DISCRETE EVENT MODELING AND SIMULATION METHODOLOGIES:
PAST, PRESENT AND FUTURE

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ABSTRACT

Modeling and Simulation methods have been used to better analyze the behavior of complex physical systems and it is now common to use simulation as a part of the scientific and technological discovery process. Formal M&S proved to be successful in providing a sound base for the development of discrete-event simulation models, improving the ease of model definition and enhancing application development tasks. The DEVS formalism is one of these techniques, which proved to be successful in providing means for modeling while reducing development complexity and costs. We will present a historical perspective of discrete-event M&S methodologies and will introduce DEVS origins and general ideas. We will then show the current status of DEVS M&S, and we will discuss a technological perspective to solve current M&S problems (including real-time simulation, interoperability and model-centered development techniques) and its application in different fields. We will finally show current open topics in the area, which include advanced methods for centralized, parallel or distributed simulation, the need of real-time modeling techniques, and our view in these fields.

AUTHOR BIOGRAPHY

GABRIEL WAINER, FSCS, SMIEEE, received the M.Sc. (1993) at the University of Buenos Aires, Argentina, and the Ph.D. (1998, with highest honors) at the Université d'Aix-Marseille III, France. In July 2000 he joined the Department of Systems and Computer Engineering at Carleton University (Ottawa, ON, Canada), where he is now Full Professor and Associate Chair for Graduate Studies. He has held visiting positions at numerous institutions. He is the author of three books and over 320 research articles; he edited four other books, and helped organizing numerous conferences, including being one of the founders of the Symposium on Theory of Modeling and Simulation, SIMUTools and SimAUD. Prof. Wainer was Vice-President Conferences and Vice-President Publications, and is a member of the Board of Directors of the SCS. Prof. Wainer is the Special Issues Editor of SIMULATION, member of the Editorial Board of IEEE Computing in Science and Engineering, Wireless Networks (Elsevier), Journal of Defense Modeling and Simulation (SCS). He is the head of the Advanced Real-Time Simulation lab, located at Carleton University's Centre for advanced Simulation and Visualization (V-Sim). He has been the recipient of various awards, including the IBM Eclipse Innovation Award, SCS Leadership Award, and various Best Paper awards. He has been awarded Carleton University's Research Achievement Award (2005, 2014), the First Bernard P. Zeigler DEVS Modeling and Simulation Award, the SCS Outstanding Professional Award (2011), Carleton University's Mentorship Award (2013), the SCS Distinguished Professional Award (2013), and the SCS Distinguished Service Award (2015). He is a Fellow of SCS. He will be the Program Chair of WinterSim 2017 in Las Vegas, NV.