

Scientific Report

Title: Visualization and Manipulation of Cellular Communities

1. Summary

The International Symposium “Visualization and manipulation of signals and forces in developing tissues” was held between 8th - 10th of October, 2014, in Munich, Germany. Lectures and poster presentations took place at the campus of the Helmholtz Zentrum München (HMGU). This venue was chosen because of its location and the large number of scientists working in campus on themes related to that of the meeting. It is also easily accessible by private or public transportation. In addition, the HMGU has a state-of-the-art auditorium and facilities that enormously facilitated the smooth running of the meeting. The aim of the symposium was to promote scientific interactions between senior scientists working at the forefront of imaging and cell biology, and junior scientists with interests in those topics. It congregated an outstanding group of 27 international speakers (22 from Europe and 5 from the USA), who showcased current technological approaches to study how molecular and physical interactions take place among cells *in vivo*, and how these interactions are interpreted at the level of tissues and organs. The meeting attracted 132 participants (annex), some of which presented their work as posters. The majority of these participants were graduate students and postdocs, and well as few young group leaders. The oral presentations were held in different sessions and organized by topic. There were two Keynote speakers, Dr. Eric Betzig and Prof. Ernst Bamberg. All the presentations were followed by questions and discussions between the speakers and the audience. Of note, the meeting begun two hours later than planned because during the morning of the first day, the first Keynote speaker, Eric Betzig, received a telephone call from Stockholm to inform him that he was awarded the Nobel Prize in Chemistry. Within an hour the press was flocking to the campus to interview him. The coffee breaks that took place in between sessions allowed more informal interaction and discussion among the participants. The meeting was a success and a great opportunity to witness the cutting edge technological developments applied to cell biology, neurobiology and developmental biology.

2. Description of the scientific content of and discussions at the event

The meeting focused on state-of-the-art microscopy, and the integration of physics and experimental biology. The topics that will be covered include mechanical properties of individual cells and tissues, intercellular communication, fast- and super-resolution imaging of cell ensembles, cell migration, tissue self-organization and pattern formation, focusing on epithelia and neurons.

The first talk of the meeting was a **Keynote lecture** by Eric Betzig, entitled: “Imaging Life at High Spatiotemporal Resolution”, during which Betzig explained the technology developments in imaging that led to his Nobel Prize. It was followed by:

Session 1 “Fast and deep imaging”

Ernst Stelzer, Minimally invasive studies of lateral root organogenesis deep inside the main root of *Arabidopsis thaliana* with Light Sheet-based Fluorescence Microscopy (LSFM)

Lars Hufnagel, Bioimaging across scales: From cells to embryos

Jan Huisken, Reconstructing the cardiovascular system in zebrafish with high-speed SPIM

Heinrich Leonhardt, Visualisation and Manipulation of the Invisible

Francesco Pavone, Large scale linear and non linear brain imaging

Session 2 “Imaging structure”

Meng Cui, Deep tissue molecular imaging in complex biological systems

Winfried Denk, Unwiring the brain

Davi Bock, Neuronal network anatomy from large-scale electron microscopy

Matthias Tschöp, Dissecting the hypothalamic control of body weight and metabolism

Hernán López-Schier, Visualizing tissue dynamics by intravital high-resolution imaging

Caren Norden, Kinetics and mechanics of retinal morphogenesis: from cells to epithelia to neurons

Session 3 “Imaging function”

Herwig Baier, Moved by vision - Circuits for behavior in zebrafish

Michael Orger, “Connecting neuronal activity dynamics to behavior in larval zebrafish”

Rubén Portugues, Whole-brain imaging during motor motor adaptation

Isabel Guerrero, Exosomes moving along cytonemes mediate Hedgehog transport and signaling

Barry Thompson, Epithelial polarity in *Drosophila*

Anne-Kathrin Classen, Cell shape transitions during epithelial tissue morphogenesis

Poster session and light dinner (Lobby of the Auditorium)

