

**GLOBAL BIOIMAGING  
EXCHANGE OF EXPERIENCE IV**  
13-14TH SEPTEMBER 2019, SINGAPORE

**GLOBAL  
BIOIMAGING**  
growing collaboration



**SingaScope**

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## WELCOME MESSAGE

Dear EoE IV participants & Global Bioimaging partners,

It is our pleasure to welcome you to the 4<sup>th</sup> edition of the annual Global Bioimaging (GBI) Exchange of Experience workshop in Singapore, the garden city.

This year marks the beginning of a new era for the Global Bioimaging network, which – having taken its first steps in late 2015 thanks to European Union’s H2020 funding – has become a truly global network of 10 international partners across six continents!

Our annual get-together has already become a tradition, and again brings together imaging scientists, academics, facility operators, infrastructure managers, data experts and policy professionals from all around the globe, to discuss common ‘hot topics’ in operating imaging infrastructures. We are very pleased that several new countries will be represented at this meeting, so a special welcome to them.

This year’s EoE will focus on the topic of “*Career Paths for Facility Staff*”, bringing together international experts to analyse the situation across the globe, to identify critical challenges as well as commonalities, and promote career opportunities for directors, managers and staff working at imaging platforms.


Moreover, during the Saturday session the Working Groups established last year in Sydney, will present their work and stimulate discussions on the topics of image data, quality management, societal impact of imaging infrastructures and the focus to strengthen GBI’s future.

As always, we have reserved key networking moments to strengthen our community bonds and build bilateral and multilateral collaboration opportunities. We will have plenty of time to talk to our international colleagues during satellite meetings, lunch and coffee breaks, as well as while savouring Singapore’s famous cuisine on Friday evening!

We take this chance to warmly thank our industry partners and A\*STAR for their generous contributions making this year’s event possible! We also thank all of the attendees for their continued commitment to the Global Bioimaging initiative.

We are looking forward to interacting with you all and bringing home many new impressions and exciting ideas! Together we not only advance the work on key topics relevant for the imaging community globally, but also create new value and demonstrate the concrete benefits of scientific international cooperation.

With kindest regards



**Antje Keppler**  
Project Coordinator  
Global Bioimaging



**Federica Paina**  
Manager  
Global Bioimaging



**Graham Wright**  
EoE IV Host  
SingaScope

## THANKS

The organisers would like to express their thanks to the following partners and organisations for their generous support for this meeting:



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## SCHEDULE – Day 1

### Friday 13<sup>th</sup> of September

10:00 – 12:00 [Optional but open to all] **A\*STAR Microscopy Platform Visit**  
Meet Goh Wah Ing (AMP Assistant Manager) at Matrix Building Lobby (Level 1) at 10am. Further details on p28.

10:00 – 12:00 [Closed session] **Global Bioimaging Management Board Meeting**  
(details distributed separately)

#### **Session 1: Promoting a culture change – Career Paths for Core Facility Staff**

*Chair: Graham Wright, SingaScope*

*Venue: Creation Theatrette, Level 4, Matrix Building, Biopolis*

12:00 – 13:00 Registration & Lunch (provided, all welcome)

13:00 – 13:15 **Welcome address**  
*Antje Keppler, Global Bioimaging & Graham Wright, SingaScope*

13:15 – 13:35 **Keynote Speech**  
*Dr Cheong Wei Yang, Deputy CEO, National Research Foundation, Singapore*

13:35 – 14:05 **Building the Infrastructure for a Career in Core Facilities**  
*Invited speaker: Phil Hockberger, Northwestern University, USA*

#### **A snapshot from around Global Bioimaging - Part I**

14:05–14:15 **Unmatched Performance Measures Fail to Recognise Core Facility Staff**  
*Saba Salehi, National Imaging Facility, Australia*

14:15 – 14:25 **International recommendation for facility staff training**  
*Antje Keppler, EMBL, Germany*

14:25 – 14:35 **Progress towards integrating an imaging community in Latin America: Mexico, Uruguay and beyond**  
*Christopher Wood (UNAM, Mexico), Andrés Kamaid (Uruguay), Leonel Malacrida (Uruguay)*

14:35 – 15:05 Coffee Break

**Session 1 continued...**

**15:05 – 15:35 A snapshot from around Global Bioimaging - Part II**

15:05 – 15:15 **Carrier path of bioimaging technical staff in Japan**  
*Naoto Ueno, ABiS, Japan*

15:15 – 15:25 **An Integrated and Progressive “Training Passport” for Recognition and Validation of Imaging Core Facility Engineers Career path**  
*Caroline Thiriet & Jean Salamero, France Bioimaging, France*

15:25 – 15:45 **Careers in Core Facilities: Global problems, national solutions?**  
*Elisa May, University of Konstanz, Germany*

15:45 – 16:15 **Advanced Microscopy & Core Facility Management Post-Doctoral Fellowship Program**  
*Invited speaker: Jennifer Waters, Harvard Medical School, USA*

16:15 – 16:30 **TBC**  
*Invited speaker: Cath Brooksbank, Head of EMBL-EBI Training Programme, RI-TRAIN Project, UK (Remote participation)*

16:30 – 17:45 **Panel discussion: Development of an international recommendation on a career path for Core Facility Managers**  
*Session chair: Ian Smith, Monash University, Australia*

*We will be using PigeonHole to help collate questions and discussion points. Session ID: GBIEOEIV.*

17:45 – 18:00 **Wrap-up of Day 1**  
*Graham Wright, SingaScope*

18:30 **Networking Dinner**  
**A taste of Singapore’s cuisine (Strait’s Kitchen, Grand Hyatt)**

Buses are provided to take attendees from Matrix to the restaurant. You are welcome to return to your own hotel at your leisure after the dinner, or take the chance to explore the nearby Orchard Road district. Further details on p29.

## SCHEDULE – Day 2

Saturday 14th of September

**Session 2: Moving Global Bioimaging Forward**

*Chair: Jan Ellenberg, EMBL*

*Venue: Creation Theatre, Level 4, Matrix Building, Biopolis*

09.00 – 09.30 **Global Bioimaging: the path so far and the objectives for the future**  
*Federica Paina, EMBL, Germany*

09.30 – 10.00 **Working Group on “Image Data Management”**  
**Metadata and Performance Tracking for Fluorescent Microscopes**  
*David Grunwald, University of Massachusetts Medical School, USA*  
**Bioimage Archive**  
*Jan Ellenberg, EMBL Heidelberg, Germany*  
**Public Data Resources for the Global Bioimaging Community**  
*Jason Swedlow, University of Dundee, UK & Shuichi Onami, RIKEN, Japan*

10.00 – 10.30 **Working Group on “Quality Management in Imaging Facilities”**  
**Overview of quality management**  
*Julie Rothacker, Monash University, Australia*  
**Common international recommendations for quality management in imaging infrastructures**  
*John Eriksson, Turku Bioscience, Univ. of Turku and Åbo Akademi Univ, FIN*  
**Exposing an Overlooked Problem: Under- and Mis-reporting of Imaging Parameters in Publication**  
*Teng-Leong Chew, Janelia Research Campus, USA*

