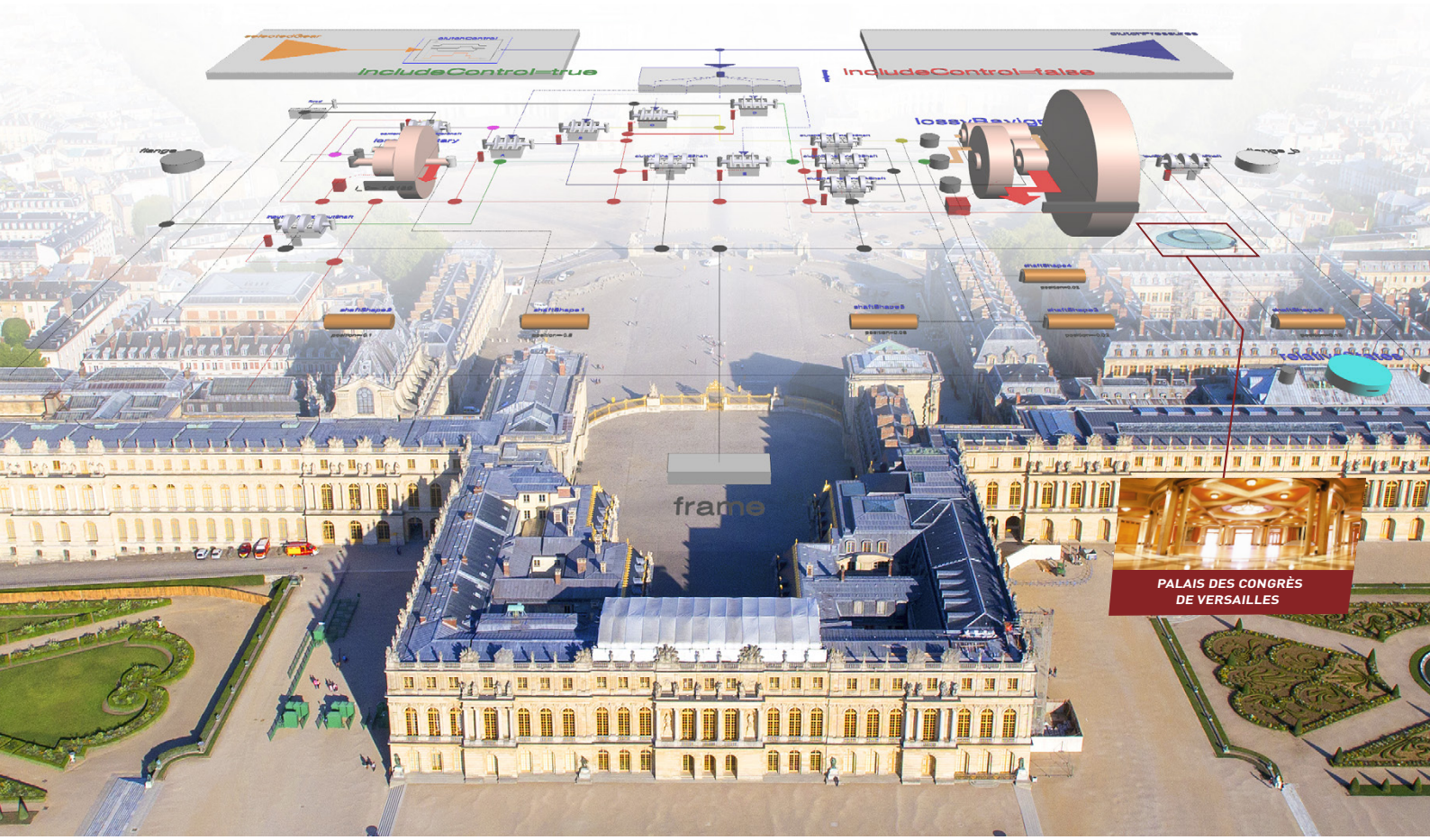
PROGRAM OF THE

11th INTERNATIONAL MODELICA CONFERENCE

September 21–23, 2015
Palais des Congrès de Versailles, France
www.modelica.org



EDITORS: PROF. PETER FRITZSON AND DR. HILDING ELMQVIST

DASSAULT SYSTEMES

LINKÖPINGS UNIVERSITET

MODELICA

The conference is organized by Dassault Systèmes and Linköping University in cooperation with the Modelica Association.

Program of the 11th International Modelica Conference
Versailles, France, September 21-23, 2015

EDITORS: Dr. Hilding Elmqvist and Prof. Peter Fritzson

ORGANIZED BY:

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IN COOPERATION WITH

Modelica Association
c/o PELAB, IDA, Linköping Univ.
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CONFERENCE LOCATION:

Palais des Congrès de Versailles
Address: 10, rue de la Chancellerie
Versailles, 78000
France

WELCOME

The 11th International Modelica Conference, which takes place at Palais des Congrès de Versailles, is the main event for the Modelica community. Users, library developers, tool vendors, and language designers gather to share their knowledge and learn about the latest scientific and industrial progress related to Modelica and FMI (Functional Mockup Interface).

The fundamental idea behind Modelica is to allow storing modeling knowhow in a high-level formally defined format, i.e., to collect information which you otherwise would find in engineering books only accessible by humans. By allowing convenient reuse of this knowhow by definition of component model libraries, enormous saving in man-hours for setting up simulation studies is achieved. Furthermore, by proper validation of such model libraries, much more reliable conclusions can be made from simulation studies leading to better products and user experience. These considerations lead to the equation-based object-oriented formalism of Modelica.

Since the start of the collaborative design work for Modelica in 1996, Modelica has matured from an idea among a small number of dedicated enthusiasts to a widely accepted standard language for the modeling and simulation of cyber-physical systems. In addition, the standardization of the language by the non-profit organization Modelica Association enables Modelica models to be portable between a growing number of tools. Modelica is now used in many industries including automotive, energy and process, aerospace, and industrial equipment. Modelica is the language of choice for model-based systems engineering.

The FMI standard has been added to the project portfolio of the Modelica Association. FMI provides a complementary standard that enables deployment of pre-compiled high quality models originating from different model formats to a larger number of engineers working with system design and verification.

The format of the conference is somewhat changed compared to previous years. We moved the vendor sessions to the first day of the conference to have two days of purely scientific presentations. Starting the tutorials one hour earlier allowed us to allocate more time and have room for 15 vendors to present their offers compared to 6 at the previous conference.

The program is available in an event app for smartphones, tablets, and PCs. It enables searching for papers with abstracts, authors, and conference rooms. It also allows setting up your own schedule by selecting your favorite presentations.

Taking a walk in the Garden of Versailles is suggested on Tuesday evening. We have allocated a break of more than one hour after the scientific program before the conference dinner is served at the Palais des Congrès de Versailles. This means that you have time to see the Apollo Fountain.

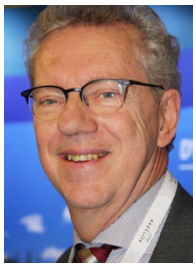
Conference highlights:

- 2 Keynote speeches
- 83 papers in 4 parallel tracks
- 18 posters
- 7 tutorials
- 5 libraries submitted for the Modelica Library Award
- 15 vendor sessions presenting the latest Modelica and FMI tools
- A fully booked exhibition area featuring 20 exhibitors
- Electronic proceedings including all papers and some associated Modelica libraries and models

Finally, we want to acknowledge the support we received from the conference board and program committee. Special thanks to our colleagues at this year's organizers, Dassault Systèmes and Linköping University, and Amelie Rönngård from Altitude Meetings. The support from the conference sponsors is gratefully acknowledged. Last but not least, thanks to all authors, keynote speakers, and presenters for their contributions to this conference.