Session 4 “Tissue dynamics and mechanics”

Primoz Zihlerl, Quantitative Morphology of Epithelial Tissues

Stephan Grill, Morphogenetic functions of actomyosin

Matthew Gibson, Mitosis and Morphogenesis in Proliferating Epithelia

Jan Bruges, Physical principles of spindle organization

Yohanns Bellaiche, Epithelial tissue morphogenesis

Shane Hutson, Cellular mechanics in early embryogenesis: a mechanical assist from an extra-embryonic tissue

Session 5 “Cellular dynamics and mechanics”

Olivier Pertz, A growth factor-induced, spatially organizing cytoskeletal module enables rapid and persistent fibroblast migration

Daniel Razansky, Rapid volumetric whole-brain neuroimaging with five-dimensional optoacoustic tomography

The last talk of the meeting was another **Keynote lecture** by Ernst Bamberg, entitled: “Microbial Rhodopsin: Molecular Mechanism and Optogenetics”, during which Bamberg gave an overview of the power of light to modify cellular activity.

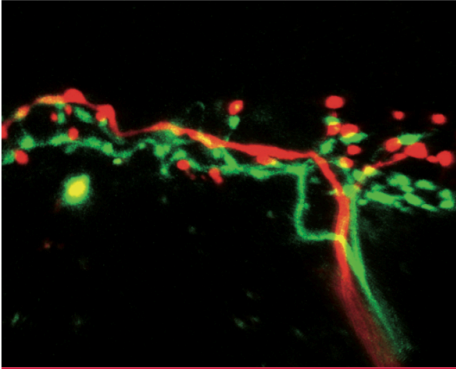
3. Assessment of the results and impact of the event on the future directions of the field

The event was over-subscribed, and attracted participants from all over Europe, with a few delegates from the USA. The attendance was well balanced between technologists and biologists. A good number of posters were displayed continuously during the meeting. There was a very strong engagement from students and postdocs. We received excellent feedback from attendees and speakers (annex). The participants (including the speakers) considered a high-quality meeting that brought together a balanced combination of established researchers and young investigators carrying out forefront research on the physics and biology. We believe that multiple collaborations

have been initiated during the meeting. Overall the meeting was a great success, and some participants expressed interest in having this meeting repeated.

Annex 4a: Programme of the meeting

HelmholtzZentrum münchen
German Research Center for Environmental Health



Quantissue Meeting 2014
Physics of Biological Systems:
Visualization and Manipulation
of Cellular Communities

8 – 10 October 2014
Munich, Germany



www.helmholtz-muenchen.de/quantissue-meeting-2014

Program • Wednesday, 8 October 2014

| | |
|---------------|---|
| 13:50 | Welcome Hernán López-Schier (Munich/DE) |
| 14:00 – 15:00 | Keynote Lecture Imaging life at high spatiotemporal resolution Eric Betzig (Ashburn, VA/US) |
| 15:00 – 15:30 | Coffee break |
| 15:30 – 18:00 | Session 1 Fast and deep imaging |
| 15:30 | Minimally invasive studies of lateral root organogenesis deep inside the main root of <i>Arabidopsis thaliana</i> with Light Sheet-based Fluorescence Microscopy (LSFM) Ernst Stelzer (Frankfurt a. M./DE) |
| 16:00 | Bioimaging across scales – From cells to embryos Lars Hufnagel (Heidelberg/DE) |
| 16:30 | Reconstructing the cardiovascular system in zebrafish with high-speed SPIM Jan Huiskens (Dresden/DE) |
| 17:00 | Visualisation and manipulation of the invisible Heinrich Leonhardt (Munich/DE) |
| 17:30 | Large scale linear and non-linear brain imaging Francesco Pavone (Sesto Fiorentino/IT) |