10.30 – 11:00 Coffee Break

**Session 2 continued...**

- 11.00 – 11.30     **Working Group “Societal Impact of Imaging Research Infrastructures”**  
*Imaging Infrastructure & Socio-Economic Impact*  
*Claire Brown, McGill University, Canada & Antje Keppler, Euro-BioImaging*
- 11:30 – 12:00     **RI-VIS: Expanding RI visibility to strengthen strategic partnerships**  
*Invited speaker: Susan Daenke, Instruct ERIC, UK*
- 12.00 – 12.30     **A snapshot of Singapore’s pre-clinical & translational bioimaging eco-system**  
*Sekar Sakthivel, SBIC, A\* STAR, Singapore*
- 12:30 – 13:15     **Signature ceremony of collaboration agreements**
- 13.15 - 14:00     Lunch (provided, all welcome)
- 14:00 – 15:00     **Image Data Management Working Group session**  
*Venue: Creation Theatrette, Level 4, Matrix Building, Biopolis*
- 15:00 – 17:00     **Individual Working Group breakout meetings**  
*Venues: Meeting Rooms, Level 3, Matrix Building, Biopolis*
- Image Data Management - Video Conference Room (if required)*  
*Quality Management in Imaging Facilities - Meeting Room 1*  
*Societal Impact of Imaging Research Infrastructures - Meeting Room 2*  
*Career Paths for Core Facility Staff – Meeting Room 3*



## ABSTRACTS - Session 1

In order of appearance

### **Building the Infrastructure for a Career in Core Facilities**

**Phil Hockberger, Associate Vice President for Research**

*Office for Research, Northwestern University, Evanston, IL USA*

#### **Abstract**

This presentation will focus on our efforts over the past 10 years to create and promote a career track for scientists working in core facilities. These efforts include the following: creation of core-specific faculty and staff positions; administrative support for core operations (business consulting, IT, marketing); financial support for lab renovations, operating expenses, and new equipment; financial support for professional development (travel, education); annual networking events and recognition (awards); development of core-specific business course (with our business school), mentorship program (with ABRF) and publication guidelines for users of core facilities. We are currently working on guidelines to improve rigor and reproducibility across core facilities. We have also instituted a rigorous evaluation process that provides annual feedback to core leadership to ensure that they are meeting the needs of researchers as well as aligned with the University's strategic plan. The success of these efforts is correlated with recruitment and retention of exceptional faculty, growth of research programs, enhanced interdisciplinary research, and improved external evaluation of core facilities.

#### **Short biography**

Phil Hockberger has been a professor and senior administrator at Northwestern University since 1987. As AVPR, Phil is responsible for: developing, maintaining and advancing state-of-the-art research (core) facilities; planning and coordination of construction and renovation of research space on the Evanston campus; developing and coordinating research partnerships with academic institutions, industry and national laboratories. Prior to his role as AVPR, he taught and ran a research lab in the Department of Physiology of the Feinberg School of Medicine for 22 years. His research contributions include advances in live cell imaging, membrane biophysics and signal transduction, cell adhesion and migration, photobiology and phototoxicity. Phil received his Ph.D. degree in Neuroscience from the University of Illinois at Urbana-Champaign, and did postdoctoral research at AT&T Bell Laboratories in Murray Hill, NJ.

# **Unmatched Performance Measures Fail to Recognise Core Facility Staff**

**Saba Salehi**

*Chief Operating Officer  
National Imaging Facility, Australia*

## **Abstract**

The main role of the National Research Infrastructure (NRI) staff is to support users' research by providing scientific input into best tools, experiment design, data interpretation, and data management. Such R&D leadership role is in particular crucial for imaging infrastructure. Therefore, National Imaging Facility and Microscopy Australia staff are often required to have similar qualifications and expertise to academics, with many being appointed on an academic level. However, these staff are often not expected to teach university courses, undertake their own research, or publish first-authored papers, which means standard academic performance measures do not match their role's responsibilities and activities. This leads to staff not meeting the recognition and development criteria for academic promotion, creating a sense of underappreciation.

This short presentation aims to provide an overview of the current status of career progression path within National Imaging Facility and Microscopy Australia.

## **Short biography**

Saba has been working in Health and Medical Technologies sector, supporting Research and Development, within industry and academic environments for the past 8 years. Her expertise includes business strategy and operations, process improvement, and stakeholder engagement.

In her current role, Saba provides operational leadership and management support to the National Imaging Facility, which is comprised of 11 partnering universities and research institutes across Australia. She leads administration, communications, business development and international engagements of the facility with particular responsibility for strategic planning, finance, and compliance.

## International recommendation for facility staff training

**Dr. Antje Keppler**

*Imaging Infrastructure Strategy Development, EMBL, Heidelberg, Germany*

### **Abstract**

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 qualify imaging facility staff to reach the highest technical expertise in order to exceptionally support their users.

In 2018, Global Bioimaging (GBI) has brought together imaging facility directors, experienced trainers in imaging technologies and core facility management from all over the world, to develop and publish 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. This presentation will summarize the recommendation for further uptake by the GBI network.

### **Short biography**

**Antje Keppler** is Global Bioimaging Coordinator and Head of Imaging Infrastructure Strategy Development at the EMBL in Heidelberg, where she leads an international team to plan and implement the pan-European research infrastructure *Euro-BioImaging Bio-Hub*. Antje studied biochemistry at the Ruhr-University, before she moved to the laboratory of Prof. Kai Johnsson at the EPFL in Switzerland, where she developed the so-called SNAP-tag technology, which is now used widely in imaging technologies. She continued to work in the field of imaging applications at the EMBL during her postdoc, before starting her career track in science management.

## Progress towards integrating an imaging community in Latin America: Mexico, Uruguay and beyond

Christopher Wood<sup>1</sup>, Andrés Kamaid<sup>2</sup>, Leonel Malacrida<sup>3</sup>

1. *Laboratorio Nacional de Microscopía Avanzada, Universidad Nacional Autónoma de México.*
2. *Institut Pasteur Montevideo, Uruguay*
3. *Hospital de Clinicas "Dr. Manuel Quintela", Montevideo, Uruguay*

### Abstract

Growing numbers of researchers in Latin America are incorporating, or are seeking to incorporate, sophisticated imaging techniques into their research. Whilst the high capital cost of bioimaging technology is problematic, its fundamental importance to all forms of life science research is increasingly recognised, although investment has been uneven throughout the region. Nevertheless, familiar problems remain: existing imaging infrastructure fragmented, generally poorly integrated at national and regional levels, and often underexploited; the expertise required for maximizing availability of technology through bioimaging centers is limited; and access to training programmes for human resources is difficult, and knowledge of quality assurance and related technology requirements scant. In this presentation I will inform about nascent regional initiatives that take their cue from Global Bioimaging and its affiliated organizations that seek to improve regional bioimaging community integration and knowledge transfer, and progress in other areas of regional interest, for example, opening access to microscopy techniques in socially and economically marginalised communities.