We wish all participants an enjoyable and inspiring conference.

Lund and Linköping, September 1, 2015
Hilding Elmqvist and Peter Fritzson



Hilding Elmqvist

Peter Fritzson

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KEYNOTE SPEAKERS

Designing Cyber-Physical Systems: A Tale of Two Worlds Coming Together

Presenter:
Prof. Alberto Sangiovanni-Vincentelli
UC Berkeley, USA

Abstract: Cyber-Physical Systems have been the focus of many research and public forum initiatives in the world since the early 2000s. The concept of CPS involves the tight integration and co-design of physical (for example, mechanical, electrical, biological and chemical), systems with analysis, monitoring and control implemented on a computing system. As such it has important intersections with other fields of great interests such as Internet of Things, Hybrid Systems, Swarm Systems and Systems of Systems. One of the main challenges has been to develop solid foundations for design and manufacturing including formal methods and requirement capture.

I will review the major directions of research and industrial relevance of CPS with particular attention to design methodologies and requirement capture with considerations about approaches to CPS simulation and analysis and their limitations.

Bio: Alberto Sangiovanni-Vincentelli holds the Buttner Chair of EECS, University of California, Berkeley. He was a co-founder of Cadence and Synopsys, the two leading companies in Electronic Design Automation. He was a member of the HP Strategic Technology Advisory Board, of the Science and Technology Advisory Board of GM, and is a member of the Technology Advisory Council of UTC. He is member of the Scientific Council of the Italian National Science Foundation (CNR) and of the Executive Committee of the Italian Institute of Technology. He is President of the Consiglio Nazionale Garanti della Ricerca, and of the Strategic Committee of the Italian Strategic Fund.

He received the Kaufman Award for "pioneering contributions to EDA", the IEEE/RSE Maxwell Medal" for groundbreaking contributions that have had an exceptional impact on the development of electronics and electrical engineering or related fields. He holds an honorary Doctorate by the University of Aalborg, Denmark and one by KTH, Sweden.

He is an author of over 850 papers, 17 books and 2 patents, is IEEE Fellow and a Member of the NAE.

A systems engineering perspective for Modelica and the heritage of synchronous language

Presenter:
Dr. Albert Benveniste,
INRIA, France

Abstract: In the first part of my talk I shall develop a vision of the central role of Modelica in systems engineering. The Modrio project has recently developed a Requirements profile for Modelica and progresses have recently been made regarding the link between Modelica and safety analyses. I shall discuss how far, I think, one could go in these directions. I shall also draw directions toward using Modelica for system-wide monitoring and diagnosis. All of this calls for a rigorous understanding of Modelica, its execution semantics: paying attention to this will constitute the second part of my presentation. I shall describe the background from synchronous languages by emphasizing how sound compilation schemes can be formally derived and how some of the above mentioned uses in system engineering were performed with synchronous languages. I shall conclude by indicating how these techniques can be adapted to derive structural analyses for multi-mode DAE systems. Nonstandard analysis will be used to help for this.

Bio: Albert Benveniste was Directeur de Recherche at INRIA, where he is now emeritus. In 1990 he received the CNRS silver medal, he was elected IEEE fellow in 1991 and IFAC Fellow in 2013. From 1986 to 1990 he was vice-chairman of the IFAC committee on Theory and was chairman of this committee for 1991-1993. He has been Associate Editor (at Large) for IEEE Transactions on Automatic Control, Associate Editor for Int. J. of Adaptive Control and Signal Processing, and Int. J. of Discrete Event Dynamical Systems, and member of the Editorial Board of the Proceedings of the IEEE. From 1997 to 2013, he was head for INRIA of the joint Alcatel-INRIA research programme. He is a member of the scientific advisory boards of Safran Group and Orange. From 2011 to 2014, he was co-heading the Center of Excellence (Labex) CominLabs in the area of telecommunications and Information systems. He has been elected to the Académie des Technologies in december 2011. His areas of interest cover system identification in control, embedded systems in computer science, and network management in telecommunications.

GENERAL SCHEDULE

GENERAL SCHEDULE OF MONDAY, SEPTEMBER 21

13:00	Tutorials, see page 13 for more info.	
16:30	Refreshments	
17:00-17:45	Vendor Session Part I	see page 17 for more info.
17:50-18:35	Vendor Session Part II	
18:40-19:25	Vendor Session Part III	
19:30-22:00	Reception	

GENERAL SCHEDULE OF TUESDAY, SEPTEMBER 22

		RICHELIEU	LULLI	COLBERT	CONDÉ
09:00		Opening			
09:05		Welcome Address			
09:25		Modelica News			
09:35		Keynote 1			
10:20	Coffee Break				
10:50	Exhibition	FMI 1	Building Energy Applications 1	Simulation Techniques	Automotive Applications 1
12:30	Lunch				
13:45	Exhibition	FMI 2	Building Energy Applications 2	Modelica Language & Compiler Implementation 1	Automotive Applications 2
15:25	Coffee Break				
15:55	Exhibition	Optimization Applications and Methods	Control Applications 1	Novel Modelica Applications and Libraries	Building Energy Applications 3
17:10	Refreshments				
17:20		Control Applications 2	Mechanical Systems	Modelica Language & Compiler Implementation 2	Electrical Systems
18:10	Relaxation				
19:30-23:00	Dinner including Library Award Announcement				

GENERAL SCHEDULE OF WEDNESDAY, SEPTEMBER 23

		RICHELIEU	LULLI	COLBERT	CONDÉ
08:30		Keynote 2			
09:15	Small Break				
09:20	Exhibition	Aerospace Applications 1	Electrical Machines	3D Representations for Modelica Models	Virtual Test Benches
10:10	Coffee Break				
10:40	Exhibition	Aerospace Applications 2	Power, Energy & Process Applications 1	Safety & Formal Methods	Thermofluid Systems, Models and Libraries 1
11:55	Poster Session				
12:55	Lunch				
14:00	Exhibition	Testing & Diagnostics	Power, Energy & Process Applications 2	Modelica Tools	Thermofluid Systems, Models and Libraries 2
15:15	Coffee Break				
15:45		Panel Discussion			
16:25-16:30		Closing			

RICHELIEU

09:00 **Opening,** *Hilding Elmqvist, Dassault Systèmes and Peter Fritzson, Linköping University*

09:05 **Welcome Address,** *Dominique Florack, Senior Executive Vice President, Research and Development, Dassault Systèmes*

09:25 **Modelica News,** *Martin Otter, DLR*

09:35 **Keynote 1: Designing Cyber-Physical Systems: A Tale of Two Worlds Coming Together,** *Prof. Alberto Sangiovanni-Vincentelli, UC Berkeley, USA, Chair: Hilding Elmqvist*

