VPH Institute
Building the Virtual Physiological Human

NTNU – Trondheim
Norwegian University of Science and Technology

Programme day by day

Tuesday 9 September

16:00-18:30	Registration
19:30-22:30	Reception at Nidaros Cathedral

Wednesday 10 September

08:00	Registration
08:30	Opening address of VPH2014
	08:40-12:00 Session 1: The Digital Patient: The intimate links between the Virtual Physiological Human and predictive, preventive and participatory medicine ***Chair:*** *Adriano Henney, Virtual Liver Network, Germany*
08:40	**Keynote** Denis Noble**: Is the digital patient possible: What are the roadblocks and how do we negotiate them?**
09:25	Ivan Viola: **Visual computing for biology and medicine – highlights from EG VCBM 2014**
09:50	Mark Sagar: **Creating interactive biomimetic models of the face**
10:15	Coffee break
10:45	Nicolas Smith, Sander Land, Jack Lee, Andrew Cookson, Eoin Hyde: **Multiphysics cardiac modeling: From experiment to the clinic**
11:10	Tommaso Mansi, Itu Lucian, Tiziano Passerini, Saikiran Rapaka, Viorel Mihalef, Puneet Sharma, Dorin Comaniciu, Bogdan Georgescu: **Data-driven strategies for patient-specific modelling of heart function**
11:35	Themis Toumanidou, Jérôme Noailly: **Simulating muscle activation in the lumbar spine while accounting for condition-dependent intervertebral disc multiphysics**
12:00	End of session 1
12:00	Lunch
	13:00-15:55 Session 2: The Ageing Physiome: Quantitative understanding of the ageing phenotype to understand, prevent and treat complex disease ***Chair:*** Hans Van Oosterwyck, University of Leuven
13:00	**Keynote** Tom Kirkwood**: Untangling the complexity of ageing**
13:45	Morten Andre Høydal**: Effects of exercise on the ageing individual and cardiovascular disease**
14:10	Coffee break
14:40	Liesbet Geris: **Model-guided bone tissue engineering: From bench to bedside via in silico modeling**
15:05	Lars Ole Schwen, André Homeyer, Felix Gremse, Arne Schenk, Lars Kuepfer, Uta Dahmen, Olaf Dirsch: **Multiscale simulation of zonated metabolism in steatotic livers**
15:30	Véronique Thomas-Vaslin: **Understanding and modelling the complexity of the immune system: Systems biology for integration and dynamical reconstruction of lymphocyte multiscale dynamics**
15:55	End of session 2
16:00	e-Poster session
17:00	**Parallel workshops** **W1.1 Metamodelling methodology for easing model construction, validation and clinical implementation** **Organizer: Kristin Tøndel, Simula Research, Oslo Co-organizer: Gunnar Cedersund** • Kristin Tøndel, Andrew Crozier, Steven Niederer, Nic Smith: **Insight into model mechanisms and more efficient model development and validation by multivariate metamodelling** • Harald Martens, Anders Lyngvi Fougner, Hodjat Rahmati, Øyvind Stavdahl, Ole Morten Aamo: **From measurements to models and back – and forth** • Kristin McLeod, Kristin Tøndel, Samuel Wall, Jørg Saberniak, Kristin Haugaa: **Metamodelling of structural abnormalities in the ARVC heart** • Vitor Martins dos Santos, Willem de Vos, Edoardo Saccenti: **The Virtual Intestine: Metamodelling and systems biology of host– food– microbe interactions in the mammalian gut** • Jeroen Feher, Susheel Varma, Martina Sciola, Paul Morris, Rod Hose: **Characterising uncertainty of VPH-related multiscale models** • Gunnar Cedersund, Martin Gollvik, Markus Karlsson, Mikael Forsgren, Olof Leinhard-Dahlqvist, Harald Martens, Peter Lundberg: **Inverse metamodelling makes a mechanistic model for liver diagnosis robust and clinically fast** **W1.2 Mathematical challenges of multiscale modelling** **Organizer: Merryn Tawhai, Auckland Bioengineering Institute, University of Auckland** **Co-organizer: Blanca Rodriguez** • Pablo Lamata, Sander Land, Nicolas Smith, Steven Niederer:

	Moving from patients to populations through robust personalised cardiac modelling • Oliver Röhrle, Michael Sprenger, Syn Schmitt: **Using nested models to achieve a multiscale, continuum-mechanical, forward dynamics simulation framework for musculoskeletal systems** • John Rice, Slava Gurev: **High-resolution models of human ventricles: electrophysiology and mechanics** • Paris Perdikaris, Leopold Grinberg, George Karniadakis: **An effective fractal-tree closure model for simulating blood flow in large arterial networks** • Alessio Gizzi, Christian Cherubini, Annamaria Altoma: **Three-dimensional thermo-viscoelasticity for electroactive intestine modeling** • Blanca Rodriguez, Oliver Britton, Kevin Burrage, Esther Pueyo, Alfonso Bueno-Orovio: **Multiscale mathematical models to capture and investigate sources and modulators of variability in cardiac electrophysiology** **W1.3 Model-guided tissue engineering and stem cell therapy** **Organizer: Liesbet Geris, Biomechanical Engineering, University of Liege** **Co-organizer: Jose Manuel Garcia-Aznar** • Janine Post, Stefano Schivo, Jetse Scholma, Jaco Van der Pol, Johan Kerkhofs, Liesbet Geris, Rom Langerak: **An ECHO in biology: validating the executable chondrocyte** • Hans Van Oosterwyck, Tim Odenthal, Bart Smeets, Herman Ramon: **Quantifying cell mechanical forces as determinants of stem cell fate** • Jose Manuel Garcia-Aznar, Ismael Gonzalez-Valverde, Thomas Rüberg: **Multiscale Simulation of Cell Migration for the Guidance of Tissue Growth** • Adrien Baldit, Ana Campos, Marzia Brunelli, Cécile Perrault, Damien Lacroix: **Multiscale modelling in tissue engineering: a Virtual Physiological approach** • Yann Guyot, Ioannis Papantoniou, Jan Schrooten, Liesbet Geris: **A Multiphysics model of neotissue growth in a perfusion bioreactor** • Aurélie Carlier, Nick van Gastel, Geert Carmeliet, Hans Van Oosterwyck, Liesbet Geris: **To heal or not to heal: designing successful bone tissue engineering strategies with a multiscale bioregulatory model** **W1.4 Make them run: modelling challenges identified by exercise physiology** **Organizer: Trine Karlsen, Department of Circulation and Medical Imaging, NTNU** **Co-organizer: Allen Kelly** • Jeroen Jeneson, Remco Renken, Marco van Brussel, Dan Beard, Bert Groen: **Model that! *in vivo* observations on muscle energetics in whole body exercise** • Vegard Malmo, Allen Kelly, Ulrik Wisløff, Godfrey Smith, Jan-Pål Loennechen: **Interval training increases AF resistance in aged Rats by increasing conduction velocity and electrical stability** • Kari Jørgensen, Morten Andre Høydal, Anne Berit Johnsen, Svein Erik Gaustad, Eirik Skogvoll, Godfrey L. Smith, Ulrik Wisløff: **Exercise training reduces life-threatening arrhythmias in heart failure rats: the importance exercise training intensity** • Nina Zisko: **Generation 100: A randomized controlled study of the effects of long-term exercise training on mortality in elderly people. Study protocol and design.** • Micaela Morettini, Massimo Sacchetti, Aurelio Cappozzo, Claudia Mazzà: **Effects of intensity and duration of physical exercise described by a mathematical model of Interleukin-6 dynamics** • Johannes van Beek, Farahaniza Supandi, Hannes Hettling: **Modelling muscle energy turnover and whole body heat transport during a Tour de France stage** **W1.5 Models for surgical decision support** **Organizer: Kerstin Denecke, ICCAS, Medical Faculty, University of Leipzig Co-organizer: Gabriel Kiss** • Kerstin Denecke: **Model-based decision support: A multi-layer approach to Digital Patient modelling** • Jörg Sabczynski, Maria João Cardoso, Jaime S. Cardoso, David Hawkes, Gerrit-Jan Liefers, Mohammed Keshtgar, Ralph Sinkus, Björn Eiben: **PICTURE: Predicting the cosmetic outcome of breast cancer surgery** • Francesco Migliavacca, Lorenza Petrini, Debora Testi, Michel Rochette, Gordon Clapworthy, Gabriele Dubini, Giancarlo Pennati: **Real time fatigue behaviour of peripheral stents** • Gabriel Kiss, Hans Torp: **Multi-modal visualization and augmentation for cardiac applications** • Thomas Langø, Sinara Vijayan, Frank Lindseth, Sebastien: **Feasibility of 4D ultrasound-based motion tracking in focused ultrasound therapy of tumors in moving abdominal organs** • Sjur Urdson Gjerald, Sebastian Sarvari, Hans Henrik Odland, Samuel Wall: **A generic right ventricle model for simulating patient-specific pacing procedures from echocardiography data**
19:00	End of workshops
20:00–22:30	Conference dinner