### Short biography

Chris Wood is an optical microscopist and cell biologist, and Director of the Laboratorio Nacional de Microscopía Avanzada (National Laboratory for Advanced Microscopy), incorporated into the Biotechnology Institute at the Mexican National Autonomous University (UNAM). He graduated from the University of Oxford with a Bachelor's degree in Biochemistry, and in 2000 was awarded his Ph. D. by the University of Liverpool, during which he developed a novel photon-counting assay for measuring luciferase activity in single cells. While undertaking postgraduate studies in Ca<sup>2+</sup> signalling at fertilization, he met Dr Alberto Darszon of the Biotechnology Institute, UNAM, who persuaded him to tackle the far more challenging problem of determining the role of Ca<sup>2+</sup> transients in swimming spermatozoa. These studies continued for 5 years after his arrival in Mexico in 2002, whereupon he took an Associate Researcher position in the laboratory of Dr Luis Covarrubias, developing macrobioluminescence imaging techniques for studying embryonic development of the mouse midbrain. Since 2008 he worked on establishing Mexico's first open-access microscopy core facility, and after receiving funding from CONACyT (national funding agency) and UNAM in 2011, the Laboratorio Nacional de Microscopía Avanzada opened its doors to scientific researchers in any discipline or Institution in January 2013. After the initial \$1.5 million USD foundation grant, ongoing funding has reached > \$3 million USD to date, permitting significant expansion of equipment and services to two further sites, and creation of educative programs targeted at underprivileged sectors of society.

## **Carrier path of bioimaging technical staff in Japan**

**Naoto Ueno**

*National Institute for Basic Biology, ABiS Japan*

### **Abstract**

Three years have passed since ABiS, the Japanese bioimaging alliance, was launched. The supporting teams of over 20 contributing to the network have staffs who devote themselves to the support for image data acquisition and analysis for users, who are 26 individuals in total as of September 2019. Therefore, facilitating career development and establishing career path of are critical not only for them but also for the further growth of ABiS. In this presentation, I would like to introduce our activities for career development and also point out several issues, based on the feedback from the recent survey on the career path of technical staff of ABiS.

## An Integrated and Progressive “Training Passport” for Recognition and Validation of Imaging Core Facility Engineers Career path.

**Caroline Thiriet (FBI Manager) & Jean Salamero (FBI Director)**

*France-Biolmaging (FBI) National Infrastructure; UMS3714 CNRS-Institut Curie, Paris, France*

### Abstract

Platform staff is at the heart of knowledge transfer in biological imaging. The technology, implementation of methods and use of bio-imaging require different levels of interdisciplinary knowledge and expertise. A high proportion of new users (doctoral students, post-doctoral fellows, young researchers) have not acquired sufficient expertise during their studies or/and cannot follow the rapid and continuous technology development. They refer to specialists and, in the first place, to platform staff. It is thus essential that the content of a training passport and the validation system of knowledge acquisition be integrated into the training plan/career plan of platform staff. Like in many other countries, there exist in France an impressive number of vocational training sessions, workshops and “schools” in imaging. While most of those training actions are certainly useful in terms of knowledge acquisition, they are scattered, not integrated in a progressive training, their long term benefit is not evaluated and lacks recognition. Consequently, their effect on the career of Imaging Facility staff does not have a clear impact on their professional status.

Together with some Universities, Institutional Research Organisms, in the context of EuroBioimaging and importantly, through consultations of core F staff on the 13 FBI-National Imaging Centers and of the FBI Industry Board, we aimed to overcome these issues by building a “Training Passport”.

Briefly, it is a progressive learning path with a knowledge assessment system to move from one level to another. The first level corresponds to the basics and the last level proposes most advanced imaging techniques and methodologies. Three main courses are developed (Photonic imaging; Electronic imaging; Image analysis and processing) and based on alternated theory and practical sessions. The Passport provides interfaces between the three paths and is accompanied by validation procedures of acquired knowledges adapted to each level. Implementation of the assessment of acquired knowledge/skills is done as a 2-steps evaluation (immediate and deferred) and is mandatory for progression from one level to the next. Content, schedule, modalities and accreditation procedures will be discussed.

### Short biographies

**C. Thiriet** (Master Degree in Archeology). She was the “training officer” of the EuroBioimaging PPII (2016-2018). Since 2018 she is both “training officer” and “operational manager” of the French National Infrastructure “France Biolmaging-FBI”

**J. Salamero** (PhD in Biochemistry). He is CNRS Research Director at Institut Curie. In the context of Imaging Core F,1) 2000-2019, head of the Institut Curie Imaging Center (PICT-IBISA), 2) 2012-2015 coordinator of the “Paris Center NODE of FBI and 3) since 2015, Director of the France Biolmaging-FBI” National Infrastructure and Director of the UMS 3714 at CNRS.

## Careers in Core Facilities: Global problems, national solutions?

**Prof. Dr. Elisa May**

*Bioimaging Center, Dept. of Biology, University of Konstanz, Konstanz, Germany*

### **Abstract**

Core facilities have opened up new career opportunities for young academics. Currently, how one can qualify for and advance to a leading position in a core facility is not well defined. One of the reasons is that the levels of appointment and responsibility of core heads vary considerably, across institutions within the same country, and all the more so between systems of higher education in different countries. Moreover, the majority of core leaders holds temporary positions, at least in Germany, as indicated by a survey among imaging facilities. This situation is in contradiction with one of the primary purposes of core facilities: To secure continuity in scientific support and technical expertise.

Since its inception as a network funded by the German Science Foundation, German Biolmaging - now the German scientific association for microscopy and image analysis - has advocated a clear definition of the career paths and professional opportunities associated with imaging core facilities. The presentation will describe how we have engaged with funding institutions and policymakers on this topic. Our experiences could prove helpful for the formulation of international recommendations on careers in core facilities.

### **Short biography**

Elisa May is the director of the Bioimaging Center of the University of Konstanz in Germany. She was born in Genova, Italy, and moved to Germany to study Biochemistry at the University of Tübingen as a fellow of the German Academic Exchange Service (DAAD). After accomplishing her Ph.D. on archeobacterial photoreceptors at the Max-Planck-Institute for Biochemistry in Martinsried in 1988, she started a PostDoc in Molecular Toxicology at the University of Konstanz. After receiving her Habilitation in Toxicology and Cell Biology in 2005, she continued as a PI studying the response of the cell nucleus to stress and damage with the help of advanced light microscopy. In 2008 she was appointed head of the newly founded light microscopy core facility. She is the founding chairwoman of "German Biolmaging – Society for Microscopy and Image Analysis," which developed 2017 from the DFG-funded national network of imaging core facilities "German Biolmaging." Elisa is the German national coordinator for Euro-Biolmaging, the pan-European infrastructure project for biomedical imaging. In her research work, she develops novel nonlinear photomanipulation techniques for the study of the DNA damage response. She has two children and lives with her family in Konstanz.

