

Global BioImaging Project

D2.1 Report on common strategy for exchange of best practice in imaging infrastructure operation

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Abstract

One of the main aims of the Global BioImaging project is to enable exchange of best practices in open access imaging infrastructures' operation between Euro-BioImaging and other European imaging facility staff with their counterparts from Australia and India as well as Argentina, Japan, South Africa and the USA. The first key milestone in achieving this goal is represented by the first physical meeting of all partners organised by WP2, the "Exchange of Experience I" workshop, which was attended by 78 imaging infrastructure representatives from 6 continents. This first workshop took place in Europe at the European Molecular Biology Laboratory (EMBL) in Heidelberg on the 8-10th of June 2016.

The present report constitutes deliverable D2.1 of the Global BioImaging project.

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1. Introduction

The Global Biolmaging project brings together Euro-Biolmaging with imaging infrastructure experts from Australia, Argentina, South Africa, India, Japan and the United States of America to open provision of imaging and training services to biological and medical researchers and imaging facility staff world-wide. It has the ambitious goal of creating a global network of stateof-the-art imaging research infrastructures which will operate interconnected, by pursuing collaboration agreements on the reciprocal use, openness and co-financing of common services, in particular in image data and training.

Work Package 2 (WP2)'s aim is to provide the means for exchange of experience among all partners involved. WP2 is in charge of organizing three international workshops in the areas of open access to imaging infrastructure, user training, imaging facility operation, quality management and cutting-edge imaging technologies in close collaboration with WP3, WP4, and WP6. In order to facilitate this, WP2 also provides and manages travel grants to European and international imaging facility staff to attend the workshops. Back-to-back with these workshops, which take place in Europe (M6), India (M18) and Australia (M30), WP3, WP4 and WP6 organize their meetings and courses for training and image data experts as well as leading imaging experts from other regions of the world. In this way, Global BioImaging project brings together all relevant partners involved at the same time for optimizing the impact on the project deliverables, especially those which are of a global nature i.e. developing the recommendation for open user access or quality management at the international level.

The goal of Work Package 2 is to support GBI partners in developing a sustainable plan for the future networking activities including reciprocal use of infrastructure services, international training courses and virtual platforms for data management.



2. Description of Task 2.1

A key task of WP2 within Global Biolmaging framework is to organize three workshops on exchange of experience and best practice in operation of imaging infrastructure. These workshops take place in Europe, India and Australia in close cooperation with and co-financing by Euro-Biolmaging collaboration partners Australian Microscopy and Microanalysis Research Facility (AMMRF), National Imaging Facility (NIF) from Australia, and India BioImaging. The duration is each workshop is planned to be 2-3 days and each shall be open for ca. 60-80 European and international participants. The workshops "Exchange of Experience" will be organized back-to-back with the training courses for facility staff in facility management (WP3) and image data tools (WP4), workshops of the international stakeholders (WP6) and the physical meetings of the Management Board (WP1).

As imaging facilities and communities are rapidly evolving and facing many similar challenges around the globe, many countries have a strong interest to be engaged in a new level of networking at a global scale and have the need to learn the experiences from well-established infrastructures. The Global BioImaging project's Exchange of Experience workshops, where imaging communities around the globe can meet and directly discuss about their needs and expectations for imaging infrastructure services, aim at facilitating this process. In addition to experiences exchange and networking, this framework should enable the global imaging community to establish common tools and prepare guidelines for imaging infrastructure services.

3. First "Exchange of Experience" workshop, 8-10th of June 2016

The first Exchange of Experience workshop, EoE I, was organized at European Molecular Biology Laboratory (EMBL) from 8th to 10th of June 2016, back-to-back with the CTLS 2016 congress¹ (12^{ve}-15th June 2016, EMBL Heidelberg), with the aim of creating a link with the state-of-the-art activities in Core Technology facilities and resource laboratories in all fields of Life Science. The

¹ http://www.embl.de/training/events/2016/CTL16-01/



workshop brought together 78 participants (see Annex 3), ranging from European facility staff to their international colleagues from India, Australia, Japan, South Africa, Argentina and the USA to exchange best practice in benchmarking performance of imaging technology platforms, image data management and facility staff training.

