



### 3<sup>rd</sup> International Conference on Complex Systems Design & Management

December 12 – 14, 2012, Maison Internationale, Cité Internationale Universitaire de Paris  
17 Bld Jourdan 75014 Paris

#### Wednesday, December 12, 2012 – Societal and Industrial Challenges

The first day in the **Amphitheater Adenauer** is dedicated to the presentation of the societal & industrial contexts of complex systems engineering. It consists of a number of high-profile invited seminars that give to the participants a clear and synthetic vision of the domain and of its themes. A poster session blends then into as well as the conference cocktail in Salon Honnorat.

- **09:00-09:30 - Opening of the Conference**
  - 09:00-09:05 – Welcoming by Daniel Krob, general chair of the CSD&M 2012 and professor of the Ecole Polytechnique - France
  - 09:05-09:10 – Marc Aiguier, chair of the Organizing Committee and Professor of the Ecole Centrale de Paris - France
  - 09:10-09:15 – Yves Caseau, co-chair of the Program Committee and executive vice-president of Bouygues Telecom - France
  - 09:15-09:20 – Antoine Rauzy, co-chair of the Program Committee and professor of the Ecole Polytechnique - France
  - 09:20-09:25 – Dominique Vernay, president of the Université de Paris Saclay – France (to be confirmed)
  - 09:25-09:30 – Yves Demay, managing director of Ecole Polytechnique – France
- **09:30-12:30 – Societal Challenges : Risk & Safety**
  - 09:30-09:35 – Welcoming of the session chairman
  - 09:35-10:05 – Framework for Ensuring Nuclear Safety: Being Prepared for Nuclear Risk: Akira Yamaguchi, professor, Osaka University – Japan
  - 10:05-10:35 – New Financial Regulations, Impact and New Projects in Financial Technology: Raphaël Douady, founder, RiskData - France
  - 10:35-10:50 – Coffee Break
  - 10:50-11:20 – Energetical risk: Pierre Bornard, vice-president, RTE - France
  - 11:20-11:50 – Risk Management and Transfer to Insurance: Bernard Laporte, head of R&D and Training, AXA - France
  - 11:50-12:30 – Open Discussion
- **12:30-14:00 - Lunch at the Salon Honnorat**
- **14:00-17:30 - Industrial Challenges: Risk & Safety**
  - 14:00-14:05 : Welcoming of the session chairman
  - 14:05-14:35 : Risk and Opportunity Management of Complex Systems: David Walden, chairman, Sysnovation & INCOSE - USA
  - 14:35-15:05 – Smart City Challenges: Olivier Flous, Technical Director of Transport & Safety, Thales Communications & Security S.A. - France

- 15:05-15:35 – Building and Construction Risks: Jean-Christophe Visier, head of the Energy, Health and Environment Department, CSTB - France
- 15:35-16:05 – Certification Approach for Future Aviation Systems: Pascal Medal, Head of Certification Experts Department- EASA - Germany
- 16:05-16:30 - Coffee Break
- 16:30-17:30 - Open Discussion
- **17:30-19:00 – Poster Session & Conference Cocktail**  
Location: Salon Honnorat
- *A3 Architecture Overviews for Systems-of-Systems*, Rien L. Kooistra (University of Twente, Netherlands), G. Maarten Bonnema (University of Twente, Netherlands) and Jacek Skowronek (Thales, Netherlands)
- *Smart Failure and Risk Analysis in Complex Systems*, Frank Zeihsel (Synnovating , Germany), Christian M. Thurnes (University of Applied Sciences Kaiserslautern, Germany) and Svetlana Visnepolschi (Ideation International Inc., USA)
- *Tools for railway transitions*, Jop van Den Hoogen (Delft University of Technology, Netherlands) and Sebastiaan Meijer (KTH Stockholm, Sweden)
- *An approach to complexity assessment: complexity measurement through integration tests*, Patrick Farfal (PATSYS, France)
- *Illustration of the information model for complex system modeling: from requirement to V&V*, Romaric Guillerm (LAAS, France), Nabil Sadou (Supelec, France) and Hamid Demmou (LAAS, France)
- *Return of experience on the implementation of the system engineering approach at Alstom*, Marco Ferrogolini (Alstom, France) and Jean Le Bastard (Alstom, France)
- *Complex Product Design: Method and Experimental Results for Discovering New Characteristics Values*, Elsy Kaddoum (IRIT, France), Jean-Pierre Georgé (Université Toulouse III, France), Gleizes Marie-Pierre (IRIT, France) and Glize Pierre (Université Toulouse III, France)
- *How to turn spreadsheets into object oriented models*, Samuel Boutin (Knowledge Inside, France)
- *Complex managing of energy and material flow to achieve buildings with a low environmental footprint*, Valeria Montrucchio (Politecnico di Torino, Italy), Marco Simonetti (Politecnico di Torino, Italy) and Clara Ceppa (Politecnico di Torino, Italy)
- *Designing for technological refreshability over the system operational life*, Alberto Sols (Sabentia, Spain), Robert Cloutier (Stevens Institute of Technology, USA)
- *Managing Complexity of Information Systems*, Pirmin Lemberger (Alcyonix, France) and Médéric Morel (Alcyonix, France)
- *Use of a Bayesian nets-based method to automatically generate complex product architectures: application on the cooling system of a radar active antenna*, Marie-Lise Moullec (Thales Air Systems, France), Marc Bouissou (Ecole Centrale Paris), Marija Jankovic (Ecole Centrale Paris) and Jean-Claude Bocquet (Ecole Centrale Paris)
- *Systems approach to developing a program (of projects) to improve the engineering IT environment of a multi-industry corporation*, Mikhail Belov (IBS, Russia)

