eu/sites/default/files/D13.2_Proposal_for_rules_and_requirements_for_the_training_program_in_biomedical_imaging_0.pdf)

<sup>8</sup> [http://www.eurobioimaging.eu/sites/default/files/D13.3.-EuBI-training\\_strategy-submitted\\_coord-21\\_11\\_2013.pdf](http://www.eurobioimaging.eu/sites/default/files/D13.3.-EuBI-training_strategy-submitted_coord-21_11_2013.pdf)

### ***A3.1 Initial modular course for facility managers***

In D13.3, EuBI suggests introducing a modular one-week course for managers of the imaging facilities. The course will be divided into 3 modules. These modules can be offered within a one-week course or as separate 1-2-day courses. They recommend organizing the complete one-week course at the beginning of the EuBI construction phase. It would help build the collaborative attitude within the EuBI infrastructure and among the imaging facilities across Europe. The facility managers would also receive uniform information during the course that would assure the same perception of how an imaging facility should operate. Last but not least, this course would stimulate the facility managers' networking and cooperation from the very beginning of the EuBI operational phase.

The course is designed as a curriculum consisting of 3 modules that cover:

- Biological and biomedical imaging: overview of current state-of-the-art and future prospects (divided into panels based on type of imaging; delivered by internal Euro-BioImaging experts and manufacturers' representatives);
- Facility management / soft skills targeted at issues relevant for facility managers (delivered by external trainers);
- Facility administration - legal and regulatory affairs from the point of view of a facility manager (divided into panels specific for facilities with/without laboratory animals; delivered by combination of external /internal trainers).

This course is highly recommended for the managers of the future EuBI Nodes, especially for Nodes with weaker performance in comparison with other Nodes. They recommend this course to be part of the continuous professional development of imaging facility managers. Staff of the imaging facilities is also encouraged to participate in this course.

### ***A3.2 Annual workshops of facility managers / technicians***

Annual workshops of facility managers can take place on a rotating basis. These workshops should cover the following topics:

- Biomedical imaging
  - Overview of imaging techniques offered within the Euro-BioImaging infrastructure;
  - Commercially available innovative technologies (e.g. imaging methods, sample preparation, new probes); technologies under development;
  - Envisaged techniques for external access within the Euro-BioImaging infrastructure – a “wish-list” for future Euro-BioImaging proof-of-concept studies and calls.
- General aspects of managing an imaging facility

### ***A3.3 Exchange programme - study visits to the EuBI Nodes / imaging core facilities***

We propose implementing an exchange programme for the imaging facility managers and staff. We suggest approaching the EuBI Nodes whether they would be willing to offer short term exchange programmes and shadowing programmes of the senior managers or technicians by the PhD students, junior managers and technicians.

#### *A3.4 Other activities*

We suggest using on-line tools for knowledge sharing and information exchange among facility managers and staff, such as on-line discussion forums, FAQ, e-learning etc. on the Euro-BioImaging website.

#### **A4. Recommendation on training for core facility staff on emerging technologies**

During EuBi Preparatory Phase II (PPII was funded by EC H2020 in 2016-2018), the consortium partners developed a recommendation on training for core facility staff on emerging technologies<sup>9</sup>. The resulting guidelines for CFS training on emerging technologies implementation are summarized here:

Case A (commercially available technologies with robust service provision):

Format: Seminars plus Formal Course plus Small workshop sessions.

Frequency: 1 or 2 per year for one type of technology.

Duration: 3 - 5 days.

Organization: Could be done in different places with the help of companies.

Number of participants: Around 30 participants (e.g. FBI - Advanced Training 2.).

Case B (not -or just- commercially available)

Format: Expert workshops.

Frequency: As much as necessary, depending on demand.

Duration: 3 - days advanced introduction + hands on sessions: 3 - 5 days.

Organization: On expert sites (meaning places where the technology is already used and proposed as a service).

Number of participants: max. 10 participants.

