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Global BioImaging Project

D6.1 Report on strategy and establishment of collaboration tools with imaging infrastructures in Argentina, Japan, South Africa, USA

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Abstract
In its first six months, the Global BioImaging Project consortium has engaged with representatives from national imaging infrastructures and communities in Argentina, Japan, South Africa, and the USA. In this regard, a major milestone was the first international Exchange of Experience workshop, which took place in June 8-10, 2016, at the EMBL in Heidelberg, Germany. At this meeting, leading imaging infrastructure experts from these four countries presented the status of their imaging infrastructure in their home countries, and expressed needs and expectations towards the future international collaboration with the Global BioImaging partners. It was discussed in detail, how the imaging communities and facilities in these countries will now participate in very practical terms in the GBI activities, including the virtual platforms for training and data in imaging technologies as well as the newly established working groups in WP3 (training) and WP4 (data) for preparing training courses for imaging facility staff. In parallel, imaging community meetings with participation of GBI representatives in Argentina and USA already took place, and meetings in South Africa (October 2016) and Japan (February 2017) are currently being prepared.

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ANNEX 10

1. Introduction

Global BioImaging Project facilitates the development of a global network of cutting-edge imaging research infrastructures by preparing the global interoperability and reach of Euro-BioImaging with existing and newly emerging life sciences imaging research infrastructures in other regions including Africa, Asia, Australia, and North and South America by establishing common infrastructure services such as virtual platforms for training material and image data tools, and by pursuing collaboration agreements on the reciprocal use, openness and co-financing of their infrastructure services, to support their research in the areas of biological, marine, medical, material and agricultural sciences. In doing so, this project establishes a foundation for a long-term alliance of mutual benefit between Euro-BioImaging and its international partners on all sides and will serve their infrastructures' users, operators as well as the life sciences research landscape.

In particular advanced training of facility staff is in the focus of all established international collaboration agreements and current communication so far, as the sophistication of the innovative technologies and their instrumentation requires highly specialized expertise to efficiently and successfully operate and analyse the resulting image data, and to exploit the full potential of these technologies. Most countries face a severe shortage in technical experts suitable for these positions. Furthermore, the exchange of experience in running open access facilities, latest imaging technology development, the establishment of quality management as well as standardization of access protocols, methods, image data formats, common repositories for open access image data and analysis software tools are repeatedly identified items for international collaboration. Last but not least, the reciprocal use of their cutting-edge services is the long-term goal of all international partners, each of them having particular strengths and interests for access.

The major objective of *WP6 Outreach to Other Regions* is to extend the existing fruitful network of coordinated imaging infrastructures to other regions, including North and South America, Africa, and Asia, in addition to Euro-BioImaging's existing international collaboration partners in Australia and India. Before project start, in Argentina, Japan, South Africa, and the USA, Euro-BioImaging partners had already established personal contacts with leading imaging experts who are very supportive of the Global BioImaging Project, and who now participated in the first International Workshop "Exchange of Experience I" organized by WP2. At this meeting, the different status, interests and requirements of each national imaging infrastructure community, were reported and discussed. For example, Japan and the USA are leading in the development of innovative imaging technologies and Euro-BioImaging has expressed their interest inviting their senior technology experts to participate in Euro-BioImaging advanced training courses for facility staff. On the other hand, imaging facilities in Japan and the USA are highly interested in learning about the Euro-BioImaging infrastructure model and to prepare the ground for reciprocal use of their infrastructure services in the long-term. Argentina, and South Africa are less mature in their imaging infrastructure set-up, and they are particularly interested in common training activities for users and providers in this field.

For Euro-BioImaging, the extension of the international partners benefits in particular its image data infrastructure (international development of new software tools, use of common image data repositories), training activities (engaging the best international faculty for Euro-BioImaging courses, working on the sustainability of its facility staff courses by extension to international participants) and imaging technology know-how, by being in direct communication with the leading technology

developers around the globe to keep Euro-BioImaging Nodes always state-of-the-art. In addition, international infrastructure experts can advise Euro-BioImaging regarding performance and quality management.