	RICHELIEU	LULLI	COLBERT	Condé
	FMI 1	**Building Energy Applications 1**	**Simulation Techniques**	**Automotive Applications 1**
	Chair: Torsten Blochwitz	Chair: Christoph Nytsch-Geussen	Chair: François E. Cellier	Chair: Andreas Uhlig
10:50	**Experience with Industrial In-House Application of FMI** Kilian Link, Leo Gall, Monika Mühlbauer and Stephanie Gallardo-Yances	**Methodology for Obtaining Linear State Space Building Energy Simulation Models** Damien Picard, Filip Jorissen and Lieve Helsen	**Multi-Mode DAE Systems with Varying Index** Sven Erik Mattsson, Martin Otter and Hilding Elmqvist	**Model-based Development of a Holistic Thermal Management System for an Electric Car with a High Temperature Fuel Cell Range Extender** Torben Fischer, Florian Götz, Lars Fredrik Berg, Hans-Peter Kollmeier and Frank Gauterin
11:15	**A Novel Proposal on how to Parameterize Models in Dymola Utilizing External Files under Consideration of a Subsequent Model Export using the Functional Mock-Up Interface** Thomas Schmitt, Markus Andres, Stephan Ziegler and Stephan Diehl	**Simulation Speed Analysis and Improvements of Modelica Models for Building Energy Simulation** Filip Jorissen, Michael Wetter and Lieve Helsen	**Internalized State-Selection: Generation and Integration of Quasi-Linear Differential-Algebraic Equations** Christoph Höger and Andreas Steinbrecher	**Predicting the Effect of Gearbox Preconditioning on Vehicle Efficiency** Romain Gillot, Alessandro Picarelli and Mike Dempsey
11:40	**Design Choices for Thermofluid Flow Components and Systems that are Exported as Functional Mockup Units** Michael Wetter, Marcus Fuchs and Thierry S. Nouidui	**Energy Efficient Design for Hotels in the Tropical Climate using Modelica** Reymundo Miranda, Sen Huang, German Barrios, Dan Li and Wangda Zuo	**Fractional-Order Modelling in Modelica** Alexander Pollok, Dirk Zimmer and Francesco Casella	**Model Based Development of Future Small Electric Vehicle by Modelica** Yutaka Hirano, Shintaro Inoue and Junya Ota
12:05	**FMI for Physical Models on Automotive Embedded Targets** Christian Bertsch, Jonathan Neudorfer, Elmar Ahle, Siva Sankar Arumugham, Karthikeyan Ramachandran and Andreas Thuy	**Presentation, Validation and Application of the DistrictHeating Modelica Library** Loic Giraud, Roland Baviere, Mathieu Vallée and Cédric Paulus	**Modelica Library for Feed Drive Systems** Denis Özdemir, Tobias Motschke, Werner Herfs and Christian Brecher	**Modelling of Torque-Vectoring Drives for Electric Vehicles: a Case Study** Franciscus L. J. van der Linden and Jakub Tobolář

	RICHELIEU	LULLI	COLBERT	CONDÉ
	FMI 2	**Building Energy Applications 2**	**Modelica Language & Compiler Implementation 1**	**Automotive Applications 2**
	Chair: Rüdiger Franke	Chair: Gerhard Schmitz	Chair: Michael Tiller	Chair: Jonathan Brembeck
13:45	**Co-Simulation of Hybrid Systems with SpaceEx and Uppaal** Sergiy Bogomolov, Marius Greitschus, Peter G. Jensen, Kim G. Larsen, Marius Mikučionis, Thomas Strump and Stavros Tripakis	**Coupled modeling of a District Heating System with Aquifer Thermal Energy Storage and Absorption Heat Transformer** Carles Ribas Tugores, Henning Francke, Falk Cudok, Alexander Inderfurth, Stefan Kranz and Christoph Nytsch-Geusen	**Automatic GPU Code Generation of Modelica Functions** Hilding Elmqvist, Hans Olsson, Axel Goteman, Vilhelm Roxling, Dirk Zimmer and Alexander Pollok	**High Fidelity Multibody Vehicle Dynamics Models for Driver-in-the-Loop Simulators** Mike Dempsey, Garron Fish and Juan Gabriel Delgado Beltran
14:10	**Automated Deployment of Modelica Models in Excel via Functional Mockup Interface and Integration with modeFRONTIER** John Batteh, Jesse Gohl, Anand Pitchaikani, Alexander Duggan and Nader Fateh	**Energy-Efficient Design of a Research Greenhouse with Modelica** Torsten Schwan, Rene Unger and Jörg Pipiorke	**Constructs for Meta Properties Modeling in Modelica** Hilding Elmqvist, Hans Olsson and Martin Otter	**Modeling and Validation of a Multiple Evaporator Refrigeration Cycle for Electric Vehicles** Andreas Varchmin, Manuel Gräber and Jürgen Köhler
14:35	**An Open-Source Graphical Composite Modeling Editor and Simulation Tool Based on FMI and TLM Co-Simulation** Alachew Mengist, Adeel Asghar, Adrian Pop, Peter Fritzson, Willi Braun, Alexander Siemers and Dag Fritzson	**Production Planning for Distributed District Heating Networks with JModelica.org** Håkan Runvik, Per-Ola Larsson, Stéphane Velut, Jonas Funkquist, Markus Bohlin, Andreas Nilsson and Sara Modarrez Razavi	**Flattening of Modelica State Machines: A Practical Symbolic Representation** Bernhard Thiele, Adrian Pop and Peter Fritzson	**Modeling the Effects of Energy Efficient Glazing on Cabin Thermal Energy & Vehicle Efficiency** Aled Gravelle, Dr. Simon Robinson and Alessandro Picarelli
15:00	**The Modelica Language and the FMI Standard for Modeling and Simulation of Smart Grids** Olivier Chilard, Jérémy Boes, Alexandre Perles, Guy Camilleri, Marie-Pierre Gleizes, Jean-Philippe Tavella and Dominique Croteau	**Hardware-in-the-Loop-Simulation of a Building Energy and Control System to Investigate Circulating Pump Control Using Modelica** Georg Ferdinand Schneider, Jens Oppermann, Ana Constantin, Rita Streblow and Dirk Müller	**Exploiting Repeated Structures and Vectorization in Modelica** Joseph Schuchart, Volker Waurich, Martin Flehmig, Marcus Walther, Wolfgang E. Nagel and Ines Gubsch	

	RICHELIEU	LULLI	COLBERT	CONDÉ
	Optimization Applications and Methods Chair: Bernhard Bachmann	**Control Applications 1** Chair: Dan Henriksson	**Novel Modelica Applications and Libraries** Chair: Martin Otter	**Building Energy Applications 3** Chair: Michael Wetter
15:55	**A Framework for Nonlinear Model Predictive Control in JModelica.org** Magdalena Axelsson, Fredrik Magnusson and Toivo Henningsson	**A Modelica Library for Manual Tracking** James Potter	**Free Modelica Library for Chemical and Electrochemical Processes** Marek Matejak, Martin Tribula, Filip Ježek and Jiri Kofranek	**An Open Toolchain for Generating Modelica Code from Building Information Models** Matthis Thorade et. al
16:20	**A Toolchain for Solving Dynamic Optimization Problems Using Symbolic and Parallel Computing** Evgeny Lazutkin, Siegbert Hopfgarten, Abebe Geletu and Pu Li	**Model-based control with FMI and a C++ runtime for Modelica** Rüdiger Franke, Marcus Walther, Niklas Worschech, Willi Braun and Bernhard Bachmann	**Modeling Biology in Modelica: The Human Baroreflex** Christopher Schölzel, Alexander Goesmann, Gernot Ernst and Andreas Dominik	**Lessons Learnt from Network Modelling of a Low Heat Density District Heating System** Itzal del Hoyo Arce, Susana López Perez, Saioa Herrero López and Iván Mesonero Dávila
16:45	**NMPC Application using JModelica.org: Features and Performance** Christian Hartlep and Toivo Henningsson	**Nonlinear Dynamic Inversion Control for Wind Turbine Load Mitigation based on Wind Speed Measurement** Matthias Reiner and Dirk Zimmer	**A City Traffic Library** Eashan Liyana, Simon Lacroux and Jean-Baptiste Barbe	**Modelica based Design and Optimisation of Control Systems for Solar Heat Systems and Low Energy Buildings** Stephan Seidel, Christoph Clauss, Jürgen Haufe, Kristin Majetta, Torsten Blochwitz, Edgar Liebold, Ullrich Hintzen and Volker Klostermann

