

The 2019 COMBINE MEETING

Heidelberg
15-19 July 2019





**Heidelberg Institute for
Theoretical Studies**



Welcome to Heidelberg!

In 2010, the first *COMBINE Forum* was held in Edinburgh (UK). Since then, the meeting took place as the annual meeting of the whole COMBINE community. We are very proud to host the tenth COMBINE Forum in Heidelberg this year at the Heidelberg Institute for Theoretical Studies (HITS) from July 15th to July 19th, 2019. More than 100 guests from around the globe will celebrate with us, exchanging their ideas, approaches and implementations for improved data and modelling standards in the life sciences. We will as well discuss further needs for standardization and harmonization in order to further improve data and model interoperability. A combination of keynote lectures, invited talks and interactive breakout discussions, as well as contributed talks, posters and lightning talks, selected from submitted abstracts, provides the basis for the meeting, offering diverse formats to work on interoperability problems.

One special focus this year is on the standardization need in systems medicine, which has been recognized as a necessity for computer-assisted personalized medicine. To direct the scientific community's attention to this topic, the *European standardization framework for data integration and data-driven in silico models* (EU-STANDS4PM) organizes a workshop as part of COMBINE 2019.

Also, reproducibility in modelling is a main topic this year, as reflected by several sessions and workshops, like the *FAIRDOM PALs and user workshop*, the inaugural meeting of the *Model eXchange consortium* and breakout sessions on data and model reproducibility, as well as on metadata specifications. Besides these focus themes, also sessions, workshops and breakout discussions around single standards, their further development and their interoperability help to advance the standardization, standing in the tradition of COMBINE.

We invite you to celebrate the tenth anniversary of the COMBINE Forum this year with us and wish you a productive meeting, fruitful discussions and a wonderful time in Heidelberg.

The image shows two handwritten signatures in blue ink. The first signature on the left is 'M. Golebiewski' and the second signature on the right is 'Dagmar Waltemath'.

Martin Golebiewski & Dagmar Waltemath
(on behalf of the organizing team of COMBINE 2019)

Funding is gratefully provided by:



Heidelberg Institute for
Theoretical Studies



Welcome by the HITS management

On behalf of the HITS management, we are pleased to welcome all delegates and visitors to the campus for the 10th COMBINE meeting which runs from 15-19 July at the Studio Villa Bosch, right next to the Heidelberg Institute for Theoretical Studies (HITS).

There is some history of COMBINE at HITS. After our institute was founded by Klaus Tschira and Andreas Reuter in 2010, the following year already saw the hosting of the second meeting at HITS. It was a major effort for the young institute as it was then, since COMBINE has been the combined conference on standards in computational modelling of biological systems.

The COMBINE community has returned to HITS stronger than ever for its 10th anniversary meeting.

We are delighted that we will be host to this event again and we hope you will join us to make this anniversary meeting a memorable event.

Dr. Gesa Schönberger (HITS Managing Director) &
Priv.-Doz. Dr. Wolfgang Müller (HITS Scientific Director)

About HITS

The Heidelberg Institute for Theoretical Studies (HITS) was established in 2010 by the physicist and SAP co-founder Klaus Tschira (1940-2015) and the Klaus Tschira Foundation as a private, non-profit research institute. HITS conducts basic research in the natural sciences, mathematics and computer science, with a focus on the processing, structuring, and analyzing of large amounts of complex data and the development of computational methods and software. The research fields range from molecular biology to astrophysics. The shareholders of HITS are the HITS-Stiftung, which is a subsidiary of the Klaus Tschira Foundation, Heidelberg University and the Karlsruhe Institute of Technology (KIT). HITS also cooperates with other universities and research institutes and with industrial partners. The base funding of HITS is provided by the HITS Stiftung with funds received from the Klaus Tschira Foundation. The primary external funding agencies are the Federal Ministry of Education and Research (BMBF), the German Research Foundation (DFG), and the European Union.

