Foreword

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Biographical notes: Grégoire Danoy received his Industrial Engineer degree in Computer Science from Luxembourg University of Applied Sciences in 2003 and MS in Web Intelligence from Ecole des Mines of Saint-Etienne, France, in 2004. He obtained his PhD in Computer Science in 2008 with the University of Luxembourg and the Ecole des Mines of Saint-Etienne. Since August 2008, he is Scientific Collaborator in the Computer Science and Communications research unit (CSC) of the University of Luxembourg. His current research interests include nature inspired algorithms and multi-agent systems for tackling green computing, bioinformatics and mobile ad hoc networks problems.

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The increasing complexity of recent systems and networks has raised new concerns in terms of security, reliability and trust. Indeed, the past few years have seen a significant increase in cyber attacks on the internet, resulting in degraded confidence and trust in the use of internet and computer systems. The same way, there is an increasing demand for measures to guarantee the privacy, integrity, and availability of resources in distributed

systems, such as grid and P2P systems. Further, as heterogeneous computing systems like grid and cloud become larger and larger, reliability issues of such systems need to be addressed. For the execution of applications in these systems, it is becoming increasingly important to provide reliable scheduling by evaluating the reliability of resources.

These new problems require dependable systems and networks, which can intelligently react to abnormal situations and ensure the security, reliability, quality and trustworthiness of the information. In the case of reliable scheduling two important issues need to be considered, how to evaluate the reliability of a resource and how to perform reliable scheduling based on the reliability information of a resource. Metaheuristics provide a way to develop such techniques, algorithms, protocols and tools in the different aspects such as authentication, access control, availability, integrity, privacy, confidentiality and non-repudiation as they apply to both networks and systems.

This special issue convenes researchers in the areas of security, reliability, trust and metaheuristics. We collected five high-quality papers with the most recent advances in metaheuristics (evolutionary algorithms, ant colony algorithms, particle swarm optimisation, etc.), which are applied to security, reliability and trust.

The paper by Miloud-Aouidate and Baba-Ali proposes a memetic algorithm for the accurate K-nearest neighbour classification for intrusion detection systems. The developed technique is the result of enhancing a specialised genetic algorithm with a problem specific local search method. The algorithm was tested on a well-known database, and it was evaluated according to its accuracy, detection rate, and false positive rate. Results show a high detection rate while reducing the false positive alerts, compared to other state-of-the-art techniques.

In the paper by Dridi et al., authors apply a hybrid genetic algorithm to improve coastal security and safety challenges through the optimisation of large volume surveillance missions. A new multi-objective problem is defined with the goals of minimising the total surveillance missions length and the cost. The proposed approach is compared versus other state-of-the-art techniques, outperforming them, and solutions obtained are validated through the Inform Lab simulator.

'A simulation method for network performability estimation using heuristically computed pathsets and cutsets', by Robledo and Sartor, proposes a novel approach for network performability estimation in stochastic networks where links fail independently with known probability, which for instance finds applications in VoIP or vehicle/packet routing applications. The authors propose two contributions: a Monte-Carlo-based method based on *d*-pathsets and *d*-cutsets that reduces the variance of the estimator, and a set of heuristics to generate these pathsets and cutsets. Experimental results on three network topologies demonstrate the performance superiority of the approach compared to crude Monte Carlo.

Risso and Robledo, in their paper titled 'Using GRASP for designing a layered network: a real IP/MPLS over DWDM application case', design a GRASP algorithm to find good quality solutions for the network design problem arising from the deployment of an IP/MPLS (multiprotocol label switching) network over an existing transport infrastructure. The aim is to find a minimum cost installation of links such that traffic demands can resiliently be accomplished. The algorithm is validated on real-world network scenarios for a telecommunications company. Results computed by the proposed approach allowed the company to reduce over 30% of the infrastructure cost.

In the paper by Yassa et al., authors propose a multi-objective genetic algorithm for the problem of scheduling workflow applications on cloud computing optimising several quality of service objectives, namely computation time, cost, reliability or security. The proposed algorithm is able to handle a large number of workflow scheduling aspects such as deadline and budget. Experimental results using data from Amazon elastic compute cloud and workflows from London e-Science Centre show that the proposed algorithm outperforms state-of-the-art algorithms, both in terms of solution quality and running time.

Finally, the guest editors would like to deeply thank the Editor-in-Chief of the *International Journal of Metaheuristics*, Prof. Sergio Nesmachnow, for providing the opportunity to organise this special issue and for his continuous support. We also thank the Inderscience Publishers team for its professional help and the anonymous reviewers who helped in selecting the five articles for this special issue. Last but not least we are very grateful to the authors for their excellent contributions. We sincerely hope that the readers will find the selected articles very useful and valuable.