## **Advanced Microscopy & Core Facility Management Post-Doctoral Fellowship Program**

**Jennifer Waters**

**Director of the Nikon Imaging Center at Harvard Medical School  
Chan Zuckerberg Initiative Imaging Scientist**

*Harvard Medical School, Boston MA, USA*

### **Abstract**

Optical microscopy has become central to progress in many areas of science. At the same time, the complexity of instruments and quantitative imaging experiments has dramatically increased, with many requiring extensive expertise to operate. Microscopy facilities managed by PhD-level scientists who advise and train researchers on imaging experimental design, the best instruments to use for their experiments, and proper use of instruments have become essential sources of expertise in many research institutions, and core facility management has become a stimulating career path for scientists with experience in advanced quantitative microscopy techniques and an interest in facilitating science broadly. The Advanced Microscopy Fellows at Harvard Medical School learn quantitative microscopy techniques including confocal, TIRF, FRET, FRAP, photo-activation, single-molecule imaging, light sheet and super-resolution microscopy, and key skills needed to manage a large, heavily-used core facility. Fellows learn to train core facility users to select and apply the appropriate techniques, using a wide range of biological specimens and experimental approaches. Fellows are also encouraged to identify scholarly projects that match their interests, such as: organizing and teaching microscopy lectures, workshops, discussion groups or journal clubs; developing protocols for testing equipment performance; designing and/or implementing novel or custom imaging techniques. The benefits and challenges of training post-doctoral fellows in a core facility environment will be discussed.

### **Short biography**

Jennifer received her PhD in Biology from UNC-Chapel Hill in 1998, under the guidance of Dr. Ted Salmon. After teaching a graduate level microscopy course at Wake Forest University for several years, she began her current position at Harvard Medical School in 2001. Jennifer directs three optical microscopy cores - The Nikon Imaging Center at Harvard Medical School, the Systems Biology Microscopy Facility and the Cell Biology Microscopy Facility – which contain 20 light microscopes used by over 100 labs from Harvard Medical School. She teaches microscopy courses and workshops at Harvard, and organizes an annual two-week course on Quantitative Imaging at Cold Spring Harbor Laboratory. In 2019, she received a Chan Zuckberg Initiative Imaging Scientist award.



## **Development of an international recommendation on a career path for Core Facility Managers**

**Professor Ian Smith (Chair)**

*Monash University, Melbourne, Australia*

### **Abstract**

Across the world networks of world-class technologies and expertise, under the umbrella designation of ‘research infrastructures’, critically underpin the efforts of the global research community, their research goals and research outcomes. The often “unsung heroes” driving these critical infrastructures are the highly skilled experts who manage and operate these often very sophisticated capabilities. Through the efforts of these experts, many infrastructures are operating at international best practice and have achieved international standard (ISO) certification to demonstrate to the research community and industry that their capabilities are serious in ensuring the delivery of best possible outcomes. Unfortunately, many of the research organisations (eg research institutions, publicly funded research organisations and universities) that employ these experts, do not have adequate mechanisms in place to recognise and reward the efforts of these key personnel. This is a global issue and one that is seen universally as something that needs to be addressed. The panel will outline and discuss the problem, some of the issues and barriers around finding a solution, perhaps some of the consequences of failing to adequately address the issue as well as hopefully putting forward some suggestions to remove some of these obstacles and finally, developing a framework around career paths for core facility staff and managers.

### **Short biography**

Ian Smith is Vice-Provost (Research & Research Infrastructure) at Monash University, playing a university-wide leadership role, responsibility for research strategy, infrastructure and alliances. A major focus is building linkages to industry and encouraging large companies and SMEs to use the university’s globally-recognised research capabilities and tools to innovate, capture new opportunities and solve problems. Ian has a background in both industry and research. He is a leader in his field of medical research that has resulted in over 250 publications and many patents. Ian receives regular invitations to speak at international meetings and his research has had a direct impact on human health and led to changes in clinical practice. Ian also co-founded a proteomics-based, publicly listed, biotechnology company which he helped build to IPO and trade sale and he continues to collaborate and consult widely with the pharmaceutical and biotechnology industry. Ian is a board director and chair of a number of national and international senior government and non-government advisory boards and committee memberships, many with a strong industry focus. He also serves on a number of international editorial boards and holds and has held office-bearing positions in national and international societies, helping organise numerous national and international scientific meetings.

### **ABSTRACTS - Session 2**

In order of appearance

## **Global Bioimaging: the path so far and the objectives for the future**

**Dr. Federica Paina**

*Imaging Infrastructure Strategy and Development, EMBL, Heidelberg, Germany*

### **Abstract**

The imaging landscape changed significantly in the last 10-15 years as the concept of open access to cutting-edge technologies became valued and well recognized worldwide. In more and more places around the globe, imaging communities have started organizing themselves and succeeded in putting down the foundations of national – or even continental – imaging Research Infrastructures.

Recognizing this, in 2015 the European Union funded the Global Bioimaging project, promoting the international cooperation of imaging infrastructures and communities. The project found growing consensus amongst scientists and facility operators worldwide, and naturally evolved into a fully-fledged international network, with a growing membership of currently 10 partners (Microscopy Australia/National Imaging Facility Australia, Advanced Bioimaging Support Japan, Singascope – Singapore, India Bioimaging, South Africa Bioimaging, Canada Bioimaging, Bioimaging North America – bringing together Canada, Mexico, USA –, Argentina Sistema, and Euro-Bioimaging).

Facilitating networking, building capacity internationally, helping to raise the visibility of imaging technologies with funders and policy makers, Global Bioimaging has helped nascent communities to organize themselves and established infrastructures to raise their visibility beyond national borders.

### **Short biography**

Dr. Federica Paina is a project manager and policy officer at the European Molecular Biology Laboratory (EMBL) in Heidelberg. A chemist by training (PhD in 2008 from Imperial College London), she has gained extensive experience in scientific project management and European affairs by working both in the private sector and at the European Commission's Joint Research Centre. Since 2015 Federica is part of the Imaging Infrastructure Strategy Development team at EMBL: in this capacity she has contributed to the launch of Euro-Bioimaging (the European Research Infrastructure in biological and biomedical imaging) and managed Global Bioimaging since its outset.

## Metadata and Performance Tracking for Fluorescent Microscopes

David Grunwald, Ph.D.

*RNA Therapeutics Institute, University of Massachusetts Medical School, Worcester, MA, USA*

**Abstract:** Microscopy images need to be accompanied by a description of the sample, its preparation and experimental layout as well as technical parameters under which images were taken. The term "metadata" is used to refer to such accompanying information, but the exact meaning of "metadata" frequently varies with context. A major challenge with metadata for technical parameters is the large variability of what is recorded by different microscopes. Metadata can be as simple as the pixel size or as complex as the results of an entire internal instrument calibration routine and everything in between. To enable full quantitative analysis to extract the maximal information content of images and to make images from different microscopes comparable, we propose 1) an OME based, extended metadata model to capture complete hardware and settings used for image acquisition, 2) an extension of metadata to contain optical calibration- and performance documentation, 3) a tier system for metadata requirements that scales the amount of metadata to be reported with the complexity of the imaging data and 4) an interactive, easy-to-use GUI-based software tool to ease the often tedious and time consuming metadata collection process and lower the experimental record-keeping burden. However, there are certain crucial pieces of information that simply are not captured in even the most rigorous and precise routines for record-keeping and calibration, as they simply cannot be measured without the aid of (often costly, cumbersome and complicated) external devices. Here, we present an inexpensive, easy-to-use calibration device combining a power sensor with a light source that allows the user to measure excitation power and perform basic detector calibration routines. This provides crucial meta-data on experimental conditions and allows current and future model-based data processing tools to get as much quantitative information as possible out of the images. The device also provides an elegant, possibly automated way to track microscope performance over time.