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	Control Applications 2 Chair: Lars Mikelsons	**Mechanical Systems** Chair: Yutaka Hirano	Modelica Language & Compiler Implementation 2 Chair: Hans Olsson	**Electrical Systems** Chair: Anton Haumer
17:20	**How to Shape Noise Spectra for Continuous System Simulation** Andreas Klöckner, Andreas Knoblach and Andreas Heckmann	**Generic Modelica Framework for MultiBody Contacts and Discrete Element Method** Hilding Elmqvist, Axel Goteman, Vilhelm Roxling and Toheed Ghandriz	**Efficient Compilation of Large Scale Dynamical Systems** Federico Bergero, Mariano Botta, Esteban Campostrini and Ernesto Kofman	**Developing Mathematical Models of Batteries in Modelica for Energy Storage Applications** Thanh-Son Dao and Chad Schmitke
17:45	**Dynamic Modelling of a Flat-Plate Solar Collector for Control Purposes** Saioa Herreo López, Susana López Perez, Itzal del Hoyo Arce and Iván Mesonero Dávila	**Different Models of a Scaled Experimental Running Gear for the DLR RailwayDynamics Library** Christoph Schwarz, Andreas Heckmann and Alexander Keck	**Simulation of Large-Scale Models in Modelica: State of the Art and Future Perspectives** Francesco Casella	**Average Model of a Synchronous Half-Bridge DC/DC Converter Considering Losses and Dynamics** Michael Winter, Sascha Moser, Stefan Schoenewolf, Julian Taube and Hans-Georg Herzog

RICHELIEU

08:30 **Keynote 2: A systems engineering perspective for Modelica and the heritage of synchronous language,** Albert Benveniste, Chair: Peter Fritzson

RICHELIEU	LULLI	COLBERT	CONDÉ
Aerospace Applications 1	**Electrical Machines**	**3D Representations for Modelica Models**	**Virtual Test Benches**
Chair: Stefan-Alexander Schneider	Chair: Kristin Majetta	Chair: Peter Harman	Chair: Wilhelm Tegethoff
09:20 **Modeling and Simulation of Liquid Propellant Rocket Engine Transient Performance Using Modelica** Wei Liu, Liping Chen, Gang Xie, Ji Ding, Haiming Zhang and Hao Yang	**Multi Electrical Machine Pre-Design Tool with Error Handling and Machine Specific Advanced Graphical Design Aid Features Based on Modelica** Tomasz D. Michalski, Antoni Garcia Espinosa, Jordi-Roger Riba Ruiz and Luis Romeral Martinez	**Simulation of Piping 3D Designs Powered by Modelica** Xavier Remond, Thierry Gengler and Christophe Chapuis	**Holistic Virtual Testing and Analysis of a Concept Hybrid Electric Vehicle Model** Jonathan Spike, Johannes Friebe, Chad Schmitke, Christian Donn, Michael Folie, Valerie Bensch and Christine Schwarz
09:45 **Model Based Specifications in Aircraft Systems Design** Martin Kuhn, Martin Otter and Tim Giese	**Enhancements of Electric Machine Models: The EMachines Library** Anton Haumer and Christian Kral	**3D Schematics of Modelica Models and Gamification** Hilding Elmqvist, Alexander D. Baldwin and Simon Dahlberg	**Modeling of an Automatic Transmission for the Evaluation of Test Procedures in a Virtual End-of-Line Test Bench** Jan Röper, Jörn Göres and Clemens Gühmann

RICHELIEU	LULLI	COLBERT	CONDÉ
Aerospace Applications 2	**Power, Energy & Process Applications 1**	**Safety & Formal Methods**	**Thermofluid Systems, Models and Libraries 1**
Chair: Dirk Zimmer	Chair: Kilian Link	Chair: Timothy Bourke	Chair: Francesco Casella
10:40 **A New Fault Injection Method for Liquid Rocket Pressurization and Feed System** Mingqing Zhu, Gang Xie, Jintao Shao, Liping Chen and Fanli Zhou	**Dynamic Modeling of a Central Receiver CSP System in Modelica** Johan Edman and Johan Windahl	**Fault Detection and Diagnosis with Modelica Language using Deep Belief Network** Dong Kyu Lee, Byoung Doo Lee and Jin Woo Shin	**Fundamental EoS Implementation for {Water+Ammonia} in Modelica** Leonard Becker and José Luis Corrales Ciganda
11:05 **Automated Safety Analysis by Minimal Path Set Detection for Multi-Domain Object-Oriented Models** Christian Schallert	**Modeling of Linear Concentrating Solar Power using Direct Steam Generation with Parabolic-Trough** Antoine Aurousseau, Valéry Vuillerme and Jean-Jacques Bezian	**Formal Requirements Modeling for Simulation-Based Verification** Martin Otter et. al	**MultiComponentMultiPhase - A Framework for Thermodynamic Properties in Modelica** Johan Windahl, Katrin Prölss, Maarten Bosmans, Hubertus Tummescheit, Eli van Es and Awin Sewgobind
11:30 **High-fidelity Modelling of Self-regulating Pneumatic Valves** Alexander Pollok and Francesco Casella	**Transient Simulation of the Power Block in a Parabolic Trough Power Plant** Heiko Schenk, Jürgen Dersch, Tobias Hirsch and Thomas Polklas	**Towards a Formalized Modelica Subset** Lucas Satabin, Jean-Louis Colaço, Olivier Andrieu and Bruno Pagano	**Modeling of the German National Standard for High Pressure Natural Gas Flow Metering in Modelica** Michael von der Heyde, Gerhard Schmitz and Bodo Mickan

	RICHELIEU	LULLI	COLBERT	CONDÉ
	Testing & Diagnostics Chair: Lena Buffoni	**Power, Energy & Process Applications 2** Chair: Daniel Bouskela	**Modelica Tools** Chair: Adrian Pop	**Thermofluid Systems, Models and Libraries 2** Chair: Hubertus Tummescheit
14:00	**Automatic Regression Testing of Simulation Models and Concept for Simulation of Connected FMUs in PySimulator** Adeel Asghar, Andreas Pfeiffer, Arunkumar Palanisamy, Alachew Mengist, Martin Sjölund, Adrian Pop and Peter Fritzson	**Status of the TransiEnt Library: Transient Simulation of Coupled Energy Networks with High Share of Renewable Energy** Lisa Andresen, Pascal Dubucq, Ricardo Peniche Garcia, Günter Ackermann, Alfons Kather and Gerhard Schmitz	**Where impact got Going** Michael Tiller and Dietmar Winkler	**Mass Conserving Models of Vapor Compression Cycles** Christopher Laughman and Hongtao Qiao
14:25	**Abrasive Waterjet Intensifier Model for Machine Diagnostics** Gianni Ferretti, Michele Monno, Bruno Scaglioni, Massimo Goletti and Marco Grasso	**Mathematical Model of Soot Blowing Influences in Dynamic Power Plant Modelling** Conrad Gierow, Moritz Hübel, Jürgen Nocke and Egon Hassel	**Visualizing Simulation Results from Modelica Fluid Models Using Graph Drawing in Python** Marcus Fuchs, Rita Streblow and Dirk Müller	**EPSILON Modelica Library for Thermal Applications** Laurent Lachassagne, Arnaud Colleoni, Hervé Feral and Nicolas Dolin
14:50	**Optimica Testing Toolkit: a Tool-Agnostic Testing Framework for Modelica Models** Anders Tilly, Victor Johnsson, Jon Sten, Alexander Perlman and Johan Åkesson	**Flexibilization of Coal-fired Power Plants by Dynamic Simulation** Marcel Richter, Florian Möllenbruck, Andreas Starinsk, Gerd Oeljeklaus and Klaus Görner	**Reuse of Physical System Models by means of Semantic Knowledge Representation: A Case Study applied to Modelica** Elena Gallego, Jose María Alvarez Rodríguez and Juan Llorens	**Multi-Objective Optimization of Dynamic Systems combining Genetic Algorithms and Modelica: Application to Adsorption Air-Conditioning Systems** Uwe Bau, Daniel Neitzke, Franz Lanzerath and André Bardow
	RICHELIEU			
15:45	**Panel Discussion**			
16:25	**Closing the Conference**			

POSTER SESSION

Wednesday September 23, 11:55–12:55
The poster session is held in Le Nôtre gallery on Level 2.

