

# Global Biolmaging Project

## D6.2 Report on outcome of international workshops in Argentina, Japan, South Africa, as well as USA

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**Abstract**

Since the beginning, the Global BioImaging Project consortium has engaged with representatives from national imaging infrastructures and communities in Argentina, Japan, South Africa, and the USA as described in detail in D6.1. Later during the project, Canada, Mexico and Singapore also joined GBI as associated partners. In this regard, a major milestone was the formation of the external Management Board (eMB) at the second international Exchange of Experience workshop, which took place in September 15-16th, 2017, at the NCBS in Bangalore, India. Current eMB members are representing Europe (Euro-BioImaging), Argentina, Australia, Canada, India, Japan, Mexico, Singapore, and USA. In the eMB, these leading imaging infrastructure experts discuss and work on their commonalities and challenges in managing (national) imaging infrastructure in their home countries, and work towards building a long-term sustainable international Global BioImaging network.

Since delivery of D6.1, which summarized collaboration tools with international imaging infrastructures, GBI organized several workshops in South Africa, Japan, Canada and USA. The workshop in Argentina was already described in D6.1.

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## **1. Introduction**

The Global BioImaging Project facilitates the development of a global network of cutting-edge imaging research infrastructures by preparing the global interoperability and outreach 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. It aims at establishing common infrastructure services such as virtual platforms for training material and image data tools, and at pursuing whenever possible collaboration agreements on the reciprocal use, openness and co-financing of their services. These activities support international research in the areas of biological, marine, medical, material and agricultural sciences.

In summary, this project is establishing the foundation for a long-term alliance of mutual benefit between Euro-BioImaging and its international partners and serves international infrastructures' users, operators as well as the life sciences research landscape.

So far advanced training of facility staff has been in the focus of all established international collaboration agreements as well as of more informal communication between Euro-BioImaging and its international partners. This is because the sophistication of the innovative technologies and their instrumentation requires highly specialized expertise to efficiently and successfully operate the instruments and analyze the resulting image data, while most countries face a severe shortage in technical experts.

At the same time, the exchange of experience in running open access facilities, the latest imaging technology developments, the establishment of quality management and the 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.

Within this international capacity building and exchange of experience exercise, the major objective of *WP6 Outreach to Other Regions* has been 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 were and have continued to be very supportive of the Global BioImaging Project. They have participated to the first and the second International "Exchange of Experience" Workshops, organized by WP2 and demonstrated renewed interest in all project activities such as the shadowing program and extended Management Board meetings.

More countries have shown interest and participated in the project. Canada and Singapore joined the GBI consortium as associated partners. First conference calls and meetings with imaging infrastructures from Chile and China were also held, but the engagement still needs to be further developed before organizing a dedicated workshop in these countries.

In the first two years of GBI, the different status, interests and requirements of each national imaging infrastructure community became clearer and were also reported by WP2 and in D6.1. For example, Japan and the USA are leading in the development of innovative imaging technologies and Euro-BioImaging partners have 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 objectives formulated for GBI at project start were proven valid: the interaction with international partners benefits in particular its image data infrastructure (international development of new software tools, use of common image data repositories), its training activities (engaging the best international faculty to take part in Euro-BioImaging courses, working on the sustainability of its facility staff courses by extension to international participants) and the general imaging technology know-how – being in direct communication with leading technology developers around the globe helps keeping Euro-BioImaging Nodes state-of-the-art. In addition, international infrastructure experts can advise Euro-BioImaging regarding performance and quality management.

In D6.2, we report on several international workshops, which took place in South Africa, Japan, Canada and the USA. The workshop in Argentina took place in M3 and was already reported on in D6.1.

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

Because of the recent technical revolution in imaging applications in the life sciences, imaging core facilities and infrastructure are forming at many research institutions around the globe. They all face similar challenges: finding well-trained staff to operate the instruments and manage the facilities, implementing efficient and affordable user access policies, implementing sustainable quality management and providing support with image data storage and analysis challenged by 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. From the 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.

Therefore, GBI ran several international workshops in the countries listed below. The workshop have always been supported by local organizers who planned the meetings and invited the national imaging communities and national funding representatives.