Thursday 11 September

08:00	Registration
	09:00-12:00 Session 3: Empowering theoretical-experimental research and clinical applications: Model repositories, standards and data integration ***Chair:*** *Rod Hose, University of Sheffield*
09:00	**Keynote** Peter Hunter**: Reproducible modelling: Standards, databases and software tools**
09:45	Bernard de Bono, Pierre Grenon, Michiel Helvensteijn, Joost Kok, Natallia Kokash: **ApiNATOMY: The generation of interactive circuitboard views of multiscale physiology knowledge**
10:10	Coffee break
10:40	Piotr Nowakowski, Tomasz Bartynski, Marian Bubak, Tomasz Gubala, Daniel Harezlak, Marek Kasztelnik, Maciej Malawski: **Development, execution and sharing of VPH applications in the cloud with the Atmosphere Platform**
11:05	Thomas Heidlauf, Oliver Röhrle: **Multiscale modelling of the neuromuscular system using the open-source software library OpenCMISS**
11:30	Susheel Varma, Development Team VPH-Share: **VPH-Share: A scalable architecture for scientific cloud computing**
11:55	End of session 3
12:00	Lunch
	13:00-15:55 Session 4: From sequence to consequence: The integration of genomic information with multiscale computational physiology ***Chair:*** *Nicolas Smith, University of Auckland*
13:00	**Keynote** Yoram Rudy: **Multiscale integration of cardiac excitation: From molecular structure to the human heart**
13:45	Eleni Kolokotroni, Eleftherios Ouzounoglou, Martin Stanulla, Dimitra Dionysiou, Georgios Stamatakos: **In silico oncology: Developing and clinically adapting the Acute Lymphoblastic Leukemia (ALL) oncosimulator**
14:10	Coffee break
14:40	Johannes van Beek, Farahaniz Supandi, Anand Gavai, Hannes Hettling: **What is BiGGR in human brain metabolism: Models or data?**
15:05	Gunnar Cedersund, Elin Nyman, William Lövfors, Mattias Köpsen, Rasmus Magnusson, Mika Gustavsson, Peter Strålfors: **Multilevel modelling of type 2 diabetes: From drug simulations for insulin resistance to whole-body effects**
15:30	Daniel Beard: **Modular multiscale modelling of cardiovascular function to probe the etiology of complex cardiovascular disease**
15:55	End of session 4
16:00	e-Poster session
17:00	**Parallel workshops** **W2.1 Interoperability infrastructures bridging molecular- to organ-level data and model** **Organizer: Bernard de Bono, CHIME Institute, University College London & Auckland Bioengineering Institute, University of Auckland** **Co-organizer: Peter Hunter** • Clemens Wittwehr, Hristo Aladjov, Steve Edwards: **The Adverse Outcome Pathway Knowledge Base (AOP-KB)** • Tommy Yu, David Nickerson, Michiel Helvensteijn, Bernard de Bono, Peter Hunter: **Knowledge management of semantic metadata for multiscale modeling: Physiology-based PK-PD modelling within the PMR infrastructure** • João Ferreira, Bernard de Bono, Francisco M Couto: **From data to knowledge: A tool for clustering multiscale resources for physiology research** • Ernesto Coto, Juan Arenas, Alfredo Saglimbeni, Debora Testi, Alejandri Frangi: **The VPH-Share plugin for workflow composition and execution** • Marek Kasztelnik, Marian Bubak, Maciej Malawski, Piotr Nowakowski, Ernesto Coto, Juan Arenas: **Support for Taverna Workflows in VPH-Share Cloud Platform** • Spiros Koulouzis, Dmitry Vasyunin, Adam Belloum, Marian Bubak: **Data Storage Federation for VPH applications** **W2.2 Model-guided medical device design and assessment** **Organizer: Marco Viceconti, Department of Mechanical Engineering, University of Sheffield** **Co-organizer: Claudio Cobelli** • Claudio Cobelli: **The FDA accepted type 1 diabetes simulator: In silico desing and test of the artificial pancreas** • Alfons Hoekstra, Charles Bona-Casas, Hannan Tahir, Joris Borgdorff: **A 3D Multiscale In-Stent Restenosis Model: A milestone for the next generation of in-stent restenosis modelling** • Nenad Filipovic, Dalibor Nikolic, Igor Savelijic, Branislav Jeremic, Slobodan Arsenijevic: **Modeling of cervical dilator device** • Esra Neufeld, Niels Kuster: **Methodology for assessing MRI implant safety and designing MR-safe implants using functionalized anatomical models** • Tristan Belzacq, Vit Novácek, Gaëtan Guérin, Frédèric Turquier: **Patient-specific computational abdominal wall modelling: Application to abdominal wall hernia repair** • Bertrand Fréchède, Stéphane Howley, Kristy Tan, Yoann Lafon: **Subject-specific approach and**

