Welcome Message from the Editor-in-Chief

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On behalf of the Editorial Board, I welcome you to the inaugural issue of the EAI Transactions on Self-Adaptive Systems! We are delighted to launch this new transactions journal after a preparatory process that has received encouraging support from the Editorial Board and from EAI.

The "EAI Transactions on Self-Adaptive Systems" begins with the tremendous ambition to bring the information technology we know today closer to the "autonomic culture" we are about to face tomorrow. In other words, our efforts will be to make out of this journal a bridge towards the future. The future where self-adaptive systems will be reality, and where they will relentlessly assist us in our daily lives, industry, science, and exploration of the last frontiers on Earth and new frontiers in space.

A large class of software-intensive systems, including those for industrial automation, consumer electronics, airplanes, automobiles, medical devices, and civic infrastructure, must interact with the physical world. More advanced systems, such as unmanned autonomous systems, don't just interact but also perceive important structural and dynamic aspects of their operational environment. To become interactive, an autonomous system must be aware of its physical environment and whereabouts, as well as of its current internal status. This ability helps software-intensive systems sense, draw inferences, and react by exhibiting self-adaptation. As software is used for more pervasive and critical applications, support for self-adaptation is increasingly seen as necessary in avoiding costly disruptions for repair, maintenance and evolution of systems.

A common understanding