### **2.1 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 establishing 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 scientific questions. There are unique difficulties in establishing high-end electron microscopy facilities in South Africa – although the benefits associated with using the technology are widely understood, the skilled personnel 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 have been highly interested in the Global BioImaging Project since its start, to have a platform for the exchange of expertise in facility implementation and for 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 was the organization of a GBI workshop in South Africa in October 2016, back-to-back with the International Conference for Research Infrastructures (ICRI 2016):

### 2.1.1 Global BioImaging workshop at University of Cape Town (UCT) on October 6<sup>th</sup>, 2016

A subgroup of the University Research Council's Imaging and Analysis working group convened a bio-imaging workshop back to back with the ICRI2016 conference on the 6<sup>th</sup> of October 2016, at the Belmont Square Conference Centre from 9 am until 1:30 pm. The meeting was attended by the heads of regional imaging facilities, SA Department of Science and Technology officials, post-graduate students, UCT research office staff, UCT eResearch staff, and visiting GBI and EMBL staff and scientists. Community representatives from universities and research institutes across South Africa were invited to commonly discuss their needs and expectations as well as the opportunities that GBI can offer to South African imaging scientists in the life sciences. A representative from the ministry also participated in this workshop.

The workshop was attended by the following participants:

Antje Keppler	Global BioImaging Project - Coordinator; Euro-BioImaging (EMBL)	keppler@embl.de
Yannick Schwab	EMBL Heidelberg, Head of EM Core Facility	schwab@embl.de
Jason van Rooyen	UCT eResearch	<a href="mailto:jason.vanrooyen@uct.ac.za">jason.vanrooyen@uct.ac.za</a>
Wilna Venter	UCT Research Office	<a href="mailto:wilna.venter@uct.ac.za">wilna.venter@uct.ac.za</a>
Dirk Lang	UCT PI and Head of Imaging Facility	<a href="mailto:dirk.lang@gmail.com">dirk.lang@gmail.com</a>
Musa Mhlanga	UCT PI – Dept of Integrative Biomedical Sciences, UCT	<a href="mailto:musa@mhlangalab.org">musa@mhlangalab.org</a>
Ben Loos	Stellenbosch University - PI	<a href="mailto:bloos@sun.ac.za">bloos@sun.ac.za</a>
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Dale Peters	Acting Director, eResearch, UCT	<a href="mailto:dale.peters@uct.ac.za">dale.peters@uct.ac.za</a>

The meeting aimed to take advantage of the presence of GBI representatives and EMBL scientist to achieve the following outcomes:

- To learn more about regional imaging facilities and complementary instruments.
- To bring the interests of the group to the attention of the DST.
- To hear about the opportunities presented by the GBI initiative directly from the programme manager, Antje Keppler (see Annex below).
- To learn from Yannick Schwab about the EM core facility at EMBL and his group's scientific research and method development.

Following the GBI Coordinator's introduction to EuBI and GBI, selected regional facility heads gave overviews of their facilities and research programmes. Musa Mshlanga from UCT, Dirk Lang from UCT, and Stellenbosch University's Lize Engelbrecht all presented. Unfortunately, the medical imaging (Ernesta Meintjies, [ernesta.meintjies@gmail.com](mailto:ernesta.meintjies@gmail.com)) and Faculty of Science (Nicola Illing [nicola.illing@uct.ac.za](mailto:nicola.illing@uct.ac.za)) representatives could not attend.

A short discussion followed and covered topics of concern for the community, including:

- The SA Research Infrastructure Roadmap and its implications for future facility funding
- Collaboration and interchange between regional facilities
- Re-invigorating the effort to represent bio-imaging at the national microscopy meeting
- Training and retaining staff as well as sharing experience and co-hosting workshops
- Strategic applications for new equipment avoiding duplications of efforts and simultaneous applications for funding by laboratories which could instead find collaboration mechanisms and benefit all labs (e.g. image analysis)

Yannick Schwab gave an overview of the EM facility at EMBL and spoke at length about his group's exciting scientific and development breakthroughs. His talk stimulated an interesting debate around balancing method development and service in a core facility.

In concluding the meeting, several attendees expressed their satisfaction with the event and willingness to see future engagements of a similar nature. It was discussed that regional forums and eventual national alliances of laboratories, facilities, and investigators have the potential to:

- Catalyse collaboration on research projects and joint applications for funding with international partners

- Initiate discussions on regional and national equipment needs to strengthen and support equipment grant applications
- Speak with a unified voice to national funding agencies for gaining access to foreign infrastructure
- Share training materials and expertise in science and facility management
- Identify common problems in user, data, and facility management and reach collective solutions.