#### **A5. Satellite workshop on developing an “International recommendation: training course for facility staff”**

After the GBI EoE III meeting in Sydney on September 15<sup>th</sup> 2018, the EoE III participants contributed to the satellite workshop on developing this “International recommendation: training course for facility staff”. About 45 international participants including facility directors, senior technology and training experts, course participants and industry, discussed the EMBO recommendation (see A2) and the PPI strategy (see A3). Their discussion is summarized here:

Overall, the EMBO recommendation is not regarded suitable in this case, as it is tailored for the organization of advanced and international training courses for scientists to learn new cutting-edge methods or technologies, whereas the recommendation here aims at organizing training courses for staff on facility administration or image data management. Therefore, the following points were made during the satellite meeting discussion:

- Reaching a limitation to 15% national participation from the course-hosting country is not realistic.

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<sup>9</sup> [http://www.eurobioimaging.eu/sites/default/files/EuBI\\_PPII\\_D7.3\\_Procedure for...CFS training on emerging technologies.pdf](http://www.eurobioimaging.eu/sites/default/files/EuBI_PPII_D7.3_Procedure_for...CFS_training_on_emerging_technologies.pdf)

- For hands-on versus theoretical training, a good balance should be the target, which can be even reaching the 50:50 ratio.
- A poster session in this context may not be so useful, it could be substituted by a short introduction via a flash talk where one presents/markets her/himself.
- It would be beneficial if the senior experts and trainers stay a bit longer than just for their presentation. One day seems like a good compromise and achievable (more can be difficult if you want to win world-leading experts as trainers).
- In this case of training courses, industrial participation can be problematic, as their participation will be biased towards promoting their own products.
- In case of advanced training for new technologies having industry, participation is very important, as several companies can be invited to present their instruments and support the course through this provision.
- Especially for the data course but also for more advanced courses in facility management, we should consider increasing the length of the courses to make them more comprehensive. It was fine to have the 5/6 days format of two combined courses in one week in total until now because these were pilot courses.
- It was recommended having different courses tailored for junior and senior staff.
- From PPI D13.3, the two topics of facility management and facility administration can be merged, but the distinction between junior and senior staff could be introduced.
- It is suggested to send out preparation material for the course at the aim of minimizing the length and making the course more efficient. This possibility depends on the course topic.
- A new topic on diplomatic and negotiation skills is suggested (“what are the arguments that one can use to convince a dean to set up a core facility?”).

The audience of the satellite meeting was requested to discuss the following questions:

*Q1 - Which are the preferred topics in a training course suggested by participants? (soft skills, eLearning, ... )*

Rating of course topics in facility management and administration by the audience of the EoE III satellite meeting:

Keeping the facility cutting edge	Less
Core facility operation management	Strong
Budget and budgeting, technology upgrade	Strong
Personnel management	Strong
Collaboration with industry, technology transfer	Medium
Outreach and communication with users	Strong
Training and course design	Strong
Management of user projects	Less
Quality control in imaging facility	Strong
Soft skills	Less

*Q2 - Should the three major recommendation topics (EuBI PPI) be taught in one or three (more?) courses, and to which level of details?*

From PPI D13.3, the two topics of facility management and facility administration can be merged, but the distinction between junior and senior staff could be introduced.

*Q3 - Is it more or less beneficial to have a diversity of different levels of experience in the same course?*

It was recommended having different courses tailored for junior and senior staff.

*Q4 - Should there be a series of courses focussing on topics of increasing complexity/levels (starting for beginners and ending in advanced)?*

The audience confirmed that it would be beneficial of having series of courses with increasing level of complexity.

*Q5 - How long should such courses (modules) last?*

The course on facility management should be sufficiently long, probably three to four days. A course for training on an emerging technology may however need to be longer (depending on the technology), see also A4.

*Q6 - Should latest technology developments be part of the course(s), or rather left to specific workshops?*

Latest technology developments should be covered by specific workshops, see A4.

Regarding the training course on image data management as organized by GBI WP4, the WP4 Chair Jason Swedlow explains that this course was unique for addressing both biological and medical communities, and for letting participants work on large image data sets to demonstrate the different image analysis software tools. This turned out being technically very challenging and therefore will not be always possible everywhere. A suggested solution is to start using cloud services for providing required virtual access capacities to the different software tools and datasets. Again, this is technically quite challenging. However, it is still the goal: to have the course permanently uploaded on the cloud. It is suggested that the provision of cloud services could be the in-kind contribution of some of the institutions in GBI. It will have practical implications and benefits for the GBI network. This would mean having an authentication issue to log in students into the cloud, but there are several international projects to create universal AAls (e.g. eduGAIN). In general, this could be a fantastic use case of added value for GBI.