Editorial

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In areas such as engineering, economics, and insurance, real-world systems are becoming increasingly complex to analyse due to their global scale as well as to the uncertainty and dynamic conditions that characterises realistic scenarios. This increasing complexity makes risk analysis and analytic (RA&A) methods more important than ever, since being able to design, develop, and operate real-live systems while assessing and reducing their risk of malfunctions or inefficiencies constitutes one of the most relevant challenges in our current society.

RA&A methods and techniques have rapidly evolved over the last years. One factor that explains this development is outstanding and continuous improvement in software and computing power, which facilitates the use of hybrid algorithms combining risk/reliability principles with modern optimisation and simulation frameworks. Another factor is the increasing use of problem solving approaches that benefit from the so-called 'big data' phenomenon. However, despite these significant advances in this scientific arena, there seems to be an important gap between theory and practice; most industrial sectors (including engineering, economics, and insurance) are only starting to employ the full potential of state-of-the-art scientific advances in RA&A.

This special issue aims at providing a set of selected articles which describe different RA&A methods and techniques that can be applied in realistic scenarios related to engineering, economics, and insurance. Most of the papers composing this special issue have been carefully selected from the articles presented at the 2015 International Conference on Risk Analysis (ICRA6), an international forum for disseminating recent advances in the field of RA&A, with applications for the risk assessment and the risk management in economics, engineering, and insurance, among other fields. The ICRA6 was held in Barcelona (Spain), on May 26–29, 2015.

An overview of the selected articles is given next:

- In ‘On effects of asymmetric information on non-life insurance prices under competition’, Hansjörg Albrecher and Daily-Amir Dalit examine the effects of asymmetric information about risk profiles on the pricing mechanism of a competitive insurance market. They use Bayesian Nash and Stackelberg equilibrium concepts to quantify these effects in an extension of a previously proposed game-theoretic model. A series of numerical experiments contribute to illustrate several scenarios in which uncertainty can be beneficial, and others where market participants have incentives to be transparent to their competitors.
- In ‘Cost risk analysis and learning curve in the military shipbuilding sector’, Abderrahmane Sokri and Ahmed Ghanmi analyse the learning curve risk associated with military shipbuilding projects and discuss the corresponding cost contingency. In order to represent the learning curve risk, the authors use a probabilistic risk approach, and illustrate their methodology throughout a case study using a military shipbuilding project.
- In ‘Uncertainty in basic short-term macroeconomic models with angel-daemon games’, Joaquim Gabarro and Maria Serna propose the use of an angel-daemon framework to develop an uncertainty analysis of short-term macroeconomic models. The framework specifies a strategic game where both the angel and the daemon act selfishly. An uncertainty profile, presenting a short and macroscopic description of a perturbed situation, is considered, and the Nash equilibrium on these games provides stable strategies in this situations, thus giving a natural estimation of uncertainty.
- In ‘Clustering and hitting times of threshold exceedances and applications’, Natalia Markovich analyses exceedances which determine the risk of hazardous events, such as climate catastrophes, huge insurance claims, or the loss and delay in telecommunication networks. Since these exceedances are usually correlated, they tend to occur in clusters. Accordingly, the author derives an asymptotic distribution and a limit expectation of the first hitting time to exceed a user-defined threshold. Applications in large-scale networks such as social, telecommunication, and recommender systems are also discussed.
- In ‘Execution time distributions in embedded safety-critical systems using extreme value theory’, Maria Padilla et al. propose a set of techniques to predict the worst-case execution time behavior of software programs in the case of embedded safety-critical systems. For that, they use extreme value theory to estimate a high quantile for different types of execution time distributions observed for a set of representative programs for the analysis of automotive applications. The authors apply their method to a set of benchmarks of automotive data to predict the maximum execution time of the analysed programs.
- In ‘Risk aware intelligent system for insider threat detection’, Sarala Ramkumar et al. propose an intelligent risk-aware decision support system that identifies the presence of insider threats and their intensity in an organisation. The decision support system aims at monitoring users who access internal assets and quantifies the risk that this accesses impose on the assets. Thus, the system is able to identify malicious insiders, as well as the intensity of their maliciousness, based on the cumulative trust of the user, which is computed from historical data. A case study, regarding a banking system, is also considered to better illustrate the concepts.

The guest editors of this special issue hope that the selected articles will be able to arise the interest of the *IJDATS* readers in RA&A methods and applications, especially in the aforementioned fields. Finally, we would like to thank the authors of the articles and also the anonymous referees for their invaluable collaboration and prompt responses to our requests.