Program • Thursday, 9 October 2014

| | |
|---------------|---|
| 09:30 – 13:00 | Session 2 Imaging the nervous system: structure |
| 09:30 | Deep tissue molecular imaging in complex biological systems Cui Meng (Ashburn, VA/US) |
| 10:00 | Unwiring the brain Winfried Denk (Heidelberg/DE) |
| 10:30 – 11:00 | Coffee break |
| 11:00 | Neuronal network anatomy from large-scale electron microscopy Davi Bock (Ashburn, VA/US) |
| 11:30 | Dissecting the CNS control of metabolism in health and disease Matthias Tschöp (Garching/DE) |
| 12:00 | Visualizing tissue dynamics by intravital high-resolution imaging Hernán López-Schier (Munich/DE) |
| 12:30 | Kinetics and mechanics of retinal morphogenesis – From cells to epithelia to neurons Caren Norden (Dresden/DE) |
| 13:00 – 14:00 | Lunch break |
| 14:00 – 17:00 | Session 3 Imaging the nervous system: function |
| 14:00 | Moved by vision – Circuits for behavior in zebrafish Herwig Baier (Munich/DE) |
| 14:30 | Connecting neuronal activity dynamics to behaviour in larval zebrafish Michael Orger (Lisboa/PT) |

| | |
|---------------|---|
| 15:00 | Whole-brain imaging during motor adaptation Rubén Portugues (Cambridge, MA/US) |
| 15:30 | Exosomes moving along cytonemes mediate hedgehog transport and signaling Isabel Guerrero (Madrid/ES) |
| 16:00 | Epithelial polarity in <i>Drosophila</i> Barry Thompson (London/GB) |
| 16:30 | Cell shape transitions during epithelial tissue morphogenesis Anne-Kathrin Classen (Munich/DE) |
| 17:00 – 20:30 | Poster Session |

Program • Friday, 10 October 2014

| | |
|---------------|---|
| 09:00 – 13:00 | Session 4 Tissue dynamics and mechanics |
| 09:00 | Quantitative morphology of epithelial tissues Primoz Žihnerl (Ljubljana/SI) |
| 09:30 | Morphogenetic functions of actomyosin Stephan Grill (Dresden/DE) |
| 10:00 | Mitosis and morphogenesis in proliferating epithelia Matthew Gibson (Kansas City, MO/US) |
| 10:30 – 11:00 | Coffee break |
| 11:00 | Physical principles of spindle organization Jan Brugués (Dresden/DE) |
| 11:30 | Epithelial tissue morphogenesis Yohanns Bellaïche (Paris/FR) |

Program • Friday, 10 October 2014

| | |
|---------------|---|
| 12:00 | Cellular mechanics in early embryogenesis – A mechanical assist from an extra-embryonic tissue Shane Hutson (Nashville, TN/US) |
| 12:30 – 14:00 | Lunch Break |
| 14:00 – 16:00 | Session 5 Cellular dynamics and mechanics |
| 14:00 | A growth factor-induced, spatially organizing cytoskeletal module enables rapid and persistent fibroblast migration Olivier Pertz (Basel/CH) |
| 14:30 | Microbial Rhodopsins – Molecular mechanism and optogenetics Ernst Bamberg (Frankfurt a. M./DE) |
| 15:30 | Advanced optical and optoacoustic methods for biological discovery Vasilis Ntziachristos (Munich/DE) |
| 16:00 – 16:30 | Closing Remarks Vasilis Ntziachristos (Munich/DE) |

Sponsors and Exhibitors

Sponsors

European Science Foundation (Strasbourg/FR)



Helmholtz Zentrum München (Munich/DE)

Helmholtz Zentrum münchen
German Research Center for Environmental Health

QuanTissue (Strasbourg/FR)

QuanTissue
Quantitative Analysis of Cellular and Developmental Biology

The Company of Biologists (Cambridge/GB)

the company of
Biologists
www.biologists.com

Exhibitors

THORLABS GmbH (Munich/DE)