A key outcome of this co-organized international workshop was the nomination of Ben Loos (Stellenbosch University) as representative of the South African imaging community in GBI. Subsequently, he participated in the GBI EoE II meeting in Bangalore, and became member of the extended GBI Management Board. A second workshop based on the outcome of the first one is planned for October 2018, to expand towards the imaging community at large and involve the funders in South Africa in the sustainability plans for GBI.

## **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. This endeavour is funded by the MEXT, “Grant-in-Aid for Scientific Research on Innovative Areas, Resource and technical support platforms for promoting research” and consists of an alliance of over 20 facilities with different expertise to provide a broad range of technical support.

ABiS (Advanced Bioimaging Support) provides access to and support in using cutting-edge technologies for light microscopy, electron microscopy, magnetic resonance imaging, and bioimage analysis. ABiS was established by domestic partner organizations that owned and operated multiple types of advanced specialized imaging equipment, in order to provide comprehensive support for advanced imaging to those who hold grants from MEXT in the field of life science. Currently ABiS funding by MEXT runs until 2021. For more information, please visit: <http://www.nibb.ac.jp/abis/?lang=en>

### **2.2.1 Meeting with Japanese ABiS imaging research infrastructure in Okazaki, February 19-20, 2017**

In the framework of the 1<sup>st</sup> ABiS conference at the Okazaki conference centre on February 19-20, 2017, the GBI partners from Euro-BioImaging presented the Euro-BioImaging research infrastructure concept as well as the objectives and activities of the GBI project. They discussed together with the ABiS partners and the representatives from the Japanese ministry for research (MEXT), suggestions for continued collaboration with the Japanese bioimaging communities.

The 1<sup>st</sup> ABiS conference took place for two days (the detailed program is provided in the Annex), and contained scientific and technical presentations in Japanese and English language. It was held as a joint symposium of ABiS and two program grants, Grant-in-Aid for Scientific Research on Innovative Areas “Resonance Biology for Innovative Biology” and “The Birth of New Plant Species” which are closely related to bioimaging. As part of the international sessions, Jan Ellenberg in his role as PPII Coordinator presented the Euro-BioImaging research infrastructure concept. Antje Keppler, Coordinator of Global BioImaging, presented the objectives of this project for international collaboration, highlighting the possibilities for engagement with the Japanese bioimaging community. The most relevant ones are:



- Participation of ABiS partners in the international workshops “Exchange of Experience” EoE II (India 2017) and III (Australia 2018)
- Participation of Japanese facility staff to training courses in facility operation and image data tools (e.g. 2018 in Australia)
- Common organization of training courses also in Japan
- From February 2017 onwards: Access to virtual GBI platforms (training and image data) for Japanese partners
- ABiS supporting the common development of guidelines for open user access & quality management (as part of EoE II and EoE III)

The GBI Coordinator encouraged the conference participants to engage with their national funders for additional travel funds for Japanese scientists to participate in the GBI workshops and training courses. She also highlighted that participation of Japanese imaging scientists in the GBI working groups to develop virtual platforms and international RI guidelines on user access and quality management is most welcome. In summary, it would be important to explore with the national funders in Japan their interest in building sustainable international services in imaging infrastructures.

In a dedicated meeting of ABiS leadership, MEXT, GBI and Euro-BioImaging representatives, one topic for discussion was the creation of awareness for the newly opened imaging platforms and their services in the scientific communities in Japan and Europe. Antje Keppler reported on the experiences in Euro-BioImaging regarding the outreach strategy to scientists (EuBI website, regular newsletters, social media, participation in scientific conferences etc.).

Furthermore, the involvement of industry in Euro-BioImaging was discussed in detail after questions from MEXT and ABiS on this topic. Since the start of the Euro-BioImaging initiative in 2009, imaging companies were highly interested in this project. In 2016, a dedicated industry board formed, funded by its members (EuBI Industry Board or EBIB). It currently comprises 11 companies. (<http://eurobioimaging-industryboard.com/>).

The board’s objectives are to:

- Cooperate with EuBI Nodes on testing of novel technologies
- Participate and contribute to EuBI training activities
- Create a platform for industry-science cross collaboration
- Strengthen communication with imaging technology users and imaging facilities => understanding users’ needs
- Create “one voice” to promote the importance of imaging with the national and international funders
- Stay up to date with the use of technology and software at EuBI Nodes and with the needs of researchers
- Increase the Membership to cover all areas of imaging: EBIB actively invites all companies working in the imaging field to join the Board

The participants of this meeting agreed that Euro-BioImaging, GBI and ABiS will learn a lot from each other in the different relevant topics of imaging infrastructure services, and that there is a general interest to continue and intensify the collaboration between the two imaging infrastructures.