The main objectives of the workshop were:

- To stimulate the facility staff's networking and international cooperation
- To plan and finalize upcoming workshops for core staff facility training and image data management
- To identify common strategy for exchange of best practice in imaging infrastructure operation

3.1 Strategy of structuring the first Exchange of Experience workshop

The main idea behind organizing the first international workshop was to enable to share lessons learned form other imaging infrastructures and to stimulate exchange of best practice globally (see Annex 1). Each participating country is at different stage with their national imaging communities and share different level of experience as some partners are only starting to build their imaging infrastructures and others have already long established practices in their imaging community for example in open access, training and quality management. For these reasons this workshop was a valuable tool to bring all participating countries together and to learn models established and used in other countries.

The first day of the workshop was structured into several keynote speeches, where relevant examples of research infrastructures at a national and international level were given. The second and third days² of the workshop started with breakout sessions (Sessions I and II) to stimulate engagement from all participants of structuring the program for the first GBI training courses for

² Due to a high popularity of the workshop and active discussion on many important topics, the workshop program was extended from the originally planned two days till Friday noon by the request of the participants. The third day was dedicated to the continuation on the discussion on the GBI training courses and the shadowing program.



staff in imaging facility management and operation as well as image data management. To support the breakout session's discussion on the future development of global user and staff training possibilities (Session I) and image data management (Session II), several imaging infrastructures were invited to presented their current status of existing training opportunities as well as how image data is handeled and stored in different research communities. At the end, parallel breakout sessions were summarized to all participants. Dedicated international panel sessions also took place during day-two, where participants were given opportunity to present the status of research infrastructure in their home countries and directly discuss their expectations and particular strengths they can bring to the Global Biolmaging project. Finally, the of the GBI shadowing program, its scope and objectives were presented, and met a broad interest from the international community.

3.2 International imaging infrastructure operation experiences worldwide

First day of three-day workshop was structured to broadly introduce some of the most advanced imaging communities and reseach infrastructures around the globe. Keynote speakers from Australia, United Kingdom (UK), the US, Euro-Biolmaging, France and Czechia were invited to introduce their infrastructures and models on how they have been established and are operating. Each partner was representing a different stronghold in imaging community.

Keynote speaker from Australia (Miles Apperley) was introducing their national strategy on investing into research and how that serves different large research communities in a widely spread country. After having provided the example of ANSTO (Australian Nuclear Science and Technology Organisation), the organisations operating in the imaging field were presented. The Australian Microscopy and Microanalysis Research Facility (AMMRF), which is a collaborative research infrastructure facility forming a national grid of leading expertise and instrumentation in microscopy and microanalysis, is an open-access facility comprising of 14 universities and this large infrastructure supports more than 3,000 researchers annually. Another national imaging infrastructure, Australian National Imaging Facility (NIF) provides state-of-the-art imaging capability for a whole body and small animal imaging. AMMRF and NIF have been progressive in



the development and operation of a range of e-infrastructure and online tools to support researchers. To especially address the challenges of limited resources in training the user, AMMRF has developed an online tool MyScope: Training for Advanced Research (ammrf.org.au/myscope) that comprises of education tools for teaching and learning in the area of microscopy and microanalysis. This unique tool provides an excellent example of how research infrastructure can implement new means to respond the research community challenges and solution for limited resources.

Keynote speaker from EMBL-EBI (Janeth Thornton), was sharing her experience of lessons learned on building a distributed infrastructure for European life-science information, ELIXIR. The key point of the work behind the successful infrastructure was emphasized to be building a strong and organized scientific base in each partner organization and country. Especially in the international distributed infrastructures, developing trust with national policy makers and building strong relationships with national funding bodies and their legal representatives is a key for sustainable collaboration.