About COMBINE

Standards for exchange of scientific data are critical to the development of any field. They enable researchers and practitioners to transport information reliably, to apply a variety of tools to their problems, and to reproduce scientific results. Over the past two decades, a range of standards have been developed to facilitate the exchange and reuse of information in the domain of representation and modeling of biological systems, especially in the fields of systems biology and systems medicine. These standards are complementary, so the interactions between their developers increased over time. By the end of the last decade, the research community decided that more interoperability is required between the standards, and that common development is needed to make better use of effort, time, and money devoted to these activities.

As a consequence, the COmputational MOdeling in Biology NETwork (COMBINE) was created beginning of 2010 to enable the sharing of resources, tools, and other infrastructure, and to coordinate standardization efforts for modeling in biology. COMBINE began with four core standards, and it has since expanded to eight, and coordinates with a number of other related standardization efforts. COMBINE brings standard communities together around activities that are mutually beneficial. These activities include making specification documents available from a common location, providing a central point of contact, and organizing regular face-to-face meetings.

To this end, the COMBINE network organizes an annual conference style meeting (the COMBINE Forum) and annual hackathon style events called HARMONY (Hackathon on Resources for Modeling in Biology), as well as tutorials at the International Conference on Systems Biology (ICSB) and related meetings.

Contact us

Website: <http://co.mbine.org/>

Get in touch with the editors: combine-coord@googlegroups.com

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Conference venue

COMBINE 2019 will be held at the conference facilities of Studio Villa Bosch in Heidelberg. The address is Schloss-Wolfsbrunnenweg 33, 69118 Heidelberg, Germany.

Directions

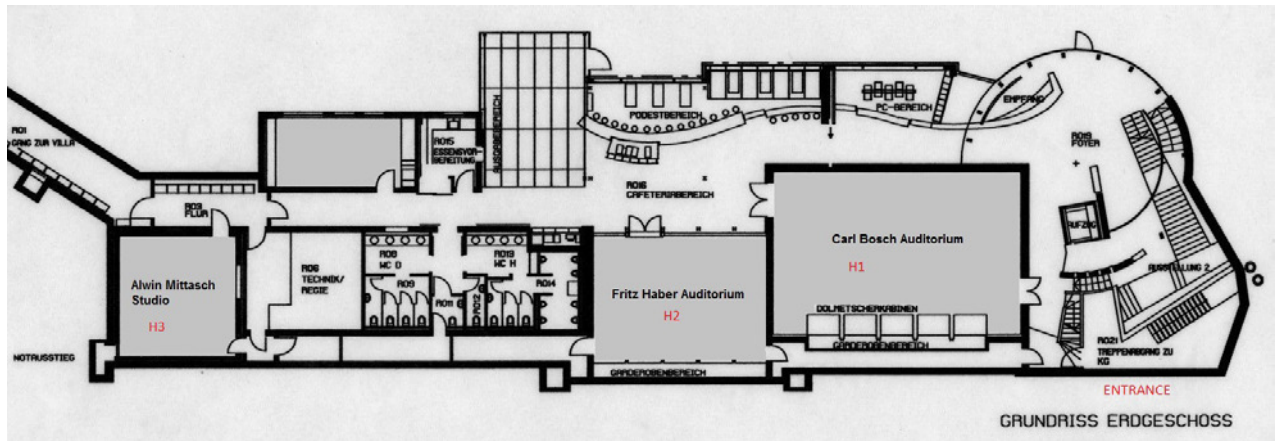
- **By plane:** You travel to the international airport of Frankfurt/Main. From there, you take the Lufthansa-Bus (leaving in front of terminal 1, section B) to Heidelberg or Mannheim/Heidelberg (depending on the time of the day). In approximately one hour it will bring you to the Crowne Plaza in Heidelberg. From there you can take a taxi for a 15 minute ride to Studio Villa Bosch in the Schloss-Wolfsbrunnenweg.
- **By train:** You travel to Heidelberg Hauptbahnhof. From there you can either take public transport, as mentioned below, or a taxi to the Studio Villa Bosch.
- **By bus:** You can reach HITS and Studio Villa Bosch directly with the bus number 30, the so called science-bus, which runs hourly from Monday to Friday. At Heidelberg main station you take the train S2 (direction Eberbach), S1 (direction Osterburken) or S5 (direction Eppingen Bahnhof) and get off at Heidelberg-Altstadt station. There you change to bus number 30, direction Schlierbach (HD), HITS. Please get off the bus at the bus stop "Villa Bosch".

