

Preface

Introduction

This volume contains the proceedings of the Second International Asia-Pacific Conference on “Complex System Design & Management” (CSD&M Asia 2016; see the conference website: <http://www.2016.csdm-asia.net/> for more details).

The CSD&M Asia 2016 conference was jointly organized during February 24–26, 2016 at the Singapore University of technology and Design by the two following founding partners:

1. The Singapore University of Technology and Design (SUTD);
2. The Center of Excellence on Systems Architecture, Management, Economy and Strategy (CESAMES).¹

The conference also benefited from the permanent support of other organizations such as the DTSA Academy (Singapore), the National University of Singapore, and many other institutions to which a number of committee members belong, and deeply contributed to the conference organization.

Special thanks also go to Accenture Technology Labs Beijing (China), Dassault Systèmes (France), DSO National Laboratories (Singapore), Defence Science and Technology Agency of Singapore (DSTA—Singapore), Electricité de France (EDF—France/Singapore), International Council on Systems Engineering (INCOSE), IRT SystemX (France), JTC Corporation (Singapore), Mega International (France), Obeo (France), Project Performance International (PPI), Sembcorp (Singapore), Surbana Jurong (Singapore), and Thales (France/Singapore), which were our key industrial and institutional sponsors. The generous support of Sembcorp is especially pointed out here.

¹CESAMES is a nonprofit organization, dedicated to the organization of CSD&M conferences, which was created by the Ecole Polytechnique—Dassault Aviation—DCNS—DGA—Thales “Engineering of Complex Systems” chair.

We are also grateful to the Council of Engineering Systems Universities (CESUN), Dassault Systèmes Singapore, Data Analytics Technologies & Applications Research Institute (Taiwan), French Chamber of Commerce in Singapore, French Embassies in Asia, Gumbooya (Australia), INCOSE Asia-Oceania Sector, Infocomm Development Authority of *Singapore* (IDA), Institution of Engineers Singapore (IES), Land Transport Authority (Singapore), Ministry of Defence of Singapore (MINDEF & SAF), Ministry of Home affairs (Singapore), National Research Foundation (NRF, Singapore), National Instruments South East Asia (Singapore), PUB-The Singapore National Water Agency, Singapore Power, Systematic (France), Veolia Environment (France/Singapore), and Vinci Constructions (France/Singapore), who all strongly supported our communication efforts.

All these institutions also helped us a lot through their constant participation in the organizing committee during the one-year preparation of CSD&M Asia 2016.

Many thanks therefore to all of them.

Why a CSD&M Asia Conference?

Mastering complex systems requires an integrated understanding of industrial practices as well as sophisticated theoretical techniques and tools. This explains the creation of an annual *go-between* forum in the Asia-Pacific region dedicated both to academic researchers and industrial actors working on complex industrial systems architecture, modeling, and engineering. Facilitating their *meeting* was actually for us a *sine qua non* condition in order to nurture and develop in the Asia-Pacific region the new emerging science of systems.

The purpose of the conference on “Complex Systems Design & Management Asia” (CSD&M Asia) is exactly to be such a forum, in order to become, in time, *the* Asia-Pacific academic–government–industrial conference of reference in the field of complex industrial systems architecture and engineering. This is a quite ambitious objective, which we think possible to achieve, based on the success of the “mother” conference, that is to say, the CSD&M conference is ongoing in France since 2010 with a growing audience (the last 2015 edition gathered almost 300 participants coming from 20 different countries with an almost perfect 50/50 balance between academia and industry).

Our Core Academic–Industrial Dimension

To make the CSD&M Asia conference a convergence point for academic, government, and industrial communities interested in complex industrial systems, we based our organization on a principle of *complete parity* between academics,

government, and industrialists (see the conference organization sections). This principle was first implemented as follows:

- Program Committee consisted of 50 % academics and 50 % government/industrialists;
- Invited speakers came from numerous professional environments.

The set of activities of the conference followed the same principle. They indeed consist of a mixture of research seminars and experience sharing, academic articles, governmental and industrial presentations, cutting edge software presentations, etc. The conference topics cover in the same way the most recent trends in the emerging field of complex systems sciences and practices from an industrial, governmental, and academic perspective, including the main industrial and public domains (aeronautic and aerospace, defense and security, electronics and robotics, energy and environment, health and welfare services, media and communications, software and e-services, transport, technology & policy), scientific and technical topics (systems fundamentals, systems architecture and engineering, systems metrics and quality, systems modeling tools) and system types (transportation systems, embedded systems, software & information systems, systems of systems, artificial ecosystems).

The Second CSD&M Asia 2016 Edition

The CSD&M Asia 2016 edition received 43 submitted papers, of which the program committee selected 17 regular papers to be published in these proceedings, which corresponds to about a 39 % acceptance ratio which is fundamental for us to guarantee the high quality of the presentations. The program committee also selected 7 papers for a collective presentation during the poster workshop of the conference that intends to encourage presentation and discussion on other interesting, emerging issues.

Each submission was assigned to at least two program committee members, who carefully reviewed the papers, in many cases with the help of external referees. These reviews were discussed by the Program Committee co-chairs during a meeting held at DSTA in Singapore on October 8, 2016, and managed using the EasyChair conference management system. Our sincere thanks go also to Dr. William Yue Khei Lau from DSO National Laboratories, whose help was precious during this evaluation step.

We also invited 15 outstanding speakers from various industrial, governmental, and scientific backgrounds, who gave a series of invited talks covering the entire spectrum of the conference on the theme of “Smart Nations: Sustaining and Designing,” mainly during the two first days of CSD&M Asia 2016. The first and second days of the conference were especially organized around this common topic, following up on the discussions from the 2014 edition focusing on “Designing Smart Cities.” This theme gave coherence to all invited talks and between the two editions organized so far. The last day was dedicated to special “thematic open

sessions,” followed by presentations of all accepted papers as well as a system-focused tutorial in parallel.

Furthermore, we had a systems architecture and engineering tools session in order to provide to each participant a good vision the present status of the systems engineering services and tools offers.

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