A keynote talk from the **US** (by Teng-Leong Chew) was introducing a unique philosophy and story behind the creation of the Advanced Imaging Center at Howard Hughes Medical Institute Janelia Research Campus, which is an exceptional facility in the US providing free access to external visitors to cutting-edge imaging technologies developed at Janelia at no cost and before the instruments are commercially available.

ESFRI research infrastructure project Euro-Biolmaging (EuBI) was presented by Jan Ellenberg, who illustrated the overall ESFRI's framework and EuBI's open user access model for biological, molecular and medical state-of-the-art imaging technologies. The work aimed at building this large infrastructure has been carried during the past decade and has managed to connect 17 European countries to one powerful imaging community. When it established as a legal entity, the EuBI infrastructure will consist of a set of complementary strongly interlinked and geographically distributed Nodes to reach European scientists in all its Member States. The pan-European infrastructure will be empowered by a coordinating entity, the EuBI Hub, which shall

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growing collaboration

provide a single entry point from which the users are directed to their desired imaging technology as served by the respective Euro-Biolmaging Nodes.

Keynote talk from France (by Jean Salamero) was sharing their national experience on how to build from a network of imaging core facilities to a big national distributed infrastructure. France Biolmaging has become an organized infrastructure that coordinates several large biological imaging facilities and laboratories specializing in R&D for imaging in 5 local and one transversal Node.

Keynote speaker from Czechia (Pavel Hozak) was presenting smaller country example of how national imaging community has managed to grow by successfully coordinating national efforts in imaging and supports the pan-European infrastructure Euro-Biolmaging as a part of the EuBl Interim Board and via two EuBI Node Candidates.

EoE I's first day was concluded by a talk from the Global Biolmaging project coordinator Antje Keppler, who introduced the scope of the project and its objectives.

On the second day of the workshop, during the afternoon panel discussion, GBI partners were invited to present the status of their national research infrastructures. This dedicated panel session gave opportunity to share the experiences of imaging communities and enabled direct discussion on participant's expectations from GBI project. Imaging infrastructures were introduced by Argentina (Alfredo Caceres), India (Krishnamurthy Hanumanthappa), Japan (Mizuki Shimanuki) and South Africa (Bryan Trevor Sewell).

All of the above described talks were valuable examples of present status of research communities in general and imaging communities in particular in each country and allowed participants to gather different features of strengths represented by each infrastructure.



3.3 Outcome of the first Exchange of Experience workshop

In addition of learning the valuable experiences from current status of different international imaging infrastructures and for the first time possible global networking at this scale, concrete action was taken regarding the future work and development of Global BioImaging project. During the tree day discussions and parallel sessions, GBI partners were able to contribute to the definition of some of the project's key milestones. In particular, the programs for the upcoming GBI training courses for staff in imaging facility management and operation (MS7) as well as for image data management (MS12) were discussed and valuable input of need by different imaging communities heard and implemented into the program. Two organizing committees, (1) for core facility staff (CFS) training and (2) for image data management training courses were formed. These committees will organize and plan the upcoming workshops and identify and invite the suitable teachers according to the selected topics.

Work on establishing a common tool for virtual platform for CFS and user training material was also initiated and international working group on e-learning was established. It was commonly agreed that work would be based on the existing virtual training platform "MyScope", tool that has been created by the AMMRF in Australia, and this platform will be enlarged into a the global e-learning platform to serve the whole imaging community. The working group will plan and structure the content of e-learning platform and this work will be implemented within GBI project.

4. Next steps in exchanging the best practice in imaging infrastructure operation

First Exchange of Experience workshop provided sharing and learning from the experiences and expectations from European and international Global Biolmaging project partners. Based on these shared views, GBI partners better understand the diverse need of different imaging infrastructures on global scale. In this workshop GBI partners have identified the critical points of different infrastructures and the aspects that will need to be covered to share and establish the best practice in imaging infrastructure operation.