A new Modelica Electric and Hybrid Power Trains Library
Massimo Ceraolo

Kansei Modeling for Delight Design based on 1DCAE Concept
Koichi Ohtomi

Towards Enhanced Process and Tools for Aircraft Systems Assessments during very Early Design Phase
Eric Thomas, Olivier Thomas, Raphael Bianconi, Matthieu Crespo, Julien Daumas

Simulation of Distributed Energy Storage in the Residential Sector and Potential Integration of Gas-based Renewable Energy Technologies using Modelica
Praseeth Prabhakaran, Wolfgang Koeppel, Frank Graf

Suitability of Different Real-Time Solvers for a Model-Based Engineering Toolchain using Industrial Rexroth Controllers
Nils Menager, Rüdiger Kampfmann, Niklas Worschech, Lars Mikelsons

An Aeronautic Case Study for Requirement Formalization and Automated Model Composition in Modelica
Wladimir Schamai, Lena Buffoni, Nicolas Albarello, Pablo Fontes De Miranda, Peter Fritzson

Initiatives for Acausal Model Connection using FMI in JSAE (Society of Automotive Engineers of Japan)
Yutaka Hirano, Satoshi Shimada, Yoichi Teraoka, Osamu Seya, Yuji Ohsumi, Shitaroh Murakami, Tomohide Hirono, Takayuki Sekisueman

A Modelica Library Organization Method Supporting Online Modeling and Simulation
Xiong Tifan, Zhou Zhiming, Wan Li, Li Yongchao

Using FMI in a Cloud-based Web Application for System Simulation
Stefan Bittner, Olaf Oelsner, Thomas Neidhold

Test of Basic Co-Simulation Algorithms Using FMI
Kosmas Petridis, Christoph Clauß

Integrated Engineering based on Modelica
Andreas Hofmann, Nils Menager, Issam Belhaj, Lars Mikelsons

FastHVAC - A Library for Fast Composition and Simulation of Building Energy Systems
Sebastian Stinner, Markus Schumacher, Konstantin Finkbeiner, Rita Streblow, Dirk Müller

Dynamical Model of a Vehicle with Omni Wheels: Improved and Generalized Contact Tracking Algorithm
Ivan Kosenko, Sergey Stepanov, Kirill Gerasimov, Alexey Rachkov

Control Development and Modeling for Flexible DC Grids in Modelica
Andreas Olenmark, Jens Sloth, Anna Johnsson, Carl Wilhelmsson, Jörgen Svensson

Anticipatory Shifting – Optimization of a Transmission Control Unit for an Automatic Transmission through Advanced Driver Assistance Systems
Salim Chaker, Michael Folie, Christian Kehrer, Frank Huber

Experimental Calibration of Heat Transfer and Thermal Losses in a Shell-and-Tube Heat Exchanger
Javier Bonilla, Alberto de La Calle, Margarita M. Rodríguez-García, Lidia Roca, Loreto Valenzuel

Coupling Model Exchange FMUs for Aggregated Simulation by Open Source Tools
Pukashawar Pannu, Christian Andersson, Claus Führer, Johan Åkesson

Open Source Library for the Simulation of Wind Power Plants
Philip Eberhart, Tek Shan Chung, Anton Haumer, Christian Kral

TUTORIALS

The tutorial sessions are held at the venue on **Monday September 21, 13.00 – 16.30.** Coffee break is included.

MODELICA Modeling Tutorial – Learn using Modelica with a tool of your choice

PRESENTER: Dr. Dirk Zimmer, DLR
ROOM: Boileau

Abstract: This tutorial offers a basic hands-on introduction in modeling and simulation with Modelica. The tutorial is aimed at people with little or no practical experience in using Modelica. All participants have the opportunity to create a model of a controlled inverse pendulum in a graphical way. This model will demonstrate the strength of Modelica by combining different fields of engineering. To this end, mechanical, electrical, and control components are simulated in a single environment.

Please bring your own laptop! For the tutorial, you can use any Modelica tool that supports graphical modeling. For participants with no tool at hand, demo versions will be provided by tool vendors. According to the current planning, at least Dymola, OpenModelica, SimulationX, and SystemModeler will be provided.

In addition to the basic modeling task, background knowledge is presented that explains six key elements of the Modelica language:

- Equation-based modeling
- Non-causal system description
- Physical connectors and signals
- Object-orientation
- Graphical modeling
- Modelica Standard Library

As final step, tasks like the modeling of hybrid systems will be carried out by introducing dry-friction and backlash to the gear model, and adapting the controller.

About the tutor:
Dr. Dirk Zimmer is a member of the Modelica Association and teaches Modelica at the Technical University of Munich (TUM). In addition, he holds guest lectures at Universities of Applied Sciences and workshops for industry partners. In his teaching work, he explains the theoretical background and uses his modeling experience that he acquired at the German Aerospace Center and ETH Zurich.

Introduction to Modeling, Simulation, Debugging and Optimization with Modelica and OpenModelica

PRESENTERS: Peter Fritzson and Bernhard Thiele, Linköping University, Sweden; Bernhard Bachmann, FH Bielefeld, Germany
ROOM: Colbert

Abstract: This tutorial gives an introduction to the Modelica language and technology to people who are familiar with basic programming concepts and to engineers who wish to learn about Modelica. It gives a basic introduction to the concepts of modeling and simulation, as well as the basics of object-oriented component-based modeling for the novice, and an overview of modeling and simulation in a number of application areas. Moreover, an introduction to debugging Modelica models will be given, and an introduction of model-based dynamic optimization with OpenModelica including goal functions, constraints, convergence.

A number of hands-on exercises will be done during the tutorial, both graphical modeling using model components from the Modelica standard library and textual modeling involving writing a few small Modelica models. The schedule is approximately as follows:

1. Modelica background and important aspects
2. Graphical modeling and simulation introductory exercise – make an RL circuit using components from MSL (Modelica Standard Library)
3. Overview of the OpenModelica environment and its capabilities
4. Simple hands-on model debugging exercise
5. Modelica language concepts of types, variables, classes, inheritance
6. Hands-on textual modeling of a small model
7. Modelica discrete event and hybrid properties including state machines
8. Small discrete-event and small state machine exercise.
9. Modelica concepts of components, connectors and connections
10. Short overview of the Modelica standard library
11. Graphical modeling hands-on exercise: extend the RL-circuit to a DC-Motor; if there is time also add a PI controller in a feedback loop.
12. Model-based dynamic optimization with OpenModelica including goal functions, constraints, convergence.
13. If there is time, a small model-based dynamic optimization exercise.

Bring your Laptop! Extensive hands-on exercises using OpenModelica will be done during the tutorial.

Lecturers:
Peter Fritzson is a Professor and Research Director of the Programming Environment Laboratory (PELAB), at Linköping University, Sweden. Peter Fritzson is director of the Open Source Modelica Consortium and vice chairman of the Modelica Association. Professor Fritzson has published 18 books/proceedings and more than 280 scientific papers.

Bernhard Thiele is researcher at PELAB, Linköping University. He contributed to the design of the clocked synchronous language element extensions in the Modelica 3.3 language and has implemented the current state machine support in OpenModelica.

Bernhard Bachmann is a Professor at FH Bielefeld, Germany. His group develops most of the numerical/symbolic solver and dynamic optimization parts of OpenModelica.