- *Analysis of the 2011 Japan's triple disaster from a conceptual ontology of the domain of risk and disaster*, Edwige Dubos-Paillard (CNRS, France) and Damienne Provitolo (CNRS, France)
- *Contribution of ANR RePDyn project to the parallel simulation of fast transient accidental phenomena at nuclear reactor scale*, Vincent Faucher (CEA, France)
- *Technical audit as a way to complex systems excellence*, Jean-Vincent Legrand (Sagem, France)
- *Using patent information for designing new technologies: The PSA Peugeot Citroen case*, Sylvain Mbongui-Kialo (Higher Institute of Management, France)
- *How to eco-design a complex systems application of CSP/LCA approach to hybrid passenger ferry design*, Nicolas Tchertchian (Supmeca, France), Pierre Alain Yvars (Supmeca, France) and Dominique Millet (Supmeca, France)
- *Model Based Systems Engineering using VHDL-AMS*, Patrice Micouin (INCOSE, France)
- *Mediator IP Telephony*, Khalfi Mohammed Fethi (University of Sidi Bel Abbes, Algeria) and Kandouci Malika (University of Sidi Bel Abbes, Algeria)
- *Analysis of the simulation system in an automotive development project*, Goknur Sirin (Ecole Centrale Paris, France), Bernard Yannou (Ecole Centrale Paris, France), Eric Coatanea (Aalto University, Finland) and Eric Landel (Renault, France)
- *Application of the Systems Engineering methodology to the design of the AOCS of an Earth Observation satellite*, Christoph Pierl (ISAE, France) and Stéphanie Lizy-Destrez (ISAE, France)
- *Diagnosis System Design for Technological Systems*, Michel Batteux (Ecole Polytechnique, France), Philippe Dague (Université Paris-Sud, France), Nicolas Rapin (CEA, France) and Philippe Fiani (Sherpa Engineering, France)
- *Foundations for model-based systems engineering*, Jon Holt, Simon Perry and Matthew Hause (Atego, UK)
- *Project Architecture and Life-cycle Performance in Large Infrastructure Projects*, Vivek Sakhrani (MIT, USA)
- *Complex network synchronization of fractional-order chaotic Chua systems*, Oscar Ricardo Acosta-Del Campo (UABC, Mexico), Cesar Cruz-Hernández (CICESE, Mexico), Adrian Arellano-Delgado (UABC, Mexico), Rosa Martha López-Gutiérrez (UABC, Mexico) and Alejandro Aguilar-Yañez (UABC, Mexico)
- *Highly Confident Reduced Life-Cycle Design Process for Small Satellite Systems: Methodology and Theory*, William Edmonson (NC A&T State University, USA), Heber Herencia-Zapana (National Institute of Aerospace, USA), Natasha Neogi (National Institute of Aerospace, USA), William Moore (Hampton University) and Scott Ferguson (NC State University, USA)
- *Design of Control Systems for Nonlinear Control Laws with Increased Robust Stability*, Gulnara Abitova (Binghamton University, USA), Vladimir Nikulin (Binghamton University, USA), Mamirbek Beisenbi (Eurasian National University, Kazakhstan) and Aliya Ainagulova (Eurasian National University, Kazakhstan)

## Thursday, December 13, 2012 - Towards a Theory of Systems

The second day of the conference in the Amphitheater Adenauer is devoted to systemic methodologies and fundamentals emerging from academic as well as industrial environments. It is centered on the fact that the architectural paradigm can help to think about complex systems in a unified way. The official conference dinner will end the day.

