Preface

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Javier Faulin is a Professor of Operations Research and Statistics at the Public University of Navarre (Pamplona, Spain). He holds a PhD in Economics, an MS in Operations Management, Logistics and Transportation and an MS in Applied Mathematics. His research interests include logistics, vehicle routing problems and decision making in service companies. He is a member of INFORMS and EURO societies and an editorial board member of the *International Journal of Applied Management Science* and the *International Journal of Operational Research and Information Systems*.

Scott E. Grasman is a Professor and the Department Head of Industrial and Systems Engineering at Rochester Institute of Technology. He received his BSE, MSE and PhD degrees in Industrial and Operations Engineering from the University of Michigan. His research focuses on workforce planning, vehicle routing, supply chain and logistics systems. His recent work has also focused on alternative fuels programmes, public-private-partnerships in transportation, alternative energy infrastructure modelling/simulation, and sustainability in supply chain and facility logistics. He is a member of INFORMS, IIE, and ASEE.

Felipe M.G. França received his Electronics Engineer degree from the Universidade Federal do Rio de Janeiro (UFRJ), in 1981, his MSc in Computer Science from COPPE/UFRJ, in 1987, and his PhD from the Department of Electrical and Electronics Engineering of the Imperial College London, in 1994. Since 1996, he has been with the Systems Engineering and Computer Science (graduate) Program, COPPE/UFRJ, and he has research and teaching interests in computational intelligence, computer architecture, cryptography, distributed algorithms, global optimisation and other aspects of parallel and distributed computing.

Industrial systems and processes are becoming more and more complex due to their large-scale, dynamic, and stochastic nature. Therefore, decision-making processes arising in industrial and service sectors are becoming extremely challenging, making necessary the development of effective computer-aided tools based on quantitative methods. Fortunately, optimisation and simulation methods and techniques have rapidly evolved over the last decades. One factor that explains this development is the outstanding and continuous improvement of computer hardware, software, and algorithms. Another factor is the increasing use of problem-solving approaches that benefit from more computing power, e.g., metaheuristics, hybrid algorithms, parallel and distributed computing, large-scale simulations, multi-agent approaches, etc. However, despite these significant advances in the scientific arena, an important gap between theory and practice persists. Most industrial sectors are still far from employing the full potential of state-of-the-art advances in optimisation and simulation.

On the one hand, optimisation and simulation techniques are constantly benefiting from theoretical advances and practical experimentation. These techniques vary from pure exact methods, such as mixed integer programming, to approximation methods such as discrete-event simulation and metaheuristics. Between both extremes, new hybrid algorithms and matheuristics are emerging as efficient methods for solving complex problems. On the other hand, computer power is still growing every year at an astonishing rate. Personal computers now have multi-core processors allowing the use of multi-threaded optimisation and simulation techniques. Furthermore, parallel and distributed computing techniques and architectures offer different ways to accelerate the

efficiency of optimisation and simulation techniques realistic scenarios where results should be obtained in almost 'real time'. All in all, application of optimisation and simulation techniques enhanced using novel computational strategies is a promising research area, the use of which is expected to lead to the design and development of better systems and process in fields, ranging from industry and services to computer systems and telecommunication networks.

With the advances in optimisation and simulation, we felt it timely to bring together a collection of recent developments in these research areas in a special issue. This *IJDATS* special issue on 'Optimisation and simulation in realistic scenarios' is aimed at engineers, scientists, operations researchers, and other applications specialists who are looking for recent advances in optimisation and simulation tools to solve particular problems. The special issue provides a broad spectrum of advances in applied optimisation and simulation with a focus on the computational aspects of different decision making processes. This special issue aims at providing *IJDATS* readers a selection of original and high-quality articles from researchers and practitioners in the fields of applied optimisation, simulation, and related computational issues.

This *IJDATS* special issue contains four articles which address different problems by using modern and hybrid optimisation and simulation tools. The problems described in these articles span research areas, such as management or natural resources, logistics, scheduling, and manufacturing.

In the first article, 'Characterised and personalised predictive-prescriptive analytics using agent-based simulation', D. Perugini and M. Perugini describe two case-studies regarding the practical use of agent-based modelling and simulation approaches. In these approaches, the authors model consumers' behaviour in order to forecast water and energy demands throughout simulation.

In the second article, 'Solving the 3D container ship loading planning problem by representation by rules and meta-heuristics', A. Tavares de Azevedo, C.M. Ribeiro, G.J. de Sena, A.A. Chaves, L.L.S. Neto and A.C. Moretti formulate the 3D containership loading planning problem and propose a new and compact representation for it. This representation is combined with genetic algorithms, simulated annealing, and beam search to efficiently solve the problem.

In the third article, 'Machining parameter optimisation by genetic algorithm and artificial neural network', N. Ahmad, T. Tanaka and Y. Saito discuss the non-linear nature of real-life machining operations, which are used for creating surfaces by cutting away unwanted materials from work pieces. Then, they propose a hybrid approach, combining genetic algorithms and artificial neural networks, to solve these problems and illustrate their methodology with a realistic example.

In the last article, 'A tabu search for the permutation flow shop problem with sequence dependent setup times', N. Santos, R. Rebelo and J.P. Pedroso consider the permutation flow-shop scheduling problem with sequence dependent setup times. This is a well-known problem both for its practical applications as well as for its intrinsic difficulty. The authors propose a tabu search approach with the goal of minimising the total weighted tardiness in this problem.

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