At the main station you can also take:

- bus number 32 (direction Universitätsplatz). You get off at the bus stop Universitätsplatz and change to bus number 30, direction Schlierbach (HD), HITS.
- bus number 33 (direction Ziegelhausen, Kpfel). You leave at the bus stop Peterskirche and change to bus number 30, direction Schlierbach (HD), HITS.
- **By car:** You travel on the Autobahn to the Heidelberger Kreuz (Heidelberg crossing), from there on route A 656 directly to Heidelberg. At the end of the Autobahn you turn left and then right; you are now on B 37, which you will follow some minutes, until Heidelberg downtown ends (ca. 5 km). After a few hundred meters, you will see a pointer to HITS, which leads you upwards to the right, across the railway. Then turn left and follow the streets Am Rosenbusch and Hausackerweg, always climbing upwards the serpentine

curves. The Hausackerweg ends by joining the Schloss-Wolfsbrunnenweg at the Hotel Atlantic. Turn left, following the HITS pointer onto the Schloss-Wolfsbrunnenweg. 300 m further at your left you have reached the gateway to the Villa Bosch. The HITS campus is about 200 meters farther, on the left-hand side. Parking: in the garage Unter der Boschwiese, opposite to the Villa Bosch.

Room names and location



Conference Dinner

Restaurant 'S' Kastanie, Elisabethenweg 1 in Heidelberg

Wednesday, July 17th, 2019 - 19:00 - 23:00

Registered accompanying persons (payable IN CASH at the restaurant): 70 Euro



Meeting Agenda

Monday, July 15th 2019

time	Plenary
Room:	Foyer
09:15-10:00	Carl Bosch Auditorium (H1)
09:15-10:00	Registration & Coffee
10:00 – 11:00	Opening Session; Chair: Martin Golebiewski (Heidelberg, D)
10:00 - 10:05	Martin Golebiewski, HITS, Heidelberg (D) Welcome by the host
10:05 - 10:20	Gesa Schönberger and Wolfgang Müller, HITS, Heidelberg (D) Welcome addresses from the HITS Management
10:20 - 11:00	Michael Hucka , California Institute of Technology, Pasadena, CA (USA) The History of COMBINE (invited talk)
11:00 – 12:00	HITS Colloquium; Chair: Wolfgang Müller (Heidelberg, D)
11:00 - 12:00	Peter Hunter (Auckland, New Zealand) Keynote: Computational Physiology and the Physiome Project
12:00 - 13:00	Lunch
13:00 – 15:00	COMBINE Colloquium; Chair: Martin Golebiewski (Heidelberg, D)
13:00 - 13:45	Thomas Lemberger (EMBO press, D) Keynote: Implementing Open Science in publishing
13:45 - 14:30	Ursula Kummer, University of Heidelberg (D) Keynote: Modeling projects across platforms - the reality and how reality should be
14:30 - 15:00	Lightning talks (1) 3 min talks selected from the submitted abstracts
15:00 - 15:30	Poster Session & Coffee Break
15:30 – 17:30	de.NBI Colloquium; Chair: Dagmar Waltemath (Greifswald, D)
15:30 - 16:00	Judith Wodtke, Humboldt University Berlin (D) How (not) to Apply (COMBINE) Standards in Agent-Based Modeling
16:00 - 16:30	Matthias König, Humboldt University Berlin (D) Computational modeling of liver function tests - Stratification and individualization based on semantic annotations of models and data
16:30 - 17:00	Heidi Seibold, Ludwig-Maximilians-Universität München (D) Research software engineers and their role for open and reproducible research
17:00 - 17:30	Lightning talks (2) 3 min talks selected from the submitted abstracts
17:30 - 19:00	Poster Session & Welcome Reception: 10 years COMBINE - Happy Birthday !