- **09-00-12:30 - Scientific State of the Art**
  - 09:00-09:05 – Opening of the session chairman
  - 09:05-09:40 – Thinking about Systems Thinking: Wolter Fabrycky, professor, Virginia Tech. – USA
  - 09:40-10:15 – Engineering Cyber-Physical : Challenges and Foundations: Manfred Broy, professor, Technische Universität Munchen - Germany
  - 10:15-10:50 – Systems design: Dinesh Verma, professor, Stevens University – USA
  - 10:50-11:00 – Coffee Break
  - 11:00-11:35 – Game-Theoretical and Evolutionary Simulation: A Toolbox for Complex Enterprise Problems: Yves Caseau, executive vice president « Technologies, Services & Innovation », Bouygues Telecom – France
  - 11:35-12:45: Software and Engineering Tools Session part 1
- **12:45-13:55 – Lunch at the Salon Honnorat**
- **13-55-17:50 - Methodological State of the Art**
  - 13:55-14:00 – Welcoming of the session chairman
  - 14:00-14:35 – Design for Reliability: Challenges in Probabilistic Risk Assessment: Antoine Rauzy, professor, Ecole Polytechnique - France
  - 14:35-15:10 – Architecting Complex Systems in New Domains and Problems: Patrick Godfrey, professor, University of Bristol - UK
  - 15:10-16:40 – Software and Engineering Tools Session part 2
  - 16:40-17:15 – Decision Support Systems for Complex Engineering Systems: Anas Alfaris, co-director of the Center for Complex Engineering Systems (CCES) at KACST and MIT - Saudi Arabia/USA
  - 17:15-17:50 – Tackling Complexity in the Probabilistic Risk Analysis of Power Systems: Pierre-Etienne Labeau, professor, Ecole Polytechnique de Bruxelles - Belgium
- **18:45-22:30: Meeting at Porte B (group entrance)** of the Musée d'Orsay, for a guided visit & conference dinner in this prestigious Parisian museum.

## Friday, December 14, 2012 – EEC Systems Vision/Tutorials and Contributed Talks

The third and last conference day is dedicated to EEC systems vision, followed by tutorials and contributed talks in parallel where industrial and academic presentations will be mixed. A farewell ceremony will end the conference and best papers awards will be announced at this moment by Daniel Krob, general chair of the CSD&M 2012.

- **09:00-11:00 - EEC Session**

Location: Amphitheater Adenauer

- 9:00-9:45: EEC Systems Vision: Khalil Rouhana, Director of “Components & Systems” in the Directorate – General for “Communications Networks, Content & Technology” - European Commission
- 9:45-10:30: questions & responses
- 10:30-11:00 - Coffee Break

- **11:00- 17:30 – Four Parallel Sessions**

- **Parallel Session 1**

Location: Salon Gulbenkian

- **Session 1.1**

- 11:00-11:30 - *A Taxonomy of Procedures to Support the Design of Engineering Systems for Uncertainty and Flexibility*, Michel-Alexandre Cardin (National University of Singapore, Singapore)
- 11:30-12:00 - *An Integrated Approach to Developing an Automotive Climate Control System*, Guillaume Belloncle (Dassault Systèmes, UK), Patrick Chombart (Dassault Systèmes, France) and Bernard Clark (Dassault Systèmes, UK)
- 12:00-12:30 – *Integrating Collaborative Distributed Simulation for Building Automation and Control Systems*, Azzedine Yahiaoui (Technische Universiteit Eindhoven, Netherlands) and A.E.K. Sahraoui (LAAS-CNRS, France)

- **12:30-14:00 – Lunch at the Salon Honnorat**

- **Session 1.2**

- 14:00-14:30 - *Towards an Architectural Design Framework for Automotive Systems Development*, Hugo Guillermo Chalé-Gongora (Renault, France), Thierry Gaudre (Renault, France) and Sara Tucci (CEA, France)
- 14:30-15:00 - *Synchronization phenomena in electrical systems: emergent oscillation in a refrigerator population*, Enrique Kremers (EIFER, Germany), José María Gonzalez de Durana (Universidad del País Vasco, Spain) and Oscar Barambones (Universidad del País Vasco, Spain)
- 15:00-15:30 - *Smart Grid: Constructing a System of Systems Model Using Both Qualitative and Quantitative Assessments*, Michael Miller (Georgia Institute of Technology, USA) , Satya Pogaru (Georgia Institute of Technology, USA) and Dimitri Mavris (Georgia Institute of Technology, USA)
- 15:30-16:00: Coffee Break

- **Session 1.3**

- 16:00-16:30 – *Modeling transportation systems: a case study with the open method Praxeme*, Dominique Vauquier (Praxeme Institute, France)
- 16:30-17:00 – *Prototyping Systems Thinking Curriculum Development for Pre-College Students*, Ben Jurewicz (St Mary’s University, USA)