In D6.1, we present the reported status, needs and expectations from the imaging infrastructure partners in Argentina, Japan, South Africa, and the USA as well as the identified strategy and tools for collaboration.

2. International imaging infrastructure partners in Argentina, Japan, South Africa and USA

Because of the recent technical revolution in imaging applications in the life sciences, imaging facilities and infrastructure are forming at many research institutions around the globe, all facing similar challenges of finding well-trained staff to operate the instruments and manage the facilities, to implement efficient and affordable user access policies, to implement sustainable quality management, to provide support with image data storage and analysis with ever growing image data sets with increasing complexity. As the word is spreading regarding the identified needs of the scientists and infrastructure providers, also among national funders and decision-makers, the interest to learn more about the European approach, i.e. the pan-European research infrastructure Euro-BioImaging, has been growing, and since its start Euro-BioImaging partners were approached by their international contacts for getting in touch and working together in the future on imaging infrastructure implementation, operation and reciprocal use of services.

In addition to the existing imaging infrastructure partners in Australia (AMMRF and NIF) and India (India BioImaging), national research infrastructures and imaging facilities from the following countries are now participating as associated partners in Global BioImaging project:

2.1 Argentina

In Argentina, the National Ministry of Science, Technology and Productive Innovation (MinCyT) is promoting a countrywide scheme for strategic research infrastructure planning in the framework of the policy of articulation of the National Scientific System. In this framework, the National Microscopy System (SNM) represents over 90% of the microscopy capacity in Argentina and is supported by the MinCyT. The SNM is a network that links the Argentine largest microscopes purchases with public funds. From this network, SNM are seeking to expand access to such equipment, facilitating their improvement by the provision of financing and promoting training of human resources. The MinCyT drives this initiative together with the Interagency Council on Science and Technology (http://en.mincyt.gob.ar/casos-modelo/a-national-network-to-improve-the-use-of-microscopes-4927). The SNM encourages the use of large microscopes from large health centers by any research teams that could not use them for being external professionals. Furthermore, SNM seeks to facilitate continuous improvement of equipment by the purchase of supplementary equipment, fittings, insurances, etc., thus optimizing their features and capabilities. This initiative also promotes training of human resources in different microscopy techniques, as well as the exchange of institutional experiences in the use and maintenance of such equipment. SNM comprises 48 centers as members, with registered equipment distributed between: The Autonomous City of Buenos Aires; the provinces of Buenos Aires, Cordoba, Santa Fe, Rio Negro,

Mendoza, Entre Rios, Tucumán, Salta, San Luis, and Corrientes. SNM provides its member institutions the opportunity to submit requests for economic support. Projects to be financed may be related to training of professionals in microscopy (opticians, electronics, and scanning probes) inside the country or abroad; improvement of equipment and purchase of supplementary equipment for the existing equipment in public institutions.

The strategy and objectives of the SNM are well in line with the goals and activities of the Global BioImaging project, regarding the development of a global network of imaging research infrastructures by preparing the global interoperability and reach of EuBI to existing and emerging imaging infrastructures outside of Europe.
At a first common meeting in Argentina in February 2016, GBI was represented by its Scientific Coordinator Jan Ellenberg (see meeting agenda attached to this deliverable), who met representatives from MinCyT as well as from SNM. The main areas of collaboration between Euro-BioImaging and the Argentinian community were identified as follows:

- Via EuBI and GBI access to technologies not present or widespread in Argentina could be provided to Argentinian users (e.g. Light Sheet Microscopy, Super-resolution Microscopy, cryo-EM, CLEM etc.);
- Argentinian users could have access to training in relevant technologies in Europe;
- The Argentinian community could receive support in the preparation of training course curricula for their users and could in turn organize co-teaching in international joint courses;
- Training of facility staff, data management, image analysis and new technologies;
- Participation in setting-up virtual resources for basic training;
- Participation in data services;
- Organization of international technology workshops in Argentina;
- Organization of international practical courses in Argentina.