Organization and Imprint

Venue

Helmholtz Zentrum München
Auditorium, Building 23
Ingolstädter Landstrasse 1
85764 Neuherberg (DE)

Date

8 – 10 October 2014

Conference Chair

Dr. Hernán López-Schier
Helmholtz Zentrum München
Research Unit Sensory Biology and Organogenesis
Ingolstädter Landstrasse 1
85764 Neuherberg (DE)

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Munich

In Munich, it's the mix that makes the message. Old meets new, past meets present and future, the mod-ern blends harmoniously with the traditional, bits and bytes with beer, business and leisure. For the visitor, there is a never ending shortage of sights to see or activities to engage in.

The Bavarian Metropolis with its 1.3 million inhabitants lies virtually at the centre of Europe and is easy to access, either by high-speed trains, by motorway, or through a large international airport.

Year after year, Munich takes gold in German city rankings. When asked where they would prefer to live, most Germans say Munich. The reason is simple: a magic combination of a vigorous economy and top-notch leisure time activities and outstanding cultural offerings. Three world-class orchestras, countless concert venues and a host of festivals ensure a constant flow of music of all styles. The city also has a wide array of museums, notably the three Pinakothek art museums exhibiting fine arts and graphic arts from six centuries all located within walking distance. Completing these three cultural giants is the newly-opened Museum Brandhorst that features modern art. Science and technology have a worthy home in the Deutsches Museum on the Isar River.

Last but not least Munich is a shopper's paradise, with fine fashions, designer outlets, venerable department stores, antique shops and excellent bookstores. And while on the subject of food, the best place to enjoy typical Bavarian cuisine, a most natives of Munich will tell you, is at one of the city's lively beer gardens, the ideal place to meet old friends and make new ones.



Munich Viktualienmarkt, Foto © Tourismusamt München/Lothar Kater; Text © Tourismusamt München

Program Overview

Auditorium, Helmholtz Zentrum München, Germany

Day 1: Wednesday, October 8

10:00 - 18:00 Registration

13:50 - 14:00 Welcome address by Hernan Lopez-Schier Keynote Lecture:

14:00 - 15:00 Eric Betzig, Imaging Life at High Spatiotemporal Resolution Janelia Farm Research Campus, HHMI
Ashburn, USA

15:00 - 15:30 Coffee Break (Lobby Auditorium) Fast and deep imaging

Session1

15:30 - 16:00 Ernst Stelzer, Minimally invasive studies of lateral root organogenesis deep inside the main root of *Arabidopsis thaliana* with Light Sheet-based Fluorescence Microscopy (LSFM)

Goethe Universität Frankfurt am Main
Frankfurt, Germany

16:00 - 16:30 Lars Hufnagel, Bioimaging across scales: From cells to embryos EMBL Heidelberg
Heidelberg, Germany

16:30 - 17:00 Jan Huiskens, Reconstructing the cardiovascular system in zebrafish with high- speed SPIM
Max-Planck Institute of Molecular Cell Biology and Genetics Dresden, Germany

17:00 - 17:30 Heinrich Leonhardt, Visualisation and Manipulation of the Invisible Ludwig Maximilians University Munich
Munich, Germany

17:30 - 18:00 Francesco Pavone, Large scale linear and non linear brain imaging
European Laboratory for Non Linear Spectroscopy (LENS) Sesto Fiorentino, Italy

18:30 Dinner for speakers

Day 2: Thursday, October 9

Session2 Imaging structure

9:30 - 10:00 Meng Cui, Deep tissue molecular imaging in complex biological systems
Janelia Farm Research Campus, HHMI Ashburn, USA

10:00 - 10:30 Winfried Denk, Unwiring the brain
Max-Planck-Institut f. med. Forschung Heidelberg, Germany

10:30 - 11:00 Coffee Break (Lobby Auditorium)

11:00 - 11:30 Davi Bock, Neuronal network anatomy from large-scale electron microscopy