	active muscle implementation in a 3D FE model of the neck for orthopaedics applications **W2.3 Multiscale modelling of cancer** **Organizer: Georgios S. Stamatakos, In Silico Oncology Group, Institute of Communication and Computer Systems, National Technical University of Athens** **Co-organizer: Holger Stenzhorn** • Stavroula Giatili, Georgios Stamatakos,: **In silico Neuro-Oncology: Simulating glioma growth and inhomogeneous invasion under explicitly treated Neumann boundary conditions** • Diego Vargas, Yasha Sharma, Maria Kukuruzinska, Muhammad Zaman: **A multiscale computational model of collective invasion in carcinoma** • Juliusz Pukacki, Georgios Stamatakos, Marek Blazewicz, Dawid Szejnfeld, Dominic Tarnawcyk: **Integrated environment for running simulation applications in p-medicine project** • Daniele Tartarini, Nicolas Gruel, Kewei Duan, Debora Testi, Dawn Walker, Marco Viceconti: **The VPH Hypermodelling Framework for cancer research** • Holger Stenzhorn, Georgios Stamatakos, Stelios Sfakianakis, Juliusz Pukacki, Norbert Graf: **Integrating distributed multimodal, multiscale data for the creation of VPH models to support nephroblastoma treatment** • Dawn Walker, Cecile Perrault, Marzieh Tehrani: **An agent-based model of stem cell - cancer cell interactions** **W2.4 Computational integration of organ physiology** **Organizer: Dan Beard, Department of Molecular and Integrative Physiology, University of Michigan** **Co-organizer: Dirk Drasdo** • Tim Ricken, Daniel Werner, Hermann Georg Holzhütter, Uta Dahmen, Olaf Dirsch: **On a two-scale function-perfusion model for fatty liver** • Laura Cooper, Joshua Scallan, James Heppell, Geraldine Clough, Bharathram Ganapathisubramani, Tiina Roose: **Modelling the mechanical behaviour of collecting lymphatic vessels** • Filippo Castiglione, Teresa Colombo, Vinca Prana, Paolo Tieri: Modelling inflammation: **A step toward the simulation of type-2 diabetes** • Andy Olivares, Jerome Noailly: **Atherosclerosis explored with an agent-based model** • Ahmad Diab, Mahmoud Hassan, Jeremy Laforet, Brynjar Karlsson, Catherine Marque: **EHG source localization using signals from a uterus electrophysiological model** • Dirk Drasdo: How quantitative modelling can inform on disease pathogenesis: lessons from liver **W2.5 Cardiovascular modelling** **Organizer: Arun Holden, School of Biomedical Sciences, University of Leeds** **Co-organizer: Molly Maleckar** • Eleftheria Pervolaraki, Barrie Hayes-Gill, Andrew Hogarth, Arun Holden, Hannah Law, Craig Russell, Muzahir Tayebjee: **Cardiac arrhythmia from prenatal to elderly: coupling sparse clinical recordings with dense spatio-temporal models** • Siri Kallhovd, Valeriya Mezzano, Sjur Gjerald, Jørg Saberniak, Farah Sheikh, Kristina Haugaa, Molly Maleckar: **Localization and not extent of fibrofatty infiltration is the primary factor determining conduction disturbance in a computational model of arrhythomogenic cardiomyopathy** • Simone Rivolo, Lucas Hadjilucas, Matthew Sinclair, Nicolas P. Smith, Jack Lee: **Impact of coronary bifurcations morphology on wave propagation** • Vinzenz Eck, Jonathan Feinberg, Hans Petter Langtangen, Leif Rune Hellevik: **Effects of parametric uncertainty in blood flow simulations** • Ismail Adeniran, Henggui Zhang: **A 3D electromechanical model of the human atria for the study of atrial fibrillation** • Pablo Lamata, Anastasia Nasopoulou, Manav Sohal, Aldo Rinaldi, Nic Smith, Steven Niederer: **Improving the assessment of diastolic performance**
19:00	End of workshops
19:00	Announcement of the winner of the Best ePoster Award Presentation of the VPH2016 conference Closing remarks

Friday 12 September – at Kunnskapssenteret, St. Olavs Hospital and NTNU, Øya

09:15	Coffee break
09:30	General Assembly of the VPH Institute
11:30	Lunch
12:30	Hands on demonstrations of VPH-compliant software • VPH-Share in action: Share, discover and access biomedical resources • VPH tools from the Auckland Bioengineering Institute • EUDAT services
15:00	Closure of demonstrations