**Table 1: Closed session of GBI – ABiS meeting: List of participants**

Tetsushi Kagawa, Dr.	Ministry of Education, Culture, Sports, Science and Technology – Japan (MEXT)
Masayuki Yamamoto, Director General	National Institute for Basic Biology (NIBB)
Naoto Ueno, Prof.	National Institute for Basic Biology (NIBB)
Shoji Mano, Dr.	National Institute for Basic Biology (NIBB)
Jan Ellenberg, Head of Unit CBB	EMBL Germany
Antje Keppler, GBI Coordinator	EMBL Germany

Based on the continuous participation of ABiS representatives in GBI events (EoEs and training courses) and this common meeting in Okazaki in 2017, Japan and GBI are now negotiating a collaboration framework for their long-term collaboration and the sustainability of the GBI network.

### 2.3 Canada

The Canadian landscape accounts for scientific communities that are generally quite small, and until recently not always rationally organized in associations or societies per field. In the case of imaging, in 2017 the community in Canada was represented by two associations:

- CCMA (Canadian Cytometry and Microscopy Association), representing Cytometrists and Light Microscopists;
- MSC (Microscopical Society of Canada) focusing on Electron Microscopy mainly in the field of material science.

Alongside this, in 2016, the Canadian Network of Scientific Platforms (CNSP, <http://cnsprcps.ca/>) was founded. CNSP aims to promote awareness about the scientific platform (SP) resources available to the community across Canada, educate researchers about SP technologies, develop best practices for the operation and management of SPs, network and exchange ideas, create a cooperative culture in the research community and promote interactions with industry leaders to affect the development of SP infrastructure and applications. CNSP includes but is not limited to imaging technologies. Nevertheless, imaging covers a key role and Global BioImaging was invited to take part in their inaugural meeting on 9<sup>th</sup> May 2017, in Montreal, Canada. GBI Project Manager Federica Paina attended the meeting, which is traditionally a meeting of Core Facility Staff (not limited to imaging) that takes place straight before the annual Canadian Microscopy and Cytometry Symposium but that in 2017 was organized under the umbrella of CNSP.

She presented EuBI and GBI, and meeting participants welcomed what was achieved in Europe, in particular the results that the networking and community-building efforts allowed. Many came forward and expressed interest in participating in GBI's events but most importantly, Claire Brown (President of CNSP) has been looking into ways to make this more concrete. She joined EoE II in Bangalore via virtual communication tools and is invited as speaker to Australia's EoE III.

The Montreal meeting was also the starting point to work on Canada BioImaging, which aims at bringing together all the imaging communities across Canada (including the one represented by CCMA and MSC).

During the CNSP's Scientific Platform Meeting the need to organize core facilities was strongly advocated for. Sharing of instruments, know-how and expertise was promoted and measure aiming at facilitating good practices towards achieving this goal were described. For example, databases of

available instruments that can be consulted “open access” by the scientific community have been set-up.

Discussions on how to build a sustainable portfolio of core facilities, focusing not only on state-of-the-art infrastructures but also on building capable managers were held.

The Canadian Foundation for Innovation (CFI), the major Canadian governmental funder, also participated to the meeting. Sharyn Szick, CFI’s representative, described their efforts on leveraging the federal government to create a new funding initiative for institutional operation funds for the salaries of SP scientific staff and for repairs and maintenance of CFI equipment that is past the warranty period, in the frame of creating a sustainable environment for core facilities and infrastructures.

**Table 2: Speakers to the CNSP’s Scientific Platform Meeting**

Claire M. Brown	President of CNSP; McGill University
Federica Paina	Global Biolmaging Project Manager; Euro-Biolmaging (EMBL)
Philip E. Hockberger	Executive Director of Research Facilities at Northwestern University, Chicago
François Jean	Associate Professor, Dept. Microbiology & Immunology, University of British Columbia
Brent Myron	Manager of Operations, CREAT Network, Memorial University
Sharyn Szick	Canadian Foundation for Innovation (CFI)
Loïck-Alexandre Gautier	Pôle de recherche et d’innovation en matériaux avancés au Québec (PRIMA QUEBEC)

Since the meeting, Canada Biolmaging has been collecting letters of support from Canadian universities, imaging core facilities and imaging associations such as MSC, CCMA to build the case of the importance of such a network. Canada Biolmaging is working to put the basis for a common collaboration agreement to be signed with Euro-Biolmaging as soon as possible, ideally within the end of the GBI project.