Other immediate needs identified by the Argentinian community are:

- To learn from the ITC concept in order to establish a super-resolution microscopy service facility in Argentina;
- To set-up a community-specific project management structure.

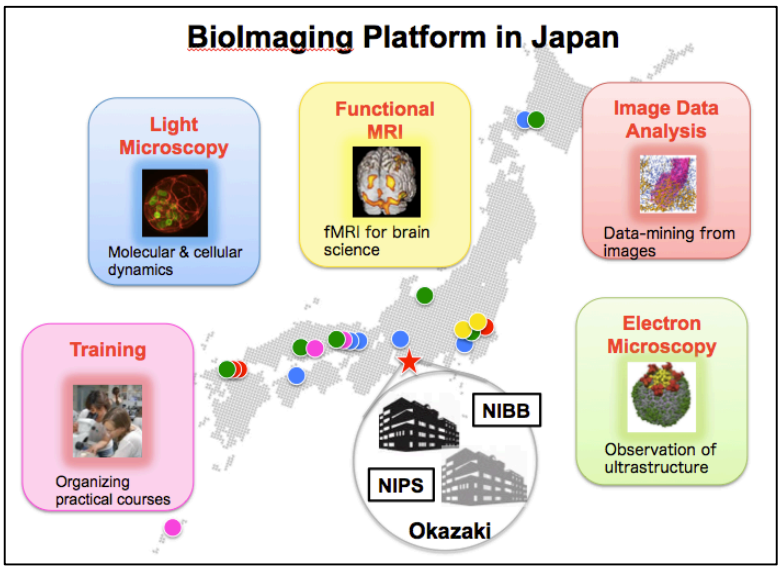
SNM and MiNCyT regard the definition of a future collaboration framework between GBI and Argentina is an achievable target and would benefit both the European and the Argentinian communities.

2.2 Japan

In **Japan**, many imaging groups and facilities in universities and institutes have launched a Japanese domestic network of imaging platforms in April 2016, offering open access via a web-based entry portal. Its main features can be summarized as follows:

- Launched in April, 2016, as a community-based network of technical support for advanced bioimaging technologies.
- Funded by the MEXT, “Grant-in-Aid for Scientific Research on Innovative Areas-Resource and technical support platforms for promoting research”
- Alliance of over 20 facilities with different expertise provides a broad range of technical support.

- Open to all MEXT grant holders (except for training).
- Request- and review-based support.
- Handling of applications and judgment are centralized to the administration office in NIBB/NIPS



http://www.nips.ac.jp/bioimaging/

To learn more about community organization and to foster the implementation of the national imaging infrastructure, Euro-BioImaging representatives are now invited to visit Japan in February 2017, during the national meeting of the Japanese imaging platform. They will present the Global BioImaging project, and discuss and identify which GBI activities are of highest relevance for the Japanese partners.

2.3 South Africa

In **South Africa**, universities are in the course of setting up dedicated imaging centers for physical but also remote user access. For example, the University of Cape Town is currently planning to establish a world-class Centre for Imaging and Analysis built largely around electron microscopy to serve the needs of all disciplines. The Facility will offer a large and versatile range of instruments and techniques serving the needs of Biological, Earth and Physical Sciences, Engineering and Medicine. It will be staffed by subject experts who will work closely with users at all levels from student training to project completion. The goal is to establish a facility in which scientists, engineers and medical researchers who can gain insight into their research topic through imaging will be able to get the necessary support to answer their questions. There are unique difficulties in establishing high-end electron microscopy in South Africa – although the benefits associated with using the technology are widely understood, the skills required to realize these benefits are not readily available. High end imaging equipment is exquisitely sensitive to environmental factors and needs to be housed in temperature controlled, vibration- and magnetic field free conditions. Both of these factors argue strongly for centralized, inter-disciplinary structures housed in specifically designed buildings.

Therefore, imaging experts in South Africa are especially interested in the Global BioImaging Project to exchange of expertise in facility implementation and training facility staff in advanced courses in facility management and imaging technologies.