Tuesday, July 16th 2019

time	Plenary/Breakout session 1		Breakout session 2	Breakout session 3
	Room:	Foyer	Carl Bosch Auditorium (H1)	Fritz Haber Auditorium (H2) Alwin Mittasch Studio (H3)
09:30 – 11:10	Session 1:			
09:30 - 10:00	Synthetic Biology ; Chairs: Ernst Oberortner (Berkeley, CA, USA) & Chris Myers (Salt Lake City, UT, USA)			
10:00 - 10:30	Chris Myers , University of Utah, Salt Lake City, UT (USA) A Standard Enabled Workflow for Synthetic Biology (invited talk) Manuel Porcar Miralles , Institute for Integrative Systems Biology, València (Spain) BioRoboost: A last chance for standardisation in biology? (invited talk)			
10:30 - 10:40	Pedro Fontanarrosa, University of Utah, Salt Lake City, UT (USA) Analyzing Genetic Circuits for Hazards and Glitches			
10:40 - 10:50	Ernst Oberortner, Lawrence Berkeley Nat. Laboratory (USA) SBOL and its applicability in partially and fully automated design workflows: Three success stories			
10:50 - 11:05	all speakers of Session 1 Discussion			
11:05 - 11:30	Poster Session & Coffee			
11:30 – 13:00	Session 2:			
11:30 - 12:00	Reproducibility in Synthetic and Systems Biology ; Chairs: Dagmar Waltemath (Greifswald, D) & David Nickerson (Auckland, NZ)			
12:00 - 12:10	Herbert Sauro , University of Washington, Seattle, WA (USA) The Center for Reproducible Biomedical Modeling (invited talk) Karin Lundengård, University of Auckland (NZ) Physiome - Publish your models curated for reproducibility and reusability to increase research quality for everyone			
12:10 - 12:20	Jacky Snoep, Stellenbosch University (South Africa) Reproducibility in model construction, validation and analysis workflows in systems biology projects; Xylose metabolism in Caulobacter crescentus as a case study, using JWS Online and the Causal, Mechanistic Pathway Based Analysis of - Omic Profiles			
12:20 - 12:30	Emek Demir, Oregon Health and Science University, Portland (USA) Predictive in-silico multiscale analytics to support cancer personalized diagnosis and prognosis, empowered by imaging biomarkers			
12:30 - 12:40	Polyxeni Gkontra, La Fe Health Research Institute (IIS La Fe), Valencia (Spain) Discussion			
12:40 - 13:00	all speakers of Session 2 Discussion			

time	Plenary/Breakout session 1		Breakout session 2	Breakout session 3
Room:	Foyer	Carl Bosch Auditorium (H1)	Fritz Haber Auditorium (H2)	Alwin Mittasch Studio (H3)
13:00 - 14:00	Lunch			
14:00 – 15:30	Session 3:	Sharing experiences in building a standards community; Chairs: Dagmar Waltemath (Greifswald, D) & Mike Hucka (Pasadena, CA, USA)	Reproducibility - SED-ML Script: a Proposal; Chairs: Herbert Sauro & Lucian Smith (Seattle, WA, USA)	
15:30 - 16:00	Poster Session & Coffee			
16:00 – 17:30	Session 4:	COMBINE as Legal Entity; Chairs: Martin Golebiewski (Heidelberg, D) & Herbert Sauro (Seattle, WA, USA)		
17:30 - 17:45		Plenary Wrapup		
18:30 - 20:30	Guided Tour through the old town of Heidelberg (optional)			