- 17:00-17:30 - *Complex Systems Architecture Framework. Extension to Multi-Objective Optimization*, Abdelkrim Doufene (Renault, France), Hugo Guillermo Chalé Gongora (Renault, France) and Daniel Krob (Ecole Polytechnique, France)

## Parallel Session 2

Location: Salon David-Weill

### • Session 2.1

- 11:00-11:30 - *Agility Problems in Traditional Systems Engineering – A Case Study*, Emrah Asan (EADS Deutschland, Germany) and Semih Bilgen (Middle East Technical University, Turkey)
- 11:30-12:00 - *Modeling the impact of requirements change in the design of complex systems*, Joao Fernandes (Instituto Superior Tecnico, TULisbon, Portugal), Arlindo Silva (Instituto Superior Tecnico, TULisbon, Portugal) and Elsa Henriques (Instituto Superior Tecnico, TULisbon, Portugal)
- 12:00-12:30 – *Flexible Product Line Derivation applied to a Model Based Systems Engineering process*, Cosmin Dumitrescu (Université Paris I, France), Patrick Tessier (CEA, France), Camille Salinesi (Université Paris I, France), Sebastien Gérard (CEA, France) and Alain Dauron (AFIS, France)

### • 12:30-14:00 – Lunch at the Salon Honnorat

### • Session 2.2

- 14:00-14:30 - *Orchestrating situation awareness and authority in complex socio-technical systems*, Guy Boy (Florida Institute of Technology, USA)
- 14:30-15:00 - *Modelling languages for Functional Analysis put to the test of real life*, Jean-Luc Voirin (Thales, France)
- 15:00-15:30 - *Human emotional interaction and hydrotherapy. Industrial design keys*, Sergio Gago (Universitat Politècnica de Catalunya, Spain) and Joaquim Lloveras (Universitat Politècnica de Catalunya, Spain)
- 15:30-16:00: Coffee Break

### • Session 2.3

- 16:00-16:30 – *Requirement management for complex systems - a critical element of the integration process*, Nicolas Chapron (AREVA, France), Michel Luttmann (CEA, France) and Christian Blanchet (AREVA, France)
- 16:30-17:00 – *Model-Driven Development of Logistic Systems using Domain-Specific Tooling*, Jacques Verriet (Embedded Systems Institute, Netherlands), Hsuan Lorraine Liang (Sioux Embedded Systems, Netherlands), Roelof Hamberg (Embedded Systems Institute, Netherlands) and Bruno Van Wijngaarden (Vanderlande Industries, Netherlands)
- 17:00-17:30 – *PBS: a major enabler for Systems Engineering*, Olivier Terrien (Thales, France) and Edmond Tonnellier (Thales, France)

### Parallel Session 3

Location: Salon Preyer

**11:00-17:30 – Tutorial 1 (optional):** Model Based Systems Engineering: Bran Selic, Malina Software, Canada

#### Abstract

Model-based engineering (MBE) is an approach to systems and software development which encompasses a variety of methods in which models play a fundamental role. In this tutorial, we first look at the essential features that characterize MBE. Next, we examine some of the salient elements of MBE-related technologies, including overviews of two of the most influential modeling languages: UML and SysML. Finally, we also examine the application and impact that MBE has had in industrial system development.

#### Schedule

- 11:00-12:30: Session I: The Essentials of Model-Based Engineering
- 12:30-14:00: Lunch Break at the Salon Honnorat
- 14:00-15:30: Session II: Key MBE Technologies: Languages and Tools
- 15:30-16:00: coffee break in the Amphitheater Adenauer.
- 16:00-17:30: Session III: MBE in Industrial Practice

### Parallel Session 4

Location: Salon Branet

**11:00-17:30 – Tutorial 2 (optional):** Critical System Simulations: joint contributions from MathWorks, Supelec and SafeRiver, France

#### Schedule

- 11:00-12:30: Complex systems as collaborating systems of systems, Pieter Mosterman (MathWorks)
  - Introduction (Cyber-Physical Systems)
  - Value of computational semantics (Model-Based Design)
  - Heterogeneity of computational semantics
- 12:30-14:00: Lunch Break at the Salon Honnorat
- 14:00-15:30: Execution of models with heterogeneous semantics, Pieter Mosterman(MathWorks), Frédéric Boulanger and Cécile Hardebolle (Supélec)
  - Heterogeneity of computational semantics
  - The need for static analysis in complex systems
- 15:30-16:00: coffee break in the Amphitheater Adenauer.
- 16:00-17:30: Deployment of formal methods on complex systems: Lessons learned in the Railway industry, Véronique Delebarre (SafeRiver)
  - Value of formal methods on complex safety-critical systems
  - Lessons learned in the Railway industry
  - Questions and answers
- **17:30 - 18:30 – Best Papers Awards and Farewell Ceremony**  
Location: Amphitheater Adenauer