Optimal control and state estimation with Modelica and Optimica

PRESENTERS: Johan Åkesson, Christian Andersson, Toivo Henningsson, Per-Ola Larsson, Stéphane Velut, Modelon
ROOM: Condé

Abstract: This tutorial demonstrates how Modelica and Optimica are used to formulate and solve optimization problems targeting control of industrial processes.

A key focus of the tutorial is usability of numerical algorithms when solving dynamic optimization problems arising in control applications. While numerical algorithms and software for non-linear dynamic optimization has been available for many years, industrial application is often hindered by challenges in achieving robust convergence for large-scale models. This tutorial demonstrates how new tool capabilities support users in isolating and resolving convergence problems. In particular, means to isolate problematic equations that contribute to non-convergence in Modelica models are presented. In addition novel heuristics for problem scaling is used to further improve convergence robustness. Participants are offered hands on experiences with effective tools for achieving convergence in industrial optimization problems.

Attention is given to methods to achieve real-time performance in non-linear model predictive control (NMPC) and Moving Horizon Estimation (MHE) applications. New tool capabilities supporting warm-start of optimization algorithms significantly reduce solve time when solving a sequence of optimization problems, as is done in NMPC and MHE.

The tutorial offers an open source tool track which is based on JModelica.org and one commercial tool track which is based on the OPTIMICA Compiler Toolkit. The latter track also offers hands on experiences with optimization of industrial power generation systems.

The tutorial is supported by Modelon's experts in optimization technology and optimization of power generation systems.

Working with MapleSim 2015

PRESENTER: Chad Schmitke, MapleSim Development, Maplesoft
ROOM: Montesquieu

Abstract: MapleSim allows users to create and document their own symbolic and numeric analyses of Modelica models in a rich problem-solving environment. Although the basics of creating and simulating models within MapleSim will be covered, the focus of the tutorial will be on the connection between MapleSim and Maple, and the unique analysis opportunities it provides. Hands-on exercises in a variety of application areas will demonstrate how to work with Modelica models within this environment. We will also look at how the resulting analysis can be easily wrapped in a custom UI (sliders, interactive plots, etc.) and deployed on the web.

Example areas will include: extracting, interrogating, and solving kinematic and dynamic equations; creating, manipulating and discretizing PDEs; automatically converting Maple equations into Modelica components; creating parametric, linearized models and finding their Eigenvalues; using MapleSim's programming interface to perform parameter sweeps and optimizations.

FMI user meeting

PRESENTERS: Torsten Blochwitz (MAP FMI Project Leader) et. al.
ROOM: Richelieu

Abstract: The FMI Project organizes this "FMI User Meeting" within the tutorial/workshop session on the first day of the MODELICA Conference 2015 as a complement to the scientific tracks on FMI. The intention is to increase the interaction between FMI users in different companies / institutions and the Modelica Association Project FMI.

In a first part, an overview on the FMI ecosystem will be given by the FMI Project leader. The working modus of the FMI Project and the new development process will be presented including FMI Change Proposals and supporting tools. The current status of the FMI standard and current development directions will be summarized. In a second part, FMI users will give presentations showing how FMI is used for model interchange between different companies or different departments resp. engineering domains within one company, enabling collaborative model-based systems engineering. Users can also give feedback on their experience with FMI and missing features for the future. Additionally, the connection of FMI to past and future research projects will be summarized.

INVITED PRESENTATIONS

Title: Overview on the FMI project
Authors: Torsten Blochwitz (MAP FMI Project Leader + ITI)

Title: FMI Processes
Authors: Torsten Blochwitz (MAP FMI Project Leader + ITI) and Andreas Junghanns (QTronic)

Title: FMI Working Groups
Authors: Torsten Blochwitz (MAP FMI Project Leader + ITI)

Title: Smart Systems Engineering
Authors: Stefan Rude (BMW AG)

SELECTED PRESENTATIONS

Title: Initiatives for acausal model connection using FMI in JSAE (Society of Automotive Engineers of Japan)
Authors: Yutaka Hirano (Toyota Motor Corporation), Satoshi Shimada (Honda R&D Co., Ltd.), Yoichi Teraoka (Mazda Motor Corporation), Osamu Seya (DENSO CORPORATION), Yuji Ohsumi (AZAPA Co., Ltd.), Shintaroh Murakami (Dassault Systèmes K.K.), Tomohide Hirono (NewtonWorks Corporation), Takayuki Sekisue (ANSYS Japan K.K.)

Title: HiL real-time testing of a gearbox controller unit including a physical gearbox FMU
Authors: Peter Rissling (BMW Group), Andreas Pillekeit (dSPACE GmbH), Christian Kehrer (ITI GmbH)

Title: Systems Model Integration & Distribution using the Functional Mock-up Interface at Jaguar Land Rover Ltd.
Authors: James Chapman (Jaguar Land Rover Ltd.)

Title: Usage of FMI at Audi and Volkswagen
Authors: Christoph Bals (Audi AG), Thies Filler and Andreas Soppa (Volkswagen AG)

Title: FMI experience at ZF – Progress in Modelica Association Project „System Structure and Parameterization"
Authors: Jochen Köhler and Michael Kübler (ZF Friedrichshafen AG)

Title: FMI-based Model Exchange for Aircraft Energy Systems
Authors: Dirk Zimmer (DLR), Tim Giese (Airbus Operations GmbH), Matthieu Crespo (Liebherr-Aerospace), Sébastien Vial (Airbus Operations SAS)

Git and GitHub for Modelica users and developers

PRESENTERS: Dietmar Winkler, Mike Tiller
ROOM: Pascal

Abstract: This tutorial provides an introduction to Git, the distributed version control system, and GitHub. It is divided in two main parts:

1. Getting started with Git:
   - Why Version Control
   - Light introduction to what Git actually does
   - First commands to create repositories, change files, commit changes
2. Getting started with GitHub:
   - Create a fork of an existing project
   - Real bug fixing of example issues by use of
     * branching
     * committing changes with correct commit messages
     * creating pull requests
     * getting pull-requests accepted
3. More advanced git commands explained (if time allows)

Prerequisites:

* a laptop with a modern browser (Firefox or Chrome are recommended)
* for part 1. you can additionally install git locally on your machine (http://git-scm.com/download/) but participating using only your web browser is fine too.
* for part 2. a free GitHub account is needed. It helps if you set up this in advance by signing up for GitHub under: https://github.com/

Background:
In the past, open-source projects have been migrating away from centralized version control systems like CVS and Subversion to decentralized ones. At the moment, the most popular of these is Git.

Two years ago, the Modelica Association started making all its Modelica libraries available via GitHub as Git mirrors (https://github.com/modelica) and placing all user libraries in one central place (https://github.com/modelica-3rdparty). Subsequently library repositories increasingly evolved from being mirrors to being real Git repository with development taking place on GitHub.

Git's decentralized development makes it easy for developers to modify, fix and contribute to the libraries of others. In addition, GitHub provides great infrastructure to support communication, forking and issue tracking. For open source projects, GitHub's functionality is completely free.