Wednesday, July 17th 2019

time	Plenary/Breakout session 1		Breakout session 2	Breakout session 3
	Room:	Foyer	Carl Bosch Auditorium (H1)	Fritz Haber Auditorium (H2) Alwin Mittasch Studio (H3)
09:30 – 11:00	Session 5:			
09:30 - 10:00	Chairs: Matthias König (Berlin, D) & Melanie Stefan (Edinburgh, UK)			
	Caroline Mendonça Costa , King's College London (UK) A personalized modeling pipeline for cardiac electrophysiology simulations of cardiac resynchronization therapy in infarct patients (invited talk)			
10:00 - 10:10	Yosef Roth , Icahn School of Medicine at Mount Sinai, New York City, NY (USA) Datanator: Tools for Aggregating Data for Large-Scale Biomodeling			
10:10 - 10:20	Fabian Fröhlich , Harvard Medical School, Boston, MA (USA) Simulation and Sensitivity Analysis for Large Kinetic Models in AMICI			
10:20 - 10:30	Alan Garny , University of Auckland (NZ) OpenCOR: current status and future plans			
10:30 - 10:45	all speakers of Session 5 Discussion			
10:45 - 11:15	Poster Session & Coffee			
11:15 – 13:00	Session 6:			
11:15 - 11:45	Chairs: Falk Schreiber (Konstanz, D) & Michael Blinov (Farmington, CT, USA)			
	Akira Funahashi , Keio University, Yokohama (Japan) CellDesigner: A modeling tool for biochemical networks (invited talk)			
11:45 - 12:15	Michael Blinov , UConn Health, Farmington, CT (USA) Virtual Cell: Modeling and Visualization of Reaction Rules (invited talk)			
12:15 - 12:25	Jeanet Mante , University of Utah, Salt Lake City, UT (USA) Visualization of Part Use in SynBioHub			
12:25 - 12:35	Oscar O Ortega , Vanderbilt University, Nashville, TN (USA) PySB framework: Tools to build, calibrate and visualize biochemical models			
12:35 - 12:45	Augustin Luna , Harvard Medical School, Boston, MA (USA) Visualization, Access, and Exploration of Biological Pathway Information from Pathway Commons			
12:45 - 13:00	all speakers of Session 6 Discussion			
13:00 - 14:00	Lunch			

time	Plenary/Breakout session 1		Breakout session 2	Breakout session 3
Room:	Foyer	Carl Bosch Auditorium (H1)	Fritz Haber Auditorium (H2)	Alwin Mittasch Studio (H3)
14:00 – 15:30	Session 7:	SBGN workshop; Chairs: Falk Schreiber (Konstanz, D) & Michael Blinov (Farmington, CT, USA) EVERYBODY IS INVITED TO ATTEND	https://sbgn.github.io/sbgn12 MIRIAM 2 & the OMEX Metadata Specification; Chairs: Dagmar Waltemath (Greifswald, D) & David Nickerson (Auckland, NZ)	SBOL; Chairs: Ernst Oberortner (Berkeley, CA, USA) & Chris Myers (Salt Lake City, UT, USA)
15:30 - 16:00 Poster Session & Coffee				
16:00 – 17:30	Session 8:	SBGN workshop; Chairs: Falk Schreiber (Konstanz, D) & Michael Blinov (Farmington, CT, USA) EVERYBODY IS INVITED TO ATTEND	https://sbgn.github.io/sbgn12 Model eXchange consortium: Inaugural meeting; Chairs: Henning Hermjakob & Rahuman Sheriff (EMBL-EBI, Hinxton, UK)	SBOL; Chairs: Ernst Oberortner (Berkeley, CA, USA) & Chris Myers (Salt Lake City, UT, USA)
17:30 - 17:45	Plenary Wrapup			

