Preface

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Biographical notes: Francesco Longo is an Assistant Professor and the Director of the Modelling and Simulation Center – Laboratory of Enterprise Solutions at DIMEG, University of Calabria. His research interests are the development of innovative and advanced simulation approaches in different domains, including industry, defence and logistics. He actively supports the organisation of the most important international conferences in the field of modelling and simulation, serving as the General/Programme Chair. He has published more than 170 scientific articles on international conferences and journals.

Continuous advances in computer science and information technology call for even more challenging researches and applications to the extent that, what was considered ideal and unfeasible only few years ago, nowadays has taken a real shape.

Frontiers of the scientific research are continuously expanding beyond each predictable expectation, and researchers from industry and academia work at high speed to develop know-how, solve even newer and complex problems, and find out the un-findable.

On this basis, modelling and simulation (M&S) is far from being an outdated practice. Ready to face even more challenging issues, M&S is always receptive to new ideas and technologies seeking to provide groundbreaking solutions. M&S has, indeed, a firm grasp of how to tackle complexity in multi-scale, multi-domain applications stemming from the ability to bond insights gained from multi-disciplinary, multi-perspective, and cross-domain experiences.

There is a dual effect that emerges when current trends in methodology and practice are considered. On one hand, M&S is increasingly pervasive since it is used as an investigation tool even in those disciplines, such as neurosciences, that are not directly related to engineering. Here, beside scientific factors, social factors are called into question, challenging M&S researchers and practitioners to go beyond established patterns and sound out non-conventional approaches.

On the other hand, M&S is used across all the engineering disciplines (i.e., industrial, automotive, mechanical, civil and management engineering) as a means to enable innovative practices and methodologies but not only. It has also been established as an everyday technology embedded in commonly used tools and instruments for design, assessment, monitoring, decision support, operational support, etc.

As mentioned before, the reason why M&S has spread around so extensively relies on the capability to integrate into its methodological body of knowledge, advances and achievements coming from multiple disciplines and perspectives. Being always reactive and proactive to external and internal influences and stimuli, M&S is prone to evolve dynamically so as to provide concrete answers to whatever kind of need.

Given that, this special issue on 'modelling and applied simulation: multi-perspective and multi-disciplinary approaches', based on a selection of the best papers published in the Proceedings of the International Multidisciplinary Modeling and Simulation Multi-conference (I3M 2013), collects relevant and high quality research works shaping M&S current and expected developments. Covering different subjects and areas of expertise, the papers that are part of this special issue provide a valuable contribution to the state of the art under multiple perspectives, namely approaches, methodologies, applications and achievements. To give an idea of the special issue's scope and coverage, a brief overview of the papers that are part of it is provided below.

- 'An ontologic agent-based model of recreational polydrug use: SimUse' (Lamy et al.) proposes an agent-based model (SimUse) devoted to reproduce trajectories of recreational poly-drug users. Being an ontology-based social simulation model, it is able to reproduce neurophysiological reactions to substance use and to explore 'what-if?' scenarios related to drug use.

- 'An integrated approach for demand forecasting and inventory management optimisation of spare parts' (Armenzoni et al.) develops and tests an advanced model, based on discrete-event simulation, whose purpose is to forecast the demand of spare parts during the whole lifetime of a complex product, such as an industrial machine.

- 'Environment exploration and map building of mobile robot in unknown environment' (Wang et al.) studies simultaneous environment exploration and map building of a mobile robot. In particular, an exploration

strategy with obstacle avoidance and based on the real-time data acquired from a laser sensor is proposed. Furthermore, a topological map model that uses the nodes of the growing neural gas network as the topological network nodes is proposed.

- 'Multi-domain modelling and simulation of an automated manual transmission system based on Modelica' (Huang et al.) uses a five-speed automated manual transmission (AMT) as a research object and present a detailed Modelica®-based hydro-mechanical dynamic model.

- 'An agent-based electronic market simulator enhanced with ontology matching services and emergent social networks' (Nascimento et al.) proposes a new model for the AEMOS' ontology services, which promotes the reuse and combination of already existent ontology alignments, with the goal of improving the adequacy of the alignments used in business negotiations.

- 'Comparison of optimisation methods tested on testing functions and discrete event simulation models' (Raska and Ulrych) compares selected and modified optimisation methods (random search, hill climbing, tabu search, local search, downhill simplex, simulated annealing, differential evolution and evolution strategy) on different types of simulation models. Optimisation methods are tested on selected testing functions (De Jong's, Rosenbrock's, Michalewicz's, and Ackley's function) and three-discrete event simulation models.

- 'Dynamic optimal power flow control with simulation-based evolutionary policy-function approximation' (Hutterer and Affenzeller) illustrates the application of policy-function approximation for dynamic optimisation under uncertainty in power flow control.

Needless to say, this special issue results from the joint effort of the editorial board, authors and reviewers, to whom my thanks and my gratitude go. Special thanks go to the Editor-in-chief of *IJSPM*, Professor Feng Qiao for his valuable work to propel simulation forward.