Jason van Rooyen and Trevor Sewell from the University of Cape Town attended the first Exchange of Experience Workshop at EMBL, and reemphasized their interest to collaborate as Associated Partner in GBI. A first concrete measure in this direction is the organization of a GBI workshop in South Africa in October 2016, back-to-back with the International Conference for Research Infrastructures (ICRI 2016). It is planned to invite community representatives from universities and research institutes across South Africa to commonly discuss their needs, expectations and opportunities that GBI can offer to South African scientists in imaging technologies in the life sciences. Representatives from the ministry and universities' executives will also be invited to this workshop.

2.4 United States of America

In the **USA**, all major research institutions and universities have implemented cutting-edge imaging facilities during the last decade, however, most of these are closed for external visitors with a few exceptions such as the Advanced Imaging Center (AIC) at the HHMI Janelia Research Campus, which makes its unique microscopes accessible to outside groups by cloning them into a service facility available free (including housing) to scientists in the USA and internationally (http://www.janelia.org/aic).

In June 2016, Jan Ellenberg (EMBL) in his role as Scientific Coordinator of GBI project visited the AIC. The visit comprised a whole day programme (see separate file in Annex), including meetings with Janelia Executive Director Gerry Rubin, the Senior Director of Scientific Services Reed George, as well as the Director of the Advanced Imaging Center Teng-Leong Chew and leading Janelia technology developers such as Harald Hess, Philipp Keller and Luke Lavis.
EuBI and GBI was presented as an overview to the AIC team and in one-on-one discussions to the leadership of Janelia and possible future collaborations were discussed, largely at the strategic level with Gerry Rubin and Reed George and with more time and in more detail with Leong Chew and the AIC team. Strategically, Janelia sees value in GBI especially in the area of image data, professional training and recognition of the AIC service team and international visibility and sustained funding of the AIC (they would like their next call for proposals to be advertised via EuBI also in Europe). On the more practical level, as the AIC focuses on access to advanced non-commercial technologies, Janelia would be very interested in joint workshops and training courses, which could alternate between US and Europe. Possible topics for such workshops were identified as:

- Super-resolution data analysis: going beyond localization to stoichiometry, conformation etc.
- Dealing with unusual samples in mesoscopic/light sheet imaging: samples from marine biology/ecology, plants, tissues, organoids, etc.
- Sample preparation for advanced methods such as PALM/STORM, SIM, lattice light sheet etc.
- Image data standards and metadata for advanced methods such as PALM/STORM, SIM, lattice light sheet etc.

In addition, the AIC is very interested in being part of an international network of facilities that provide access to cutting edge non-commercial technologies. Developing good guidelines and best practice to ensure a successful user experience for these very support intensive services, with a special focus on pre-visit user consultation, good sample preparation support and support with data analysis would be highly desirable.

3. Strategy and collaboration tools

3.1 Overview

Each of the above mentioned associated partner countries and their imaging communities have a different state of experience regarding open access provision, training level of facility staff, quality management etc. For example, the US community is particularly strong in technology development, but the landscape is absolutely fragmented and open access is in place only at very few places such as Janelia Farm, and therefore the interest in the scientific community for the European developments is extremely high. In this regard, Global BioImaging Project supports Euro-BioImaging learning from the US colleagues about the latest technology developments, while at the same time in exporting the European know-how on setting up large-scale coordinated imaging research infrastructure for open user access and offer high-level staff training courses. South Africa is just at the beginning of setting up and opening its imaging facilities, and their most urgent need is to hire and train highly professional facility staff, e.g. in Euro-BioImaging staff training courses.

In GBI, there are two distinct sets of collaboration tools to engage with the international partners.