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Exchanging the best practice will be implemented in four training courses for facility staff and facility management and for image data tools during 2016-2018. The main topics for these training courses were discussed and identified at the *EoE I* (see Annex 2. Minutes of GBI Breakout sessions I and II). In addition to these training courses, two additional *Exchange of Experiences* workshops will be organized to continue the discussion and collaboration on establishing a sustainable network of international imaging infrastructure partners in biological and medical sciences. These two workshops will be instrumental in the finalization and publishing of international recommendations on: "Open user access to biological and medical imaging infrastructure" and "Quality assurance and management in open access imaging infrastructure. These recommendations will facilitate global interoperability of Euro-Biolmaging with other international imaging infrastructures in their user services by standardization and harmonization of access protocols, methods, tests, reference materials, training programs as well as image data formats, analysis software and management. These recommendations and guidelines will be made publicly available to the global science community on GBI web site.

Global BioImaging project will organize next *Exchange of Experience II* workshop in September 2017 in Bangalore, India. The focus of this workshop will be on international open user access in imaging infrastructures. The second *EoE* workshop will be organized back-to-back with two other major imaging events that will take place in Bangalore in September 2017, Bangalore Microscopy Course (BMC 2017) and big Microscopy Conference on the advancements in microscopy. *Exchange of Experience III* workshop will be organized in Sydney, Australia in September 2018.

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Annex 1: "Exchange of Experience I" workshop program and links to presentations

Location: EMBL Heidelberg, ATC Courtyard Room A & B

Wednesday, June 8th 2016

11:00 - 12:30	3 rd GBI Management Board Meeting (upon invitation) : Separate Agenda
12:30 - 14:00	Registration
14:00 - 14:15	Welcome
The state of the state of	(Jan Ellenberg, EMBL, Germany & John Eriksson, ÅBO Akademi, Finland)
14:15 - 14:45	Keynote Speech - Global Research Infrastructures from an Australian
	perspective (Miles Apperley, ANSTO, Australia)
14:45 – 15:15	Keynote Speech - Building Research Infrastructures in Europe and
	beyond - State-of-the-art and lessons learnt from ELIXIR (Janet Thornton,
	EMBL-EBI, UK)
15:15 - 15:45	Keynote Speech - Case Study I: Open Science - Advanced Imaging Centre
	(Teng-Leong Chew, Janelia Research Campus of the HHMI, USA)
15:45 - 16:30	Coffee Break
16:30 - 17:00	Euro-Biolmaging Preparatory Phase II - Implementation of Open Access to
# 100 CO # 20 TO CO	Imaging in Europe (Jan Ellenberg, EMBL, Germany)
17:00 - 17:30	Keynote Speech - France Biolmaging, from a network of Core Facilities to
	a National Distributed Infrastructure in BioImaging (Jean Salamero,
	Coordinator of the INBS France Biolmaging, Institut Curie, Paris, France)
17:30 - 18:00	Keynote Speech - Case Study II: The Czech Republic - From community
	building to participation as Euro-Biolmaging Node (Pavel Hozak, Institute
	of Molecular Genetics Prague, Czech Republic)
18:00 - 18:30	Global Biolmaging: the project and its goals (Antje Keppler, EMBL,
	Germany)
18:30 – 20:00	Dinner at EMBL

Links to presentation slides from Wednesday, June 8th:

Miles Apperley: https://drive.google.com/open?id=0B5DC0Fh__KClUllmb0hM0ExtbG8
Teng-Leong Chew: https://drive.google.com/open?id=0B5DC0Fh-_KClUUhla1d4cms2TkE
Jan Ellenberg: https://drive.google.com/open?id=0B5DC0Fh-_KClcU5qUXNITE5ZVjg
Jean Salamero: https://drive.google.com/open?id=0B5DC0Fh-_KCldFNtbGNmZ1d1cTQ
Pavel Hozak: https://drive.google.com/open?id=0B5DC0Fh-_KClaGNOV3ZCTzBoNTA