Janelia Farm Research Campus, HHMI Ashburn, USA

11:30 - 12:00 Matthias Tschöp, Dissecting the hypothalamic control of body weight and metabolism

Helmholtz Zentrum München

Garching, Germany

12:00 - 12:30 Hernán López-Schier, Visualizing tissue dynamics by intravital high-resolution imaging

Helmholtz Zentrum München

Munich, Germany

12:30 - 13:00 Caren Norden, Kinetics and mechanics of retinal morphogenesis: from cells to epithelia to neurons

The Max Planck Institute of Molecular Cell Biology and Genetics (MPI-CBG), Dresden

13:00 - 14:00 Lunch (Auditorium Lobby)

Session3 Imaging function

14:00 - 14:30 Herwig Baier, Moved by vision - Circuits for behavior in zebrafish

Max Planck Institute of Neurobiology Munich, Germany

14:30 - 15:00 Michael Orger, Connecting neuronal activity dynamics to behavior in larval zebrafish

Champalimaud Neuroscience Programme,

Lisbon, Portugal

15:00 - 15:30 Rubén Portugues, Whole-brain imaging during motor motor adaptation

Max Planck Institute of Neurobiology Munich, Germany

15:30 - 16:00 Isabel Guerrero, Exosomes moving along cytonemes mediate Hedgehog transport and signaling

Universidad Autónoma de Madrid

Madrid, Spain

16:00 - 16:30 Barry Thompson, Epithelial polarity in Drosophila

Cancer Research UK, London Research Institute, London, United Kingdom

16:30 - 17:00 Anne-Kathrin Classen, Cell shape transitions during epithelial tissue morphogenesis

Ludwig Maximilians University Munich

Munich, Germany

17:00 - 20:30 Poster session and light dinner (Lobby Auditorium) Day 3: Friday,

Session 4 Tissue dynamics and mechanics

October 10

9:00 -09:30 Primoz Zihel, Quantitative Morphology of Epithelial Tissues

Department of Theoretical Physics, Jozef Stefan Institute

Ljubljana, Slovenia

9:30 -10:00 Stephan Grill, Morphogenetic functions of actomyosin

Max-Planck Institute of Molecular Cell Biology and Genetics

Dresden, Germany

10:00 -10:30 Matthew Gibson, Mitosis and Morphogenesis in Proliferating Epithelia

Stowers Institute for Medical Research Kansas City, USA

10:30 - 11:00 Coffee break (Lobby Auditorium)

11:00 - 11:30 Jan Brugues, Physical principles of spindle organization

Max-Planck Institute of Molecular Cell Biology and Genetics Dresden, Germany

11:30 - 12:00 Yohanns Bellaiche, Epithelial tissue morphogenesis

Institut Curie Paris, France

12:00 - 12:30 Shane Hutson, Cellular mechanics in early embryogenesis: a mechanical assist from an extra-embryonic tissue

Department of Physics, Vanderbilt University

Nashville, USA

12:30 - 14:00 Lunch (Lobby Auditorium)

Session 5 Cellular dynamics and mechanics

14:00 - 14:30 Olivier Pertz, A growth factor-induced, spatially organizing cytoskeletal module enables rapid and persistent fibroblast migration

Institute of Biochemistry and Genetics, University of Basel

Basel, Switzerland

14:30 - 15:30 Daniel Razansky, Rapid volumetric whole-brain neuroimaging with five-dimensional optoacoustic tomography

Helmholtz Zentrum München

Munich, Germany

15:30 - 16:00 Ernst Bamberg (Keynote), Microbial Rhodopsin: Molecular Mechanism and Optogenetics