Dependability Analysis for Modelica Models

PRESENTER: Lena Buffoni, Linköping University
ROOM: Vauban

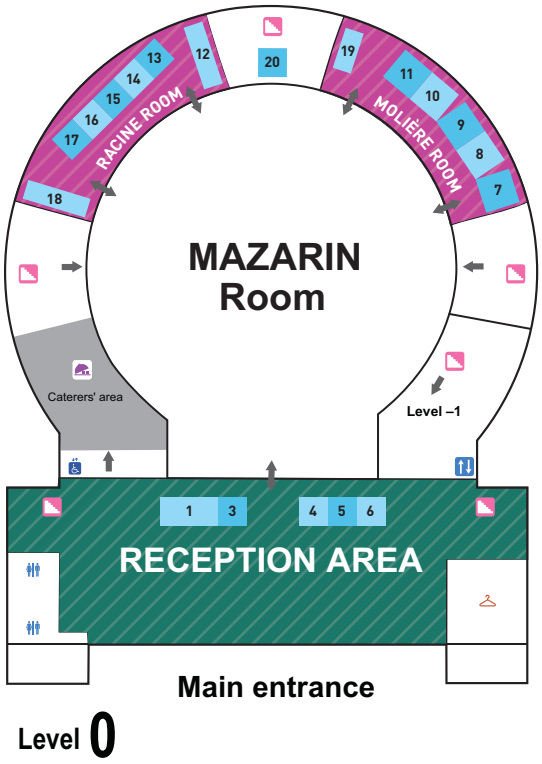
Abstract: In the development of modern large-scale systems, the verification of important non-functional requirements such as dependability and safety is often postponed to the last stages of the development process with a high risk of having to revise even basic design choices and with a consequent increase in both completion time and development costs. Including dependability information in models from the early stages would ensure that the system design takes into consideration these important factors. The tutorial will introduce the basic principles of dependability analysis for beginners, with a focus on Fault Analysis Trees. The goal is to show how to model failures in a system using FTA, to introduce key algorithms for FTA analysis and to introduce the tool-chain for generating FTAs automatically from Modelica models using the Figaro extension for Modelica. Figaro is a reliability modelling language developed by EDF (Électricité de France) to be a general representation formalism.

The tutorial will be hands on, so bring a laptop with a Windows environment. Participants will be shown through a series of exercises how to add dependability information to Modelica models with the use of the Figaro library, how to work with a Figaro knowledge base to define dependability rules for a class of Modelica systems and how to generate fault trees from Modelica models extended with dependability properties. Emphasis will be made on using inheritance and OO principles to maximise reusability and efficiency when adding dependability information to models.

EXHIBITION

The following companies/institutes will exhibit (alphabetic order):

Ansys	booth 7
Cenit AG	booth 16
Claytex Services Limited	booth 15
Concurrent	booth 10
D2T	booth 6
Dassault Systèmes	booth 11
ESI-Group	booth 1
ITI GmbH	booth 9
Kiastek	booth 19
LTX Simulation GmbH	booth 17
Maplesoft	booth 8
Modelon	booth 12
National Instruments	booth 5
Open Source Modelica Consortium	booth 3
Ricardo Software	booth 20
Siemens	booth 18
United Technologies Research Centre Ireland Ltd.	booth 4
Wolfram	booth 14
XRG Simulation GmbH	booth 13

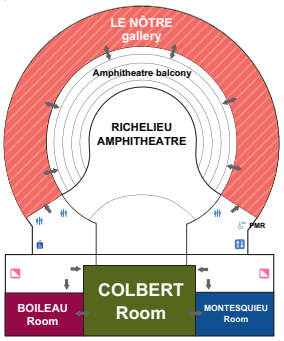


VENDOR SESSION

Program of the Vendor Sessions on Monday, September 21

	RICHELIEU	COLBERT	CONDÉ	VAUBAN	BOILEAU
17:00 – 17:45	**DASSAULT SYSTÈMES** **Dymola News and a New Approach for Modelica Modeling** *Hilding Elmqvist, Johannes Gerl, Martin Malmheden, Fabrice Pinot*	**XOGENY** **Transforming Modelica/ FMI Models into Web Applications with XenGen** *Michael Tiller*	**RISEGrid** **Distributed Architecture for Controlled CO-SIMulation** *Mathieu Caujolle, Jean-Philippe Tavella, Gilles Plessis*	**ESI GROUP** **ESI-Group – Modelica Support for Virtual Prototyping** *Peter Harman, Peter Bunus*	**DELTARES** **RTC-Tools: Optimization-based control for environmental applications**
17:50 – 18:35	**MODELON** **Modelica and FMI Products from Modelon** *Johan Åkesson, Maria Henningsson, Johan Andreasson*	**ANSYS** **Virtual System Prototyping: Combining Modelica + 3D Physics + Embedded Software** *Eric Bantegnie, Lee Johnson*	**ITI** **SimulationX Update on FMI 2.0 and MSL Compatibility** *Alex Magdanz*	**SCILAB ENTERPRISES** **Leveraging Modelica and FMI in Scilab open-source engineering software** *Paul Bignier, Yann Debray*	**LORIA/INRIA** **Smart-grid simulation with MECSYCO** *Vincent Chevrier, Laurent Ciarletta*
18:40 – 19:25	**OPEN SOURCE MODELICA CONSORTIUM** **OpenModelica Status and News on Simulation, Debugging, FMI, and Optimization** *Peter Fritzson, Bernhard Bachmann, Francesco Casella, Adrian Pop, Ruediger Franke*	**SIEMENS** **LMS Imagine.Lab Amesim** *Michael Sasena, Nicolas Orand*	**NATIONAL INSTRUMENTS** **LabVIEW Support for FMI for Model Exchange** *Jeannie Falcon, Greg Morrow*	**RICARDO SOFTWARE** **Complete Vehicle System Modeling using IGNITE** *Tyson Stewart*	**MAPLESOFT** **What's New in MapleSim 2015** *Chad Schmitke*

SITE PLAN



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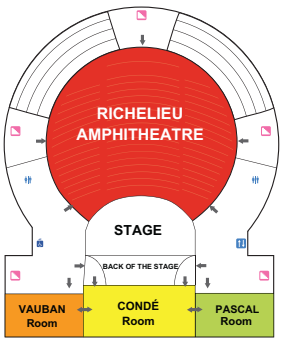

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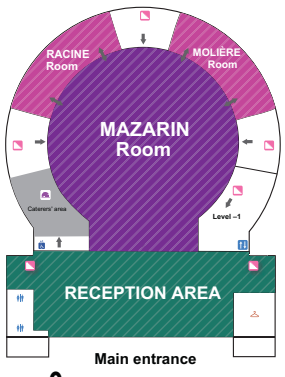
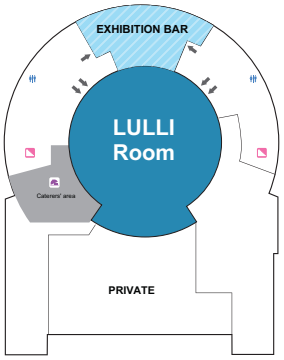


Level 0



Level –1

SOCIAL PROGRAM

Welcome Reception
Monday September 21, 19.30
The Welcome Reception will take place at Palais des Congrès de Versailles, room Mazarin. The reception will include refreshments and canapées. Please note that no dinner is served.

Conference Dinner
Tuesday September 22, 19.30
The Conference Dinner will take place at Palais des Congrès de Versailles, room Mazarin.

PRACTICAL INFORMATION

Venue
The Modelica conference will take place at Palais des Congrès de Versailles, approximately 40 minutes by train (RER C) from central Paris.

Venue Address
Palais des Congrès de Versailles
10 rue de la Chancellerie
78000 Versailles

Exhibition
A commercial exhibition will take place at the venue and will be open:

Monday	19.00–21.00 (during Welcome Reception)
Tuesday	08.00–17.30
Wednesday	08.00–15.45

Emergency
Emergency number is 112. This number will connect you to police, ambulance, or fire department. The emergency number does not require an area code and the phone call is free.

Internet / WIFi
At the conference venue you will be able to access wireless Internet.

Login: modelicaconference2015
Password: modelicaconference2015

Meals
Coffee breaks, lunches, Welcome Reception and optional Conference Dinner are included. They will be served in room Mazarin close to the exhibition area at the venue. Please note that there will be no lunch served Monday September 21 before the Tutorial sessions start.

Parking
Nearby blocks offers three car parks. There are no parking lot located nearby the building.