#### **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. AIC makes its unique microscopes accessible to outside groups by cloning them into a service facility available for free (including housing) to scientists in the USA and internationally (<http://www.janelia.org/aic>). As reported in D6.1 (please see for more details), in June 2016 Jan Ellenberg (EMBL) in his role as Scientific Coordinator of GBI project visited the AIC. 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. On the more practical level, as the AIC focuses on access to advanced non-commercial technologies, Janelia expressed its interest in joint workshops and training courses, which could alternate between US and Europe.

Therefore, Janelia together with GBI organized an international workshop for directors of imaging infrastructures:

#### 2.4.1 Frontiers in Microscopy Technologies and Strategies for Bioimaging Centers Network - Janelia Research Campus/HHMI, February 25-28, 2018

This meeting brought together directors of imaging centers and program leaders of open access infrastructures. The meeting created a platform to explore the frontiers in imaging technologies, discuss common challenges, and strategize on how the global imaging community can build a common network to tackle the era of big data as well as rapid technological advances in microscopy. Presentations covered topics such as emerging microscopy tools, probe and biosensor development, data management and analyses, outreach strategies, and global collaborative partnership. The organizers included breakout sessions for smaller group discussions and hands-on demonstrations of the latest imaging tools at Janelia's Advanced Imaging Center. The meeting was represented by more than 50 institutions from 18 countries and the meeting materials (abstract book and agenda) can be found in the URLs below. More information on the meeting can be found also on the Janelia website:

<https://www.janelia.org/you-janelia/conferences/frontiers-in-microscopy-technologies-and-strategies-for-bioimaging-centers>

Abstract book: <https://tinyurl.com/y8nmzva7>

Agenda: <https://tinyurl.com/y785osjs>

A key outcome of this workshop was the formation of “BioImaging North America” (BINA), a network whose aim is to bring together the bioimaging community in Canada, the US and Mexico. In this way, the bioimaging community in North America is organizing itself to have a collective voice. While there was no doubt there will be challenges ahead, participants felt that there were numerous benefits in forming the BINA. Before, funding agencies did not have a representative bioimaging partner with which to conduct a strategic dialogue, and their global peer organizations had no counterpart to form a closer alliance. BINA will work closely with GBI and also with the ABRF (Association of Biomolecular Resources), to better formulate meaningful partnership that would provide guidance, assistance, training opportunities, data sharing, and technology dissemination to the community, with a strict focus on bioimaging. BINA is a “network”, a platform for communication and for fostering closer partnerships. At this point, BINA is not a platform for sharing “infrastructure” like Euro-BioImaging wherein open access to technologies is managed.

The current members of the first BINA core committee are:

- **Claire Brown (McGill University, Canada)**
- Meredith Calvert (Gladstone Institute, California)
- **Teng-Leong Chew (HHMI Janelia)**
- Rich Cole (Wadsworth Center, New York)
- Alison North (Rockefeller University, New York)
- Simon Watkins (University of Pittsburgh)
- **Christopher Wood (Universidad Nacional Autónoma de México)**

In bold are those members who are also national representatives of their imaging communities of the extended Management Board of GBI.

## 2.5 Singapore

At the GBI EoE II meeting in Bangalore, Graham Wright as senior expert represented the imaging community from Singapore. This was just ahead of their proposal submission to a national infrastructure call in Singapore. In the following, the Singapore consortium included partly concepts in their proposal based on the discussion at this GBI meeting and previous work by the GBI consortium and Euro-Biolmaging.

With the recent award of the National Research Foundation (NRF) Shared Infrastructure Support (SIS) grant they now establish and develop SingaScope. Building from an initial partnership of Singapore's five leading microscopy facilities (Figure 1) and subsequently expanding to include further platforms with the intention of being inclusive and comprehensive.