**Short biography:** Dr. Grunwald received his undergraduate degree in Biophysics from Humboldt University Berlin in 2002, and his Ph.D. from LMU Munich in 2006. He joined Dr. Singer's lab as postdoc, before starting his first faculty position in Applied Physics at TU Delft in 2010. In 2013 Dr. Grunwald became a faculty member at the RNA Therapeutics Institute at UMass Medical School in Worcester, MA.

In his work Dr. Grunwald uses and develops methods and instrumentation to visualize what, where, when and how fast molecular processes are happening in the living cell by reproducibly detecting weak fluorescent signals with sub-diffraction limited precision at high temporal acquisition frequencies. He has a long standing interest of making imaging data comparable between different methods, microscopes, labs and institutions.

## **Biolmage Archive – a new hub for biological images**

**Dr. Jan Ellenberg**

*Cell Biology and Biophysics, EMBL, Heidelberg, Germany*

### **Abstract**

Developments in microscopy and imaging technologies, such as cryogenic electron microscopy, volume electron microscopy and super-resolution light microscopy, are allowing life-science researchers to observe biological structures and processes in completely new ways. These new data types present many exciting opportunities but also several challenges, including:

- Sharing – access to and reuse of images is essential for biologists because it improves research quality and significantly speeds up scientific discovery
- Diversity – imaging is not a single technology, but an umbrella term for many different methods, scales and resolutions
- Analysis – any new type of data requires new analysis tools and methods that are easily accessible to the research community

EMBL-EBI has been collaborating with the wider bioimaging community to address some of these challenges. In July 2019, it opened a central, open data resource for biological images, called Biolmage Archive. Researchers will be able to freely store, share and access biological images in the new resource, which is set to accelerate scientific discoveries. Pilot projects coordinated by EMBL-EBI, such as EMPIAR, and collaborations such as the [Cell- and Tissue- Image Data Resource \(IDR\)](#), have laid the groundwork for the creation of the Biolmage Archive.

### **Short biography**

Jan Ellenberg, (ML, MAE), is Senior Scientist and Head of the Cell Biology & Biophysics Unit at the European Molecular Biology Laboratory in Heidelberg. For over 20 years he has been interested in cell division and nuclear organisation, including systematic analysis of mitosis, nuclear pore complex structure and assembly, as well as chromatin organisation and the formation and segregation of mitotic and meiotic chromosomes. His goal has been to obtain structural and functional measures of the required molecular machinery inside cells using quantitative 4D imaging, single molecule spectroscopy, as well as super-resolution microscopy. His research group played a key role in large EU-wide efforts on systems biology of mitosis, microscopy automation as well as unbiased computational image analysis. He is coordinator of the EMBL Imaging Centre, and he coordinated the Euro-Biolmaging planning and preparatory phases (2009-2018).

## **Public Data Resources for the Global Bioimaging Community**

**Jason Swedlow**

*Open Microscopy Environment, School of Life Sciences, Univ of Dundee, Dundee,  
UK*

**Shuichi Onami**

*Laboratory of Developmental Dynamics, RIKEN Center for Biosystems Dynamics  
Research, Kobe Japan*

### **Abstract**

The Open Microscopy Environment (OME, Dundee) and the Laboratory for Developmental Dynamics (LDD, RIKEN) are collaborating on the development and use of tools for integrating, curating and publishing reference bioimage datasets. OME, in collaboration with EMBL-EBI, runs the Image Data Resource (IDR), an added value database for cell and tissue imaging. LDD runs the Systems Science of Biological Dynamics (SSBD) database, a resource for dynamic data of model biological systems. In this presentation, we'll review the current status of IDR and SSBD and present collaborative work between our groups and the groups of David Grunwald and Caterina Strambio De Castillia (UMass Med Center, USA) on schemes for flexible metadata models for bioimaging. We will also provide an update on the drafting of Global Bioimaging's Recommendations for Guidelines on Image Data Formats and Public Repositories.

### **Short biographies**

Jason Swedlow earned a BA in Chemistry from Brandeis (1982) and PhD in Biophysics from UCSF (1994). After postdocs at UCSF and Harvard, he established his laboratory at Dundee, focussed on mitotic chromosome dynamics and cell and tissue imaging informatics (1998). He was awarded several prestigious fellowships and named Professor of Quantitative Cell Biology (2007). He founded the Open Microscopy Environment (OME) and Glencoe Software, Inc. His awards include BBSRC's Innovator of the Year (2011) and Fellow of the Royal Society of Edinburgh (2012).

Shuichi Onami earned his D.V.M. from The University of Tokyo (1994) and his PhD in Genetics from SOKENDAI, the Graduate School for Advanced Studies (1998). He was an associate professor at Keio University (2002 - 2006) and joined RIKEN as a senior scientist at Genomic Sciences Center (2006). He is currently a team leader at RIKEN Center for Biosystems Dynamics Research. He founded SSBD database (2012). His current research interests include mathematical modeling of animal development and its application to human biology.

## Quality Management in Imaging Facilities

Julie Rothacker<sup>1</sup>, John E. Eriksson<sup>2</sup>, Teng-Leong Chew<sup>3</sup> and  
Béatrice Satiat-Jeunemaitre<sup>4</sup>

<sup>1</sup>Monash University, Clayton, Australia; [j](#)

<sup>2</sup>Turku Bioscience Centre, University of Turku and Åbo Akademi University, Turku, Finland;

<sup>3</sup>Howard Hughes Medical Institute, Janelia Research Campus, Ashburn, Virginia, USA;

<sup>4</sup>Institut de Biologie Intégrative (I2BC), CNRS, Gif sur Yvette Cedex, France;

### Abstract

Reproducibility of data has been discussed in many forums over the past seven years. In this time, the implementation of quality assurance and quality management measures has become a focus of many core facilities, organizations and funding agencies. At the EoE III meeting in Sydney, Global Bioimaging highlighted the importance of Quality Management principles in open access imaging core facilities. In a discussion of best practice globally, the Quality Management working group led by John Eriksson, benchmarked the different levels of quality controls and management systems within imaging facilities across the world and developed some common guidelines to support quality assurance. Recommendations from the report delivered by the working group titled “D2.3 Common international recommendation for quality assurance and management in open access imaging infrastructures” will be presented, along with some new related topics.

With the GBI EoE IV meeting focusing on career paths of core facility staff, it is important to highlight the role facility staff play in understanding and applying key principles of quality management, the key skills required to operate a QM imaging facility and to promote quality and best practice to their academic users.

Teng-Leong Chew will present the recently reported investigation that highlighted the common issue of under or mis-reporting of imaging parameters in publications which render many imaging experiments non-reproducible (see abstract for more detail). A potential role in which facility staff could advocate within their academic communities to improve the level of quality in reporting imaging data.

In closing, we will invite all delegates to join in the discussion of the QM working group to focus in greater depth on these important challenges but in the spirit of Global Bioimaging, an exchange of experiences and support the community to help develop their own successful quality management systems.

### Short biography

Julie Rothacker is Director of Platform Operations and Strategy and has led the implementation and ongoing development of the Platform Quality Management System in all core facilities at [Monash University](#).

John Eriksson is Director of [Turku Bioscience Centre](#) and [Turku BioImaging](#) of Univ. of Turku and Åbo Akademi University and heads the interim operation of the [Euro-Bioimaging](#) Seat in Turku.

Teng-Leong Chew is the inaugural director of the [Advanced Imaging Center](#) at HHMI Janelia Research Campus.

Béatrice Satiat-Jeunemaitre is Director of the [Cell Biology and Imaging facility Imagerie-Gif](#), co-heading the Ile de France South Node of [The French National Research Infrastructure for Biological Imaging](#), and has participated to the elaboration of the French Quality Management norm NFX50-900 for the French *Infrastructures en Biologie Sante et Agronomie*.

## Exposing an Overlooked Problem: Under- and Mis-reporting of Imaging Parameters in Publications

Teng-Leong Chew, AIC Director

*Advanced Imaging Center  
Howard Hughes Medical Institute Janelia Research Campus  
Ashburn, Virginia, USA*

### Abstract

The important effort of benchmarking the performance of imaging instruments has been explored and championed by many groups (Deagle, Wee, & Brown, 2017; Halter et al., 2014; Jonkman, Brown, & Cole, 2014). While this is of vital importance in facilitating data validation from various instruments, and in allowing scientists to compare scientific findings, standardization of the microscopes alone does not ensure the ultimate reproducibility and comparability of scientific data. Microscopes are instruments designed to be customized by the users for optimal image acquisition – making the subsequent accurate reporting of the imaging parameters in publications the final and essential determining factor in data replicability. Yet, when research articles in three leading developmental biology journals and a cell biology journal were analyzed for the extent of imaging use and the detail given to the experimental specifics of image acquisition, a disturbing trend was revealed. Over 72% of the journal figures contain images, largely microscopy. However, less than 5% of the text in the methods section of the analyzed articles is devoted to experimental details of image acquisition and analysis (on average 82 words). Furthermore, the overall quality of the information provided is insufficient/inaccurate, with a large majority of publications obtaining a failing grade (89%), and multiple examples containing no information at all (9%). The lack of information on the imaging methodologies used in published articles makes it impossible to critically evaluate and accurately replicate the reported data. This original findings by Marques *et al.* (University of Minnesota) will be presented, and the AIC follow-up response will be discussed with the aim of facilitating a joint recommendation from the GBI as a potential deliverable of EoE IV.

### Short biography

Teng-Leong Chew became the inaugural director of the Advanced Imaging Center at HHMI Janelia Research Campus in 2014, after directing the Center for Advanced Microscopy and the Nikon Imaging Center at Northwestern University Feinberg School of Medicine in Chicago for 12 years. He is also a member of the Executive Committee of BioImaging North America and the co-director of the annual Quantitative Fluorescence Microscopy Workshop at Mt. Desert Island Laboratory at Bar Harbor, Maine.

## Imaging Infrastructure & Socio-Economic Impact

**Claire Brown and Antje Keppler**

*Advanced Biolmaging Facility, Physiology, McGill University, Montreal, Canada  
Imaging Infrastructure Strategy Development, EMBL, Heidelberg, Germany*

### Abstract

Imaging infrastructures are increasingly expected to demonstrate their socio-economic impact to their funders, also for facilitating key decision-making in national processes of research infrastructure investments.

This Working Group has identified several objectives to support the GBI partners to better prepare for these requests in the future, and for understanding the current impact of the international network towards their national community building and recent and future funding applications. At this meeting, we will present

- I) First outline for a framework to support and guide the assessment of the socio-economic impact of imaging platforms, mainly based on the OECD policy paper (No.65, 2019) and other publications in this field;
- II) Key findings from a recent survey on GBI impact conducted among all partners in the GBI Management Board.

Based on the discussion and feedback from this audience, the Working Group will further develop the framework for publication as an international recommendation.

### Short biographies

**Antje Keppler** is Global Biolmaging Coordinator and Head of Imaging Infrastructure Strategy Development at the EMBL in Heidelberg, where she leads an international team to plan and implement the pan-European research infrastructure *Euro-Biolmaging Bio-Hub*. Antje studied biochemistry at the Ruhr-University, before she moved to the laboratory of Prof. Kai Johnsson at the EPFL in Switzerland, where she developed the so-called SNAP-tag technology, which is now used widely in imaging technologies. She continued to work in the field of imaging applications at the EMBL during her postdoc, before starting her career track in science management.

**Claire Brown** has been working in the field of light microscopy for over 25 years and has been the director of the Advanced Biolmaging Facility (ABIF) at McGill University for 14 years. Her research focuses on applying biophysical techniques to study cell adhesion and migration and understand how migration is regulated by proteins at the molecular level in normal and diseased cellular systems. She also does research on how to minimize phototoxicity in live cell imaging and development of standard samples and protocols for quality control for quantitative light microscopy. She is the founder and chair of Canada Biolmaging and the Canadian Network of Scientific Platforms. These two groups advocate for funding for research infrastructure platforms, provide educational opportunities in light microscopy for the research community and networking and professional development activities to support highly qualified platform scientists.



## **RI-VIS: Expanding RI visibility to strengthen strategic partnerships**

**Dr Susan Daenke, Instruct-ERIC Coordinator**

*Instruct-ERIC Hub, Oxford UK*

### **Abstract**

Since the inception of the ESFRI Roadmap, a collection of research infrastructures (RIs) has been built that provide facilities, resources and services of a unique nature to support top-level research activities in the various domains of Energy, Environment, Health and Food, Physical Sciences and Engineering, Social and Cultural Innovation, Data, Computing and Digital. RIs take various forms (single site, distributed), have evolved over very different timeframes and provide diverse services. There is a significant initiative to integrate the ESFRIs so that the user community has broad choices to support their requirements and a simple entry point for service access.

RI-VIS aims to increase the visibility of European RIs to new and broader communities, to industry and to strategic partners in third countries. It has taken time for the European research community to understand the ESFRI model but outside of this, there is very little information available for other potential user communities. RI-VIS is targeting new communities with information to facilitate i) the development of new collaborations and innovative actions, ii) user accessibility, iii) funding opportunities, v) knowledge transfer and vi) training opportunities.

The methods in use and current progress will be discussed, including upcoming events that may be of interest.

### **Short biography**

Susan Daenke leads the Instruct-ERIC operational Hub, located in Oxford, UK. Instruct-ERIC was launched in 2017, following 5 years of operating via a subsidiary company of the University of Oxford, providing structural biology facilities for largely academic researchers. Susan has managed European funded projects since 2003 and is the Coordinator of RI-VIS.

Previously a Research Fellow at the University of Oxford, she has a broad knowledge of academic research in the life sciences and understands the challenges of introducing new resources to a community which tends to be relatively self-sufficient. She is committed to enabling democratic access to top level facilities, resources and expertise for all researchers and is keen to support RI integration to help achieve this. She participates on a number of strategic groups related to European RI development and increasingly is engaged with globalization programmes for Instruct-ERIC.

## A snapshot of Singapore's pre-clinical & translational bioimaging eco-system

**Dr. Sakthivel Sekar**

*Programme & Business Development Principal Manager, SBIC, A\*STAR, Singapore*

### **Abstract**

The presentation will be an overview of various pre-clinical and translational bio-imaging facilities in Singapore, with particular emphasis on A\*STAR's Singapore Bioimaging Consortium (SBIC), the leading research & innovation center in APac for advanced pre-clinical and clinical bio-imaging. Further, how clinical and bio-imaging infrastructures across the nation, consolidate resources to extend joint opportunities for R&D and clinical translation will be covered exemplifying examples from both completed & on-going large multi-center bio-imaging programs: to address major public health issues as well as the needs of the pharmaceutical industry.

### **Biography**

Dr. Sekar started his research career at the Institute of Neuroscience, Newcastle University (UK) and Experimental Neuroimaging Group, University of Oxford (UK), as a Dorothy Hodgkin Postgraduate Fellow (2005) working towards a PhD degree in bioimaging enabled drug discovery. His PhD fellowship was jointly funded by Janssen Pharmaceuticals (formerly J&J PRD), Belgium and BBSRC (UK). Upon securing his PhD, Dr. Sekar took up a postdoctoral fellowship with Janssen Pharmaceuticals, Belgium (2008 to 2011) extending the bio-imaging enabled drug discovery research, facilitating medication development. Dr. Sekar joined Singapore Bioimaging Consortium (SBIC), A\*STAR in 2012 to establish an ultra-high field MR-imaging facility for industrial engagement. He has been the principle author and Lead PI of competitive A\*STAR grants; published in peer reviewed journals; appeared in several international & national level meetings and a recipient of several awards, including the 'International Society for Magnetic Resonance in Medicine' (ISMRM)'s Summa Cum Laude (Gold Medal) Merit Award. Most recently Dr. Sekar has also completed an Executive MBA in Pharmaceutical & Innovation Management, from Rutgers Business School, USA and also co-founded an A\*STAR spin-off. Currently Dr. Sekar continues to serve SBIC, A\*STAR as the Principal Manager, Programme & Business Development: Spearheading Programme Management Office & selected Admin Portfolio; Strategic Business Development/Establishing Strategic Alliances with Industry; Executing External R&D Agreements & Industrial Service Contracts; Facilitating Research /Technology Commercialization and Enhancing Outreach.

Professionally trained as a biomedical engineer, with particular expertise in bio-imaging, Dr. Sekar has been active in serving pre-clinical, clinical and pharmaceutical R&D community, internationally, with a keen interest in the bio-imaging methods, tools and bio-medical devices to improve patient access to (translation of) cutting-edge biomedical technologies: "Impacting Health Care by Imaging Today the Medicine / Solutions of Tomorrow".

## VENUE & DIRECTIONS

The **main sessions** will take place in the **Creation Theatre on Level 4 of the Matrix Building in Biopolis**. The registration desk will be set up just outside of Creation's entrance.

The **Working Group breakout meetings** on Saturday afternoon will take place in the various **meeting rooms on L3 of Matrix**.

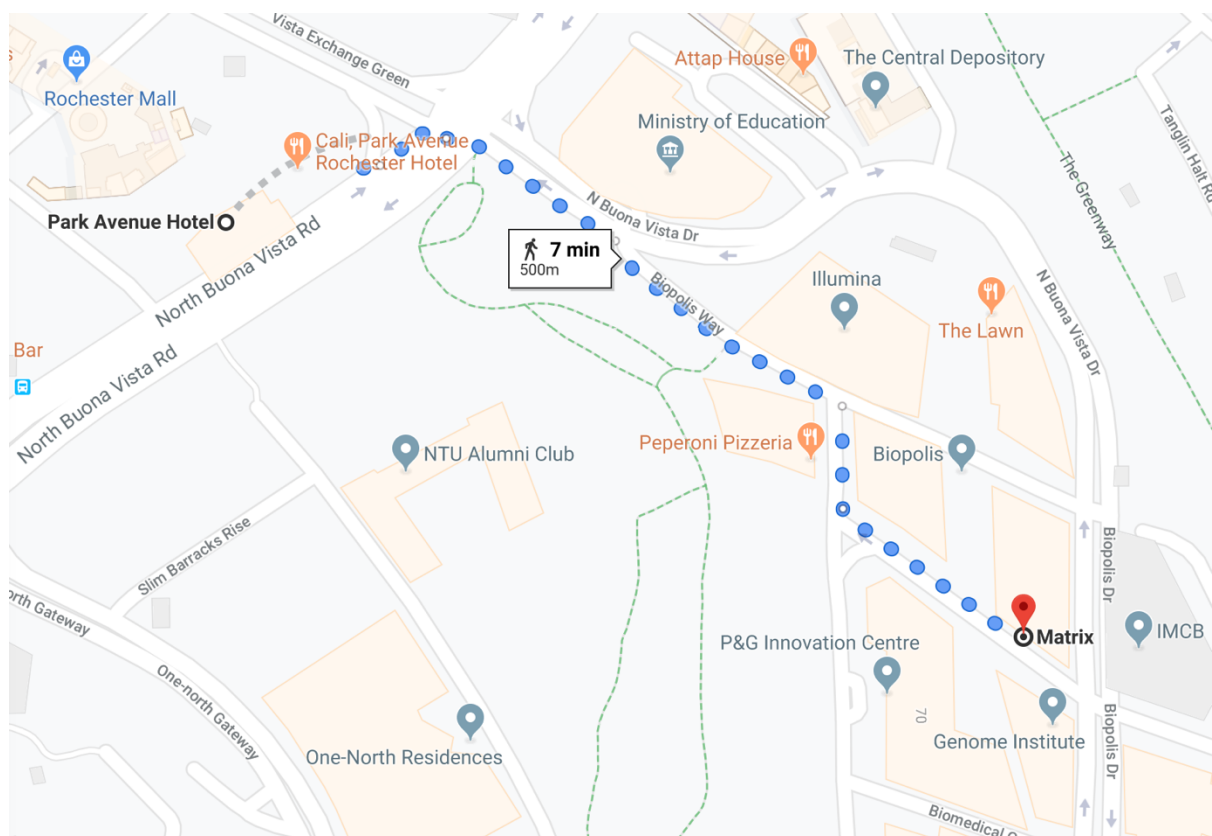
Visitors to Level 4 should not have to sign in, or exchange passes, at reception on Level 1, but you may be asked to confirm you're going to Level 4 by security.

The exact address of the Matrix Building is:

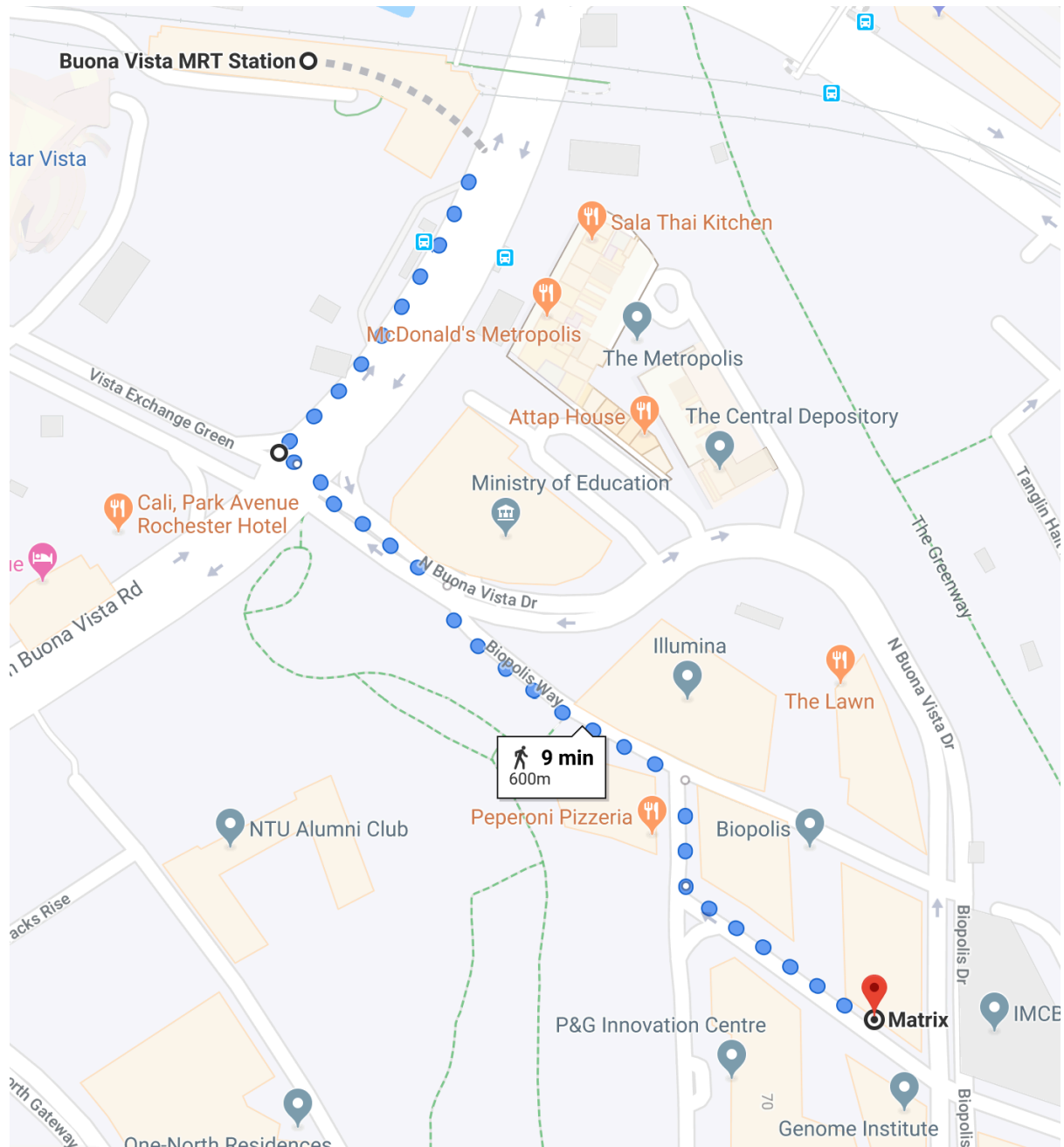
30 Biopolis St, Singapore 138671

Google maps: <https://goo.gl/maps/Kfr8nKWHAirJ2cUx7>

From the **Park Avenue, Rochester Hotel** where many people are staying, it's ~7min walk: <https://goo.gl/maps/bgtTRR51tRvS3QkF9> (screenshot below).



If you're coming by **train/MRT** from **Buona Vista station**, it is slightly longer at ~9 minutes: <https://goo.gl/maps/Ns9YU88xyTvHzd486> (screenshot below).



Singapore has an excellent **public transport network**, more information can be found here: <https://www.visitsingapore.com/travel-guide-tips/getting-around/>

**Taxis** are also an affordable alternative, from which you can get dropped off right outside the Matrix building

## PRACTICAL CONSIDERATIONS

- Being 1 degree north of the equator, Singapore is liable to tropical storms. They tend to be very intense (impressively so), but thankfully short-lived. We recommend you carry an umbrella with you in case you get caught out.
- Despite it being continuously ~30 degrees outside, and very humid, the lecture theatres can be surprisingly cold – please bring an extra layer is advised.

## INTERNET

The **EDUROAM** network is available throughout Biopolis, for those with access. Otherwise the **A\*STAR GUEST** network is available, please contact one of the AMP staff members if you need any help.

## MORE INFORMATION ABOUT SINGAPORE

Singapore's time zone is GMT +8hrs.

Singapore has a wealth of things to see and do whilst you're here:  
<https://www.visitsingapore.com/en/>

With such a rich diversity of people, exploring is fascinating from both a cultural perspective and, famously, for the food options available!

The architecture throughout the city is also breath-taking. A most of you will be travelling through Changi Airport, make some time to visit The Jewel that links Terminals 1-3 (<https://www.jewelchangiairport.com>)



## A\*STAR MICROSCOPY PLATFORM VISIT

The A\*STAR Microscopy Platform (AMP) brings together a broad range of light and electron microscopy techniques to meet the needs of the Singapore biomedical research community. Imaging is possible across the length scales; from fine ultrastructural electron microscopy, through high spatiotemporal imaging of dynamic cellular processes, to 3D intra-vital imaging deep within living tissues. Importantly, this includes the critical complementary techniques of sample preparation and quantitative image analysis. AMP's team of dedicated expert staff have the experience to consult, train, support and offer high-quality service to scientists.

A visit to AMP is available on the morning of Friday 13th September – this will be a chance to see the setup and discuss our operation and practices.

**To join, please meet Goh Wah Ing (Assistant Manager, AMP) at Matrix Building Lobby (Level 1 = Ground Floor) at 10am.**



GOH Wah Ing, PhD  
Assistant Manager  
A\*STAR Microscopy Platform



There will also be the opportunity to see new instruments and the latest technology from some of our industry partners. If you're interested in a session on these, please arrange with Wah Ing on the day.



Olympus IXplore SpinSR10



Zeiss LSM 980 with Airyscan 2



Oxford Nanoimager S

## CONFERENCE DINNER

For those that have registered, the conference dinner will take place straight after the end of the session on Friday 13<sup>th</sup> September.

Buses will be provided to take us from Matrix to the **Straits Kitchen at the Grand Hyatt Hotel** (<https://www.singapore.grand.hyattrestaurants.com/straitskitchen.html>). This restaurant offers the opportunity to:

*“Journey through Singapore’s rich food culture and savour some of Singapore’s most-loved local dishes. Witness local veteran hawkers whip up a colourful selection of local dishes, including Chinese, Indian, Malay and Peranakan dishes and desserts, and experience a truly unique gastronomic tour of Singapore.”*

For those travelling independently, the hotel’s address is:

**Grand Hyatt Hotel**

10 Scotts Rd

Singapore 228211

<https://goo.gl/maps/1ALyZxCJR5tquHbR8>

You are welcome to return to your own hotel at your leisure after the dinner (no transport provided), or take the chance to explore the nearby Orchard Road district.



## STRAITSKITCHEN

Enjoy Chinese, Indian, Malay and Peranakan cuisine from our live theatre kitchens

## LOCAL CONTACTS

Should you need any help during the conference, please approach one of the following AMP|LM staff:



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GOH Wah Ing  
Assistant Manager



Sudha Thankiah  
Advanced Microscopy Expert



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