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Thursday, June 9th 2016

09:30 - 09:45	Introductory session: Objectives of the upcoming activities		
	(John Eriksson)		
09:45 – 12:30	Break-out Sessions		
	Session I (Courtyard Room)		
	Training for Imaging Facility Staff (Chair: Rainer Pepperkok)		
	 Benchmarking existing training courses for Imaging Facility Staff at international level 		
	 Building a virtual platform for training material 		
	 Gathering expectations on the GBI courses for Imaging Facility Staff 		
	Session II (ATC Seminar Room A - Helix)		
	Image Data Management (Chair: Jason Swedlow)		
	 State-of-the-art of available tools for analysis and image data 		
	processing across biological and biomedical imaging		
	 Mapping of needs for a common virtual repository of software tools 		
12:30 – 13:30	Light Lunch		
13:30 - 14:45	Summary of Break-out Sessions (Chairs: Jan Ellenberg, John Eriksson)		
	How to build global access, image data and training services in imaging research infrastructures?		
14:45 - 15:15	Coffee Break		
15:15 - 16:15			
	Learning the experiences and expectations from international GBI partners		
16:15 – 16:30	Closing Session – Summary and next steps (Antje Keppler)		
20.20	Tanama despera		

<u>Links to presentation slides from Thursday, June 9th:</u>

Introductory session by John Eriksson:

https://drive.google.com/open?id=0B5DC0Fh-_KCldmUzdjJCakdEenM

Session I: Training

Session introduction by Rainer Pepperkok and Jean Salamero:

https://drive.google.com/open?id=0B5DC0Fh-_KClTU9XbEdrellyN2M

Benchmarking excising training courses: https://drive.google.com/open?id=0B5DC0Fh-_KClemx3cWhwZ3JTMzQ

Building a virtual platform for training material, MyScope:

https://drive.google.com/open?id=0B5DC0Fh- KClYlAtOHQ3Z2dXUm8

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Session II: Image data

Session introduction by Jason Swedlow:

https://drive.google.com/open?id=0B5DC0Fh__KClTE5IMWo0X0VzN3M

Available tools for image data analysis:

Medical Imaging Databank of the Valencia Region:

https://drive.google.com/open?id=0B5DC0Fh-_KCldHlFeGhvcUdxVEU

German BioImaging:

https://drive.google.com/open?id=0B5DC0Fh-_KClcEprM3hweFoyWkk

National Imaging Facility (NIF), Australia:

https://drive.google.com/open?id=0B5DC0Fh-_KClY3ZncGp1RGNOZDg

Data Management at Advanced Imaging Center, US:

https://drive.google.com/open?id=0B5DC0Fh-_KClRTINLWhpS0JELUk

Summary of breakout sessions:

Session I: Training

John Eriksson: https://drive.google.com/open?id=0B5DC0Fh-_KClalcydGItX3hmV3M

Session II: Image data

Jan Ellenberg: https://drive.google.com/open?id=0B5DC0Fh-_KClYktsMVZKTHIZd2c

Panel discussion: Learning the experiences and expectations from international GBI partners

Introduction by Antje Keppler:

https://drive.google.com/open?id=0B5DC0Fh- KCIX0llNDFBOVBBa00

Presentation by Argentina:

https://drive.google.com/open?id=0B5DC0Fh-_KClSXdFbmRRUEQwWWs

Presentation by India: https://drive.google.com/open?id=0B5DC0Fh-_KCIB0dUSFZmUWlyajQ Presentation by Japan: https://drive.google.com/open?id=0B5DC0Fh-_KCIb0dUSFZmUWlyajQ

Presentation by South Africa:

https://drive.google.com/open?id=0B5DC0Fh-_KClTzdnSS11MXEzeWM



Friday, June 10th 2016

09:30 - 09:45	Introductory session: Objectives of the upcoming activities (Jan Ellenberg)		
09:45 – 10:45	Summarizing Break-out sessions		
	Session I: Training (Chair: Rainer Pepperkok)		
	Session II: Image data (Chair: Jason Swedlow)		
10: 45 - 11:15	WP5: Exchange of People – Shadowing Program for Facility Staff (Lead: Silvio Aime)		
11:15 – 12:30	1:15 – 12:30 Summary of Break-out Sessions and Closing Remarks (Chair: Antje Keppler)		