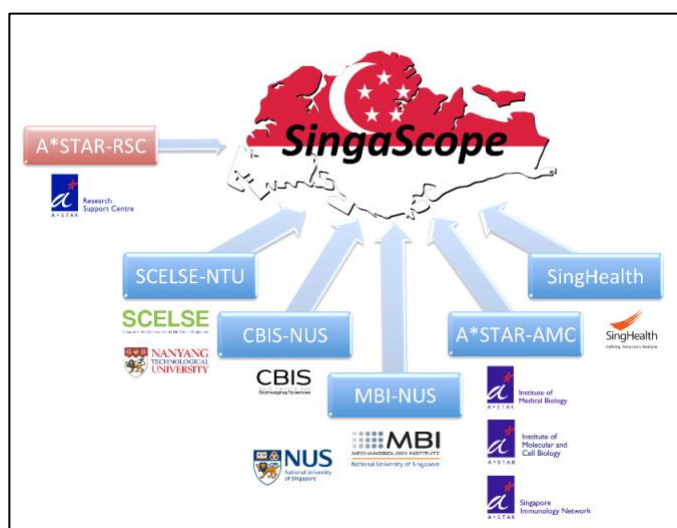


Figure 1: SingaScope - Networking Singapore's microscopy resources.

SingaScope will enable scientists in Singapore to identify (through a searchable online database) and access microscopy resources (both instrumentation and expertise) with the key principle that all researchers will have access to valuable microscopy resources. SingaScope will leverage on the existing well-equipped microscopy platforms, continuing to develop them with strategic acquisition of emerging technologies. Conversely advanced instrumentation, and the relevant expertise, has more limited availability, restricting the number of researchers with access and potentially leading to inefficient use of the resources. They aim to develop Singapore's human capital, raise service standards and cement Singapore as the regional centre of excellence for microscopy training by educating scientists at all levels and training facility staff in both technical and managerial/operational skills. They provide a forum for the exchange of experience and information between microscopists in Singapore and with the international community by engaging with similar initiatives (e.g. Global Biolmaging, Euro-Biolmaging, AMMRF, NEUBIAS).

### 3. Key outcome from international workshops

Although the imaging communities in each visited country (South Africa, Japan, Canada and USA) are quite different in their size, availability of cutting-edge imaging facilities, open access policy, and existence of imaging-related organizations, they all also presented commonalities, similar challenges they are all facing, and high interest in building together an international network of imaging infrastructures (GBI).

The common objectives for a long-term GBI network are currently assembled by all members of the extended Management Board supported by the GBI project management.

In September 2017, at its 8<sup>th</sup> meeting in Bangalore the GBI Management Board (which comprises all Beneficiaries as well as Australia and India as associated partners) decided to set-up the extended Management Board. This new forum comprises representatives from all countries interested in joining GBI and is open to new members. Currently its main task is the development of a long-term sustainability plan for the GBI as an international network of imaging infrastructures beyond November 2018, when the EU funding will end.

The extended Management Board currently comprises:

<b>Euro-BioImaging</b>	Jan Ellenberg, Antje Keppler, Federica Paina, Rainer Pepperkok (EMBL); J. Eriksson, I. Pukonen (ABO); J. Swedlow, G. Rustici (UNIVDUN); S. Aime, A. Viale (UNITO); J. Salamero (IC); W. Niessen, A. van der Lugt (ERASMUS MC); J. Colombelli (IRB)
<b>Argentina</b>	L. Pietrasanta, A. Caceres (U. Buenos Aires)
<b>Australia</b>	C. Fuery, J. Cairney (AMMRF)
<b>Canada</b>	C. Brown (Mc Gill U.)
<b>India</b>	H. Krishnamurthy, J. Mayor (India BioImaging, NCBS)
<b>Japan</b>	N. Ueno (ABiS; NIBB)
<b>Singapore</b>	G. Wright (A STAR)
<b>South Africa</b>	B. Loos (Stellenbosh U.)
<b>USA</b>	T. L. Chew (HHMI, Janelia), R. Conroy (NIH)





Figure 2: The second GBI international workshop “Exchange of Experience II”, attracted 55 participants representing 5 continents to Bangalore, India, in September 2017.

#### **4. Conclusion**

Based on the enormous interest on all sides, to participate in a global network of imaging research infrastructures, *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 progressing well towards a sustainable international network. Associated partners representing Australia, Canada, India, Japan, Singapore, South Africa and USA attended also the second GBI international workshop at NCSB in Bangalore (Sep 2017). There they emphasized again their strong interest in being engaged in drafting the long-term sustainability plan for GBI activities and to prepare for common imaging infrastructure services. Collaboration agreements are now underway with e.g. Japan and Singapore, more are planned to follow in the near future.