19:30 - 23:00 Conference Dinner at the restaurant S'Kastanie (address: Elisabethenweg 1 in Heidelberg): <https://www.restaurant-s-kastanie.de>

Thursday, July 18th 2019



EU-STANDS4PM
standards for in silico models
for personalised medicine



time	Plenary/Breakout session 1		Breakout session 2	Breakout session 3
Room:	Foyer	Carl Bosch Auditorium (H1)	Fritz Haber Auditorium (H2)	Alwin Mittasch Studio (H3)
09:30 – 11:00	Session 9:	Model and Data Management; Chairs: Wolfgang Müller & Ulrike Wittig (Heidelberg, D)		
09:30 - 10:15		Carole Goble, University of Manchester (UK)	Keynote: Let's go on a FAIR asset management safari	
10:15 - 10:25		Susheel Varma, EMBL-EBI, Hinxton (UK)	ELIXIR Cloud & AAI: Standardised and Interoperable Services for Human Data Communities	
10:25 - 10:35		Rahuman Sheriff, EMBL-EBI, Hinxton (UK)	BioModels Parameters: A resource to search and access parameters from published systems models	
10:35 - 10:45		Martin Golebiewski, HTS, Heidelberg (D)	Two universes – one world: Community standards vs. formal standards in systems biology and systems medicine	
10:45 - 11:00		all speakers of Session 9	Discussion	
11:00 - 11:30	Poster Session & Coffee			
11:30 – 13:00	Session 10:	Standards for Personalized Medicine; Chairs: Marc Kirschner (Jülich, D) & Martin Golebiewski (Heidelberg, D)		
11:30 - 11:45		Marc Kirschner, PTJ (Germany) and Ingrid Skelton Kockum, Karolinska Institutet (Sweden)	EU-STANDS4PM: A pan-European Expert Forum joined forces to tackle the complexity of big data integration for in silico methodologies in personalised medicine	
11:45 - 12:15		Norbert Graf, Saarland University Medical Center, Homburg (D)	Keynote: From data via models to personalized medicine – An example in Pediatric Oncology	
12:15 - 12:30		Petr Holub, BBMRI-ERIC, Masaryk University (Czech Republic)	Standards in Biobanking (invited talk)	
12:30 - 12:45		Søren Brunak, University of Copenhagen (DK)	Standards for Clinical Data and Systems Medicine	
12:45 - 13:00		Katharina Eva Ó Cathaoir, University of Copenhagen (DK)	A Bird's Eye view of Legal and Ethical aspects of EU-STANDS4PM	

time	Plenary/Breakout session 1		Breakout session 2		Breakout session 3
Room:	Foyer	Carl Bosch Auditorium (H1)	Fritz Haber Auditorium (H2)	Alwin Mittasch Studio (H3)	
13:00 - 14:00	Lunch		COMBINE coordinators' meeting		
14:00 - 14:30		<p>Liesbet Geris, Executive Director VPH Institute, KU Leuven (Belgium)</p> <p>In silico medicine and the VPH institute: bringing the community together and the field forward (invited talk)</p>	<p>Something old, something new: constraint-based modelling and SBML; Chair: Brett Olivier (VU University Amsterdam, NL)</p>	<p>SBOL; Chairs: Chris Myers & Ernst Oberortner</p>	
14:30 – 15:30	Session 11:	<p>EU-STANDS4PM workshop; Chairs: Marc Kirschner (Jülich, D) & Martin Golebiewski (Heidelberg, D)</p> <p>EVERYBODY IS INVITED TO ATTEND</p>	<p>Link to the agenda: http://co.mbine.org/system/files/EU-STANDS4PM_COMBINE_workshop_published_0.pdf</p>		
15:30 - 16:00	Poster Session & Coffee				
16:00 – 17:30	Session 12:	<p>EU-STANDS4PM workshop; Chairs: Marc Kirschner (Jülich, D) & Martin Golebiewski (Heidelberg, D)</p> <p>EVERYBODY IS INVITED TO ATTEND</p>	<p>Link to the agenda: http://co.mbine.org/system/files/EU-STANDS4PM_COMBINE_workshop_published_0.pdf</p>	<p>SBML L3 Packages - An Introduction to SBML packages; Chair: Sarah Keating (University College London, UK)</p>	<p>SBOL; Chairs: Chris Myers & Ernst Oberortner</p>
17:30 - 17:45		Plenary Wrapup			