Links to presentation slides from Friday, June 10th:

Introductory session: https://drive.google.com/open?id=0B5DC0Fh-_KCIM29hZTNMLXd0Wkk

Work Package 5 (WP5) Exchange of People: Shadowing program https://drive.google.com/file/d/0B5DC0Fh- KCITIZNcE1KSHIZRG8/view?usp=sharing

Summary of break-out sessions and closing remarks:

https://drive.google.com/open?id=0B5DC0Fh-_KClVGxURWV5RHRTLWc

Annex 2: Minutes of GBI Break-out Sessions I and II

During the two days of *EoE I* workshop, both upcoming workshops for core staff facility training and image data management were structured and planned. Organizing committee and working groups were identified and next steps for finalizing the program of these workshops were taken. Core facility training and image data management workshops will take place 14-18th of November at EMBL, Heidelberg.

Minutes of Global BioImaging break-out Session I: Training https://drive.google.com/open?id=0B5DC0Fh-_KCIZTJtWEZIZ0E5Z1E

Minutes of Global BioImaging break-out Session II: Image data https://drive.google.com/open?id=0B5DC0Fh-_KClR1NhNEJKc3E5ZzA

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Annex 3: List of "Exchange of Experience I" workshop participants

Last Name	First Name	Affiliation
Aime	Silvio	University of Torino
Andilla	Jordi	ICFO -The Institute of Photonic Sciences
Anger	Martin	Masaryk University
Apperley	Miles	Australian Microscopy and Microanalysis Research Facility
Bernardino de la Serna	Jorge	Science and Technology Facilities Council
Bernas	Tytus	Nancki Institute of Experimental Biology
Bulkescher	Jutta	NNF Center for Protein Research / Danish Stem Cell Center
Caceres	Alfredo	INIMEC-CONICET
Calvo	Maria	University of Barcelona
Chakraborty	Uttara	Indian Institute of Science
Chew	Teng-Leong	Howard Hughes Medical Institute Janelia Research Campus
Choquet	Daniel	CNRS
Ciuk	Marcin	Nencki Institute of Experimental Biology
Colombelli	Julien	IRB Barcelona
Cordelières	Fabrice	CNRS
de la Iglesia-Vaya	Maria	CEIB_AVS
Ellenberg	Jan	EMBL Heidelberg
Eriksson	John	Turku BioImaging
Fernandez- Rodriguez	Julia	University of Gothenburg
Filimonenko	Vlada	Institute of Molecular Genetics, v.v.i., Academy of Sciences of the Czech Republic
Galloway	Graham	National Imaging Facility
Ghose	Aurnab	Indian Institute of Science Education and Research (IISER)
Guns	Pieter-Jan	University of Antwerp
Guzman	Camilo	Åbo Akademi University
Herzog	Claire	France BioImaging
Hink	Mark	van Leeuwenhoek Centre for Advanced Microscopy, University of Amsterdam
Hozak	Pavel	Institute of Molecular Genetics
Jagavelu	Kumaravelu	Central Drug Research Institute
Janke	Andrew	CAI
Kankaanpää	Pasi	Turku BioImaging
Keppler	Antje	EMBL Heidelberg
Houtsmuller	Adriaan	Erasmus Medical Centre
Krishnamurthy	Hanumanthappa	National Centre for Biological Sciences
Leitner	Frauke	EMBL Heidelberg
Luini	Alberto	Institute of Protein Biochemistry

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Sampson David The University of Western Australia

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Ueno Naoto National Institute for Basic Biology

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van RooyenJasonUniversity of Cape Townvan ZandvoortMarcMaastricht UniversityVialeAlessandraUniversity of Torino

Weninger Wolfgang Medical University of Vienna

Weyn Babs KU Leuven

Zimmermann Timo Centre for Genomic Regulation

Thumser Christoph Leica Ankerhold Richard Zeiss Tewinkel Martin **Olympus** Fennema Herman Nikon Muelter Andrea Leica Shapter Joe **AMMRF** Widerøe NTNU Marius

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