I. Participation in core activities organized in GBI Work Packages WP2, WP3, and WP4:

- International workshops “Exchange of Experience” (Europe 2016, India 2017, Australia 2018) (WP2)
- Training courses for core facility staff in facility operation (WP3)
- Training courses for core facility staff in image data management (WP4)
- Working group to prepare for set-up of virtual platforms for eLearning based on MyScope (WP3)
- Working group to prepare for set-up of virtual repository of relevant software tools for image data analysis (WP4)
- Development of international guidelines for open user access and quality management

From the early start of GBI, these tools allow the partners in Argentina, Japan, South Africa and USA to work together with their colleagues in Europe, Australia and India, on concrete objectives which will become the basis of the future sustainable collaboration across these international partners in imaging technologies in the life sciences.

II. Meetings and engagement with the national communities

Here, the GBI key representatives (e.g. the project coordinator, scientific coordinator) support and participate in national imaging community meetings in Argentina, Japan, South Africa and the USA to reach out for presenting the Euro-BioImaging model and learning about the needs and requirements of researchers and imaging facility providers in these countries. A key aspect of these meetings is the invitation and involvement of national funders for increasing their awareness of the community needs and for preparing the negotiation for funding of the sustainable networking activities of the

Global BioImaging partners. In all four countries, the first round of these meetings are already taking place during the first year of the GBI project, allowing a quick start for active engagement in GBI, and sufficient time for planning concrete steps to draft and sign future sustainable collaboration agreements at the level of national funders.

3.2 First activities

At the first physical meeting of GBI partners and all associated partners, the "Exchange of Experience I" workshop, which took place at EMBL (Heidelberg) in June 2016, the Euro-BioImaging partners met their international partners, including the established collaboration partners from Australia and India, as well as all new partners from Argentina, Japan, South Africa, and the USA.

They presented the status of research infrastructure in their home countries in dedicated international panel sessions, and discussed and defined their expectations and particular strengths they can bring to the project on behalf of their imaging communities. By organizing the international workshop physically and timely back-to-back also with GBI work package meetings, all Global BioImaging partners (European Beneficiaries plus all international partners) took advantage of the opportunity to directly discuss and shape the outline of the Work Packages' timelines, responsibilities and key deliverables together.

In particular, the design of the program for the first GBI training courses for staff in imaging facility management and operation as well as image data management evoked a lot of engagement from all sides, demonstrating again the high interest by international partners for training opportunities for their facility staff.

The plans for enlarging the existing virtual training platform "Myscope" at the AMMRF in Australia were also highly welcomed by everybody, and an international committee was launched which now decides on the content which will be implemented in the GBI framework. The virtual platform will be openly accessible and support users and staff in imaging technologies around the globe.

Figure 1: The first GBI international workshop "Exchange of Experience I", attracted 80 participants representing 6 continents to EMBL Heidelberg, in June 2016.

As described in the previous section 2, first meetings with the national communities and funders in Argentina (February 2016) and USA (June 2016) already took place, and meetings in South Africa (October 2016) and Japan (February 2017) are now in the planning.

4. Conclusion

Based on the enormous interest on all sides, to participate in a global network of imaging research infrastructures, the start of *WP6 Outreach to Other Regions* has been extremely successful, and the planned activities regarding the engagement with the local imaging communities in all countries are well ahead of the original timeline. All associated partners representing Argentina, Japan, South Africa and USA attended the first GBI international workshop at EMBL in June 2016, and here they emphasized again their strong interest in being engaged in the various GBI activities to prepare for common imaging infrastructure services and collaboration agreements.

ANNEX

I. National Microscopy System, Argentina - Workshop: Global BioImaging Project – Collaboration with Imaging Experts in Argentina (Representative: Jan Ellenberg – GBI Scientific Coordinator)

VISIT REPORT

<table>
<tr><td colspan="2">Date of visit: 10th -11th February 2016</td></tr>
<tr><td colspan="2">Visitor: Jan Ellenberg, Scientific Coordinator of Global BioImaging</td></tr>
<tr><td>Institutions visited:</td><td>List of participants and contacts:</td></tr>
<tr><td>Ministerio de Ciencia, Tecnología e Innovación Productiva (MinCyT)
Godoy Cruz 2320 (C1425FQD)
Buenos Aires
Argentina