Friday, July 19th 2019

time	Room:	Foyer	Plenary/Breakout session 1	Breakout session 2	Breakout session 3
09:30 – 11:00	Session 13:		Carl Bosch Auditorium (H1)	Fritz Haber Auditorium (H2)	Alwin Mittasch Studio (H3)
09:30 - 10:00			Semantic Model Annotation ; Chair: Dagmar Waltemath (Greifswald, D)		
			David Nickerson , Auckland Bioengineering Institute, University of Auckland (New Zealand)	Semantic annotation in the PhysioMe Model Repository (invited talk)	
10:00 - 10:30			Huaiyu Mi , Keck School of Medicine of the University of Southern California (USC), Los Angeles, CA (USA)	Gene Ontology Causal Activity Modeling (GO-CAM) - invited talk	
10:30 - 10:40			Anand Rampadarath, University of Auckland (NZ)	Model curation and annotation	
10:40 - 10:50			Henning Hermjakob, EMBL-EBI, Hinxton (UK)	Identifiers.org Compact Identifiers for robust data citation	
10:50 - 11:00			all speakers of Session 13	Discussion	
11:00 – 11:30	Poster Session & Coffee				
11:30 – 13:00	Session 14:		Emerging Standardization Needs and Multicellular Modeling ; Chair: Tim Johann (Dortmund, D)		
11:30 - 11:50			Padraig Gleeson , University College London (UK)	Sharing standardised models and data on the Open Source Brain platform (invited talk)	
11:50 - 12:10			Melanie Stefan , University of Edinburgh (UK)	Multi-method modelling of synaptic plasticity and the challenges it brings (invited talk)	
12:10 - 12:20			Jörn Starruß, TU Dresden (D)	Principles for declarative multicellular modelling	
12:20 - 12:30			Guillerm Yanez, Pontificia Universidad Católica de Chile (CL)	Flapjack: an open-source tool for storing, visualising, analysing and modelling kinetic gene expression data	
12:30 - 12:45			all speakers of Session 14	Discussion	
12:45 – 13:00			CLOSING PLENARY ; Chairs: Martin Golebiewski (HITS, Heidelberg, D) & Dagmar Waltemath (University of Greifswald, D)		

time	Plenary/Breakout session 1		Breakout session 2	Breakout session 3
Room:	Foyer	Carl Bosch Auditorium (H1)	Fritz Haber Auditorium (H2)	Alwin Mittasch Studio (H3)
13:00 - 14:00	Lunch			
14:00 – 15:30	Session 15:	FAIRDOM PALS and User Workshop; Chair: Olga Krebs (HITS, Heidelberg, D)	Model eXchange consortium; Chairs: Henning Hermjakob & Rahuman Sheriff (EMBL-EBI, Hinxton, UK)	
		EVERYBODY IS INVITED TO ATTEND: https://fair-dom.org/events/fairdom-pals-users-meeting-2019/		
15:30 - 16:00	Poster Session & Coffee			
16:00 – 17:30	Session 16:	FAIRDOM PALS and User Workshop; Chair: Olga Krebs (HITS, Heidelberg, D)	EVERYBODY IS INVITED TO ATTEND: https://fair-dom.org/events/fairdom-pals-users-meeting-2019/	
17:30	END OF MEETING			