Max-Planck Institute Frankfurt

Frankfurt, Germany

16:00 - 16:30 Closing remarks by Hernán López-Schier

Annex 4b: Full list of participants

| Sex | Degree | First name | Last name | Country |
|--------|------------------|------------------|--------------------------|---------|
| female | M. Sc. | Leila | Abbaspour | IR |
| male | PhD Student | Adrian | Aguirre | ES |
| male | | Amir | Asgharsharghi Bonab | DE |
| male | PhD | Mostafa | Bakhti | DE |
| female | | Ramya | Balaji | DE |
| male | | Bálint | Balázs | DE |
| female | M.Sc. | Laura | Bartolini | DE |
| male | | Paolo | Barzagli | IE |
| female | Master | Aimee | Bastidas Ponce | DE |
| female | | Christina | Bielmeier | DE |
| male | Dipl. Ing. | Konstantin | Birngruber | DE |
| male | Dr. | Andreas | Bolzer | DE |
| female | PhD | Anika | Böttcher | DE |
| male | PhD | Peter | Bradley | DE |
| female | Dr. | Monika | Brill | DE |
| male | PhD | Michele | Cappetta | DE |
| female | Dr. | Prisca | Chapouton | DE |
| male | M.Sc. | Andrei | Chekkoury | DE |
| male | Ing. | Carlos | Cruz | DE |
| male | | Xose Luis | Dean Ben | DE |
| male | | Gustavo | de Medeiros | DE |
| female | PhD | Sabrina | Desbordes | DE |
| male | | Robin | Diekmann | DE |
| male | PD Dr. rer. nat. | Steffen | Dietzel | DE |
| male | Dr. | Micha | Drukker | DE |
| male | Dr. | Rahul | Dutta | DE |
| female | PHD MPH | Rebecca | Emeny | DE |
| male | Dr. | Dieter | Ernst | DE |
| male | PhD | Ali | Erturk | DE |
| male | Dr. | Ruben | Fernandez- Busnadiego | DE |
| female | | Anna Kristina | Fiedler | DE |
| female | | Alexandra | Fink | DE |



| | | | | |
|--------|--------------------------|-------------------|------------------------|----|
| female | B.S. | Yuanqing | Gao | DE |
| male | | Moritz | Gegg | DE |
| female | | Lada | Georgieva | CH |
| female | Dr. rer. nat. | Jantje Mareike | Gerdes | DE |
| male | PhD | Ara | Ghazaryan | DE |
| female | PhD | Leanne | Godinho | DE |
| female | PhD | Nadine | Gogolla | DE |
| male | | Ferdinand | Greiss | DE |
| male | | Markus | Grosch | DE |
| male | | Joaquin | Gutierrez | DE |
| male | | Joaquín | Gutiérrez | DE |
| female | | Petra | Hammerl | DE |
| male | Master | Shengcai | Han | DE |
| male | | Hartmann | Harz | DE |
| male | Dr. | Jan | Hasenauer | DE |
| male | | Hailong | He | DE |
| female | Dr. | Farida | Hellal | DE |
| female | Master of Science | Lisann | Heyner | DE |
| female | | Sabrina | Hroß | DE |
| male | | Marwan | Hussein | DE |
| male | | Nick | Jagiella | DE |
| female | | Ankita | Jha | FR |
| male | PhD student | Yuanyuan | Jiang | US |
| female | Dr. | Esra | Karaköse Balioglu | DE |
| male | Dr. | Robert | Kasper | DE |
| male | BSc (TUM), MTM (UNSW) | Moritz | Kneipp | DE |
| male | | Benno | Koberstein- Schwarz | DE |
| male | Dr. | Herwig | Koppensteiner | DE |
| male | PhD | Vladimir | Korzh | SG |
| male | PhD | Vladimir | Korzh | SG |
| female | PhD | Antonella | Lauri | DE |
| female | | Amy | Lin | DE |
| male | Dr. | Frank | Lison | DE |
| female | PhD | Anna | Lorentzen | DE |
| female | | Marta | Lozano Ortega | DE |
| male | M. Sc. | Benedikt | Ludwig | DE |
| male | | Valerio | Lupperger | DE |
| male | | Christian | Lutzweiler | DE |
| male | | Subhamoy | Mandal | DE |
| male | Dr | Carsten | Marr | DE |
| male | Dipl. | Christoph | Massner | DE |
| female | Dr. | Adriana | Migliorini | DE |
| female | Dr. | Tamara | Mikeladze-Dvali | DE |
| male | PhD | Anurag | Mishra | DE |
| male | Dr. | Eloi | Montanez | DE |
| male | Master of science | Noah | Moruzzi | DE |