Poster sessions
Wednesday September 23, 11:55–12:55 there will be poster sessions held in Le Nôtre on Level 2.

Registration desk
The registration desk at the venue will be open:

Monday	10.00–19.00
Tuesday	08.00–18.00
Wednesday	08.00–17.00

Please contact us at the registration desk if you have any questions or requests and we will try to help you.

Taxi
Recommended taxi companies in Versailles are:
Taxi Abeille +33 (1) 39 50 50 00,
e-mail: taxis-abeille@wanadoo.fr
Association Taxi +33 (1) 39 51 04 04

Travel/Transportation Information
Once you have arrived in Paris, public transportation is recommended within the city and to Versailles. Please see further details regarding transportation at the map below and on next page. For more information on public transport options see http://parisbytrain.com

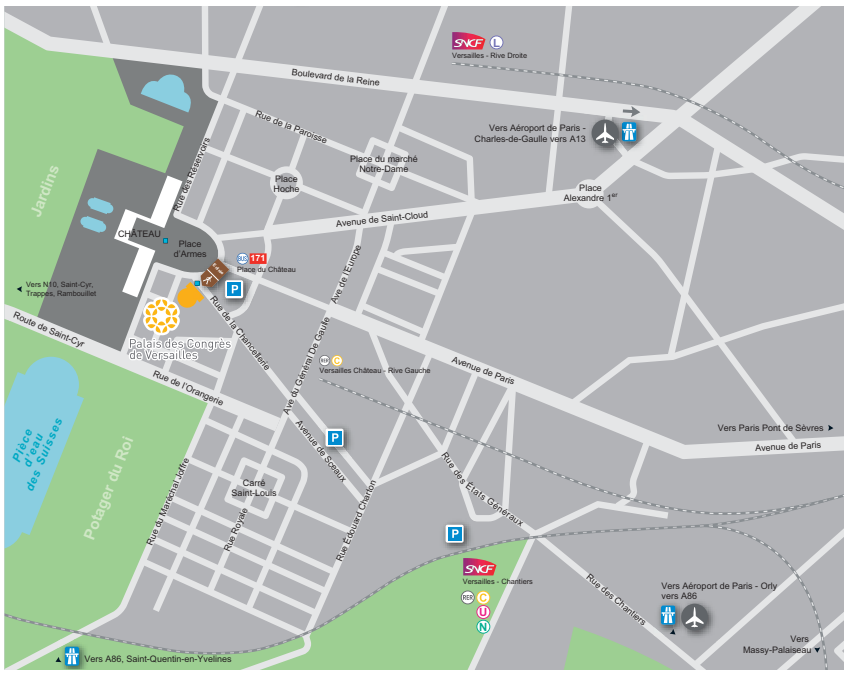
Tourist Information
Paris is a wonderful city to visit and explore. For more information about what to do when in Paris, please go to http://en.parisinfo.com

If you are interested in visiting the Versailles castle when in Versailles, please go to http://en.chateauversailles.fr/homepage for more information.

Tutorials
All tutorial sessions are held at the venue Monday September 21, 13.00–16.30. Coffee break is included.

Vendor Sessions
Vendor sessions are held at the venue Monday September 21, 17.00–19.25.

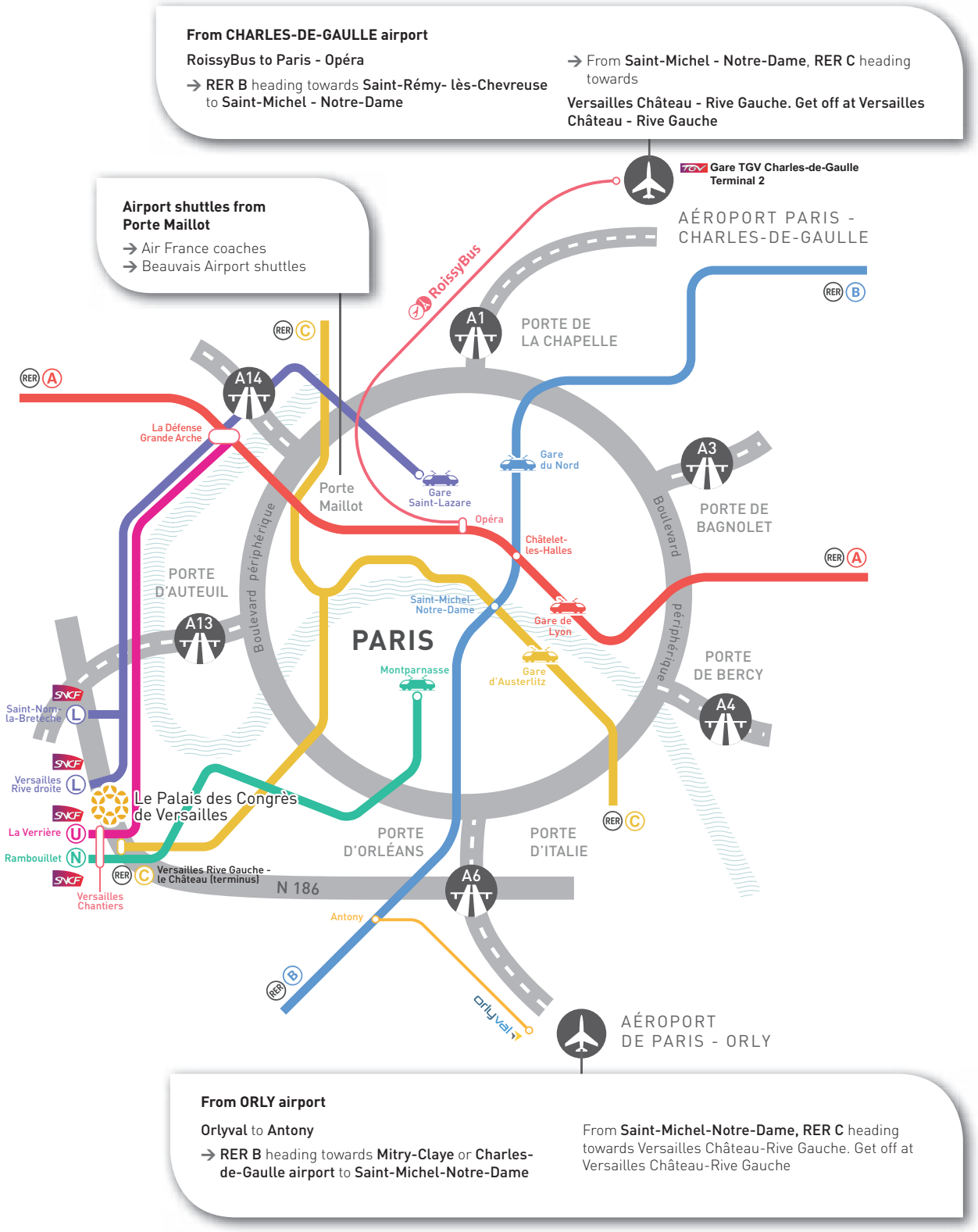
Voltage
Voltage in France is 220-240 V AC, 50 Hertz frequency. Continental Europe uses 2 round pin plugs.



RER C:
Versailles Rive Gauche station.

Bus 171:
from the Pont de Sèvres, "Place du Château" stop.

Train:
from Paris Saint Lazare mainline station (40 min), "Versailles Rive Droite" station;
from Paris Montparnasse mainline station (30 min), "Versailles Chantiers" station.



From Charles de Gaulle airport:

- 40 min by car;
- 1 hr 10 min: RER B + RER C.

From Orly airport:

- 30 min by car;
- 1 hr 15 with ORLY RAIL + RER C.

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MODELICA

The conference is organized by Dassault Systèmes and Linköping University in cooperation with the Modelica Association.