Including visits at:
• Polo Científico –Tecnológico (Scientific and Technological Hub)
• Subsecretaría de Coordinación Institucional, MinCyT</td><td>MynCyT
Sergio Daniel Matheos – Undersecretary (smatheos@mincyt.gob.ar)
Silvia Nakano – Director (snakano@mincyt.gob.ar)

Argentine representatives at the scientific committee of GBI Project, EMBL
Dr. Alfredo Cáceres (INIME: Instituto de Investigación Médica, CONICET, acaceres@immf.uncor.edu)
Dr. Lía Pietrasanta (Centro de Microscopías Avanzadas, Facultad de Ciencias Exactas y Naturales, UBA, lia@df.uba.ar)</td></tr>
<tr><td colspan="2">Purpose of the visit
To participate in the workshop on “Collaboration of Euro-BioImaging with imaging experts in Argentina” within the Global BioImaging project.

To pave the way towards the establishment of a sustainable collaboration framework between Euro-BioImaging and the Argentinian imaging community.</td></tr>
<tr><td colspan="2">Supporting documents
• Meetings’ Agenda</td></tr>
</table>

- Presentation on National Microscopy System in Argentina
- Presentation on the Euro-BioImaging (EuBI) and Global BioImaging (GBI) projects

List of attendees:

Alejandra Attoresi	IBIOBA/CONICET
Analía Trevani	Academia Nacional de Medicina
Carlos O. Arregui	Instituto de Investigaciones Biotecnológicas (UNSAM)
Enrique Portiansky	Facultad de Cs. Veterinarias- Universidad Nacional de La Plata (UNLP)
Federico Fuentes	Academia de Medicina
Fernando Stefani	CIBION/CONICET
Francisco Barrantes	Laboratorio de Neurobiología Molecular -Instituto de Investigaciones Biomédicas
Gabriela Amodeo	Departamento de Biodiversidad y Biologia Experimental- FCEN UBA
Guillermo Docena	Facultad de Ciencias Exactas –UNLP
Guillermo Lanuza	Fundación Instituto Leloir
Horacio Salomon	Facultad de Medicina- UBA
María Elena Vela	UNIFTA, UNLP
Maria Eugenia Rodriguez	Universidad Nacional de La Plata
Mario Perello	IMBICE- Fac. Cs. Exactas (UNLP)
Mirta Ana Schattner	Academia de Medicina
Nicolás De Fracesco	IMBICE- Fac. Cs. Exactas (UNLP)
Ramiro Rodríguez	Instituto de Biología Molecular y Celular de Rosario
Roberto Fernández	Departamento de Fisiología, Biología Molecular y Celular (FCEN-UBA)
Roberto Pozner	Academia de Medicina
MINCYT representatives:	
Miguel Ángel Blesa	Secretaría de Planeamiento y Políticas en Ciencia, Tecnología e Innovación Productiva
Cecilia Averza	Dirección Nacional de Relaciones Internacionales
Sandra Vovk	Subsecretaría de Coordinación Internacional (SSCI)
Gabriela Gorjon	SSCI
Francisco Monterubbianesi	SSCI

II. GBI strategic meetings at Advanced Imaging Centre at HHMI Janelia Research Campus, USA (Representative: Jan Ellenberg – GBI Scientific Coordinator)

Monday June 27, 2016
9:30 am – 11:00 am Leong Chew, Director, Advanced Imaging Center 2C.124 and AIC Team
11:00 am – 11:45 am Brian English, Senior Scientist 2C.154
Transcription Imaging Consortium
12:00 pm – 1:00 pm Lunch in Servery w/AIC Team
1:00 pm – 1:30 pm Harald Hess, Group Leader 2C.155
1:30 pm Open
2:15 pm – 2:45 pm Luke Lavis, Group Leader 3W.163
3:00 pm – 3:45 pm Reed George, Senior Director of Scientific Services 1E.116
4:15 pm -4:45 pm Gerry Rubin, Executive Director 1E.158
5:00 pm – 5:45 pm Philip Keller, Group Leader 3C.165
6:00 pm Mouse Brain Imaging Workshop