| | | | | |
|--------|-------------------------------|---------------|-----------------|----|
| female | MSc | Ahne | Myklatun | DE |
| male | | Nils | Norlin | DE |
| female | | Jara | Obermann | DE |
| male | M.Sc. | Murad | Omar | DE |
| female | Dr. | Daniela | Panakova | DE |
| male | PhD | Giorgio | Pariani | DE |
| female | | Laura | Pola Morell | DE |
| male | | Hanyu | Qin | CH |
| female | Dr. rer. nat. | Aurelia | Raducanu | DE |
| male | B.Eng. | Johannes | Rebling | DE |
| female | MCHEM | Sheryl | Roberts | DE |
| male | Dr. | Oliver | Rocks | DE |
| male | | Hannes | Rolbieski | DE |
| male | M. Sc. | Peter | Röttgermann | DE |
| female | BSc | Ejona | Rusha | DE |
| male | PhD student | Magesh | Sadasivam | DE |
| female | PhD | Eri | Sakata | DE |
| male | | Tillman | Schäfer | DE |
| male | Prof. Dr. | Michael | Schindler | DE |
| female | | Felizitas | Schmitz | DE |
| male | Prof. | Peter | Schröder | DE |
| male | | Adrian-Minh | Schumacher | DE |
| male | | Mathias | Schwarz | DE |
| male | M.Sc | Felix | Sigmund | DE |
| male | | Dominik | Soliman | DE |
| male | MSc | Ali Yasin | Sonay | CH |
| female | M. Sc. | Janina | Sörmann | DE |
| male | Prof. Dr. | Simon | Sprecher | CH |
| male | | Michael | Sterr | DE |
| male | Prof. Dr. Dr. | Fabian | Theis | DE |
| female | | Rachel | Thong | DE |
| female | Biology | Elen | Torres | DE |
| female | | Anna | Truckenbrodt | DE |
| male | M.Eng | Jake | Turner | DE |
| male | Ph.D | Fabio | Valenti | DE |
| female | | Gema | Valera | DE |
| male | Master in Biomedical Research | Oriol | Viader Llargués | DE |
| male | | Axel | von Streitberg | DE |
| female | Postdoc | Thi Kim Thanh | Vuong | FR |
| female | B.Sc. | Vanessa | Weichselberger | DE |
| male | | Stefan | Weiss | DE |
| male | Prof. | Gil | Westmeyer | DE |
| male | | Axel | Wiegand | IE |
| male | PhD | Maarten | Witte | DE |
| male | PhD | Maarten | Witte | DE |
| male | Dr. | Wolfgang | Wurst | DE |
| female | | Yan | Xiao | DE |

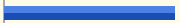

| | | | | |
|--------|------------|----------------|-------------|----|
| female | M.Sc. | Sine | Yaganoglu | CH |
| male | Ph.D | Venkata Ramesh | Yentrapalli | DE |
| female | M.D. Ph.D. | Chun-Xia | Yi | DE |
| male | | Ralf | Zenke | DE |
| male | M.Sc. | Matthias | Zorn | DE |

Annex 4c: Survey of participants

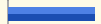


1. How would you rate the symposium

| # | Answer | Bar | Response | % |
|---|-----------|---|----------|-----|
| 1 | Excellent |  | 12 | 92% |
| 2 | Good |  | 1 | 8% |
| 3 | Fair | | 0 | 0% |
| 4 | Poor | | 0 | 0% |
| | Total | | 13 | |

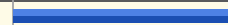

2. How would you rate the symposium in comparison to others covering similar topics that you have attended in the past two years

| # | Answer | Bar | Response | % |
|---|---------|---|----------|-----|
| 1 | Better |  | 8 | 62% |
| 2 | Similar |  | 5 | 38% |
| 3 | Worse | | 0 | 0% |
| | Total | | 13 | |




3. How do you rate the facilities

| # | Answer | Bar | Response | % |
|---|-----------|---|----------|-----|
| 1 | Excellent |  | 4 | 31% |
| 2 | Good |  | 7 | 54% |
| 3 | Fair |  | 2 | 15% |
| 4 | Poor | | 0 | 0% |
| | Total | | 13 | |

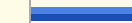


4. Please rate transportation to and from Munich

| # | Answer | Bar | Response | % |
|---|-----------|---|----------|-----|
| 1 | Easy |  | 10 | 77% |
| 2 | Neutral |  | 3 | 23% |
| 3 | Difficult | | 0 | 0% |
| | Total | | 13 | |

5. Please rate transportation to and from the Helmholtz Zentrum

| # | Answer | Bar | Response | % |
|---|-----------|---|----------|-----|
| 1 | Easy |  | 4 | 31% |
| 2 | Neutral |  | 6 | 46% |
| 3 | Difficult |  | 3 | 23% |
| | Total | | 13 | |

6. Please rate the catering at the venue

| # | Answer | Bar | Response | % |
|---|-----------|---|----------|-----|
| 1 | Excellent |  | 5 | 42% |
| 2 | Very Good |  | 4 | 33% |
| 3 | Good |  | 3 | 25% |
| 4 | Fair | | 0 | 0% |
| 5 | Poor | | 0 | 0% |
| | Total | | 12 | |

7. Please, rate dinner at the biergarten

| # | Answer | Bar | Response | % |
|---|-----------------------|-----|----------|-----|
| 1 | Excellent | | 7 | 54% |
| 2 | Very Good | | 4 | 31% |
| 3 | Good | | 1 | 8% |
| 4 | Fair | | 0 | 0% |
| 5 | Poor | | 0 | 0% |
| 6 | Did not attend dinner | | 1 | 8% |
| | Total | | 13 | |

8. Please, rate the overall organisation of the symposium

| # | Answer | Bar | Response | % |
|---|-----------|-----|----------|-----|
| 1 | Excellent | | 10 | 77% |
| 2 | Very Good | | 1 | 8% |
| 3 | Good | | 1 | 8% |
| 4 | Fair | | 1 | 8% |
| 5 | Poor | | 0 | 0% |
| | Total | | 13 | |

9. Please rate the distribution of topics

| # | Answer | Bar | Response | % |
|---|------------|-----|----------|-----|
| 1 | Too broad | | 3 | 23% |
| 2 | Optimal | | 10 | 77% |
| 4 | Too narrow | | 0 | 0% |
| | Total | | 13 | |

10. The time allocated to your talk was

| # | Answer | Bar | Response | % |
|---|------------|-----|----------|------|
| 1 | Optimal | | 13 | 100% |
| 2 | Too much | | 0 | 0% |
| 3 | Too little | | 0 | 0% |
| | Total | | 13 | |

11. Would you attend / recommend attendance if the symposium were held again

| # | Answer | Bar | Response | % |
|---|--------|-----|----------|-----|
| 1 | Yes | | 12 | 92% |
| 2 | May be | | 1 | 8% |
| 3 | No | | 0 | 0% |
| | Total | | 13 | |

12. Did you establish new collaborations or will incorporate new technology to your research based on your attendance to the symposium

| # | Answer | Bar | Response | % |
|---|----------|-----|----------|-----|
| 1 | Yes | | 5 | 38% |
| 2 | Possibly | | 8 | 62% |
| 3 | No | | 0 | 0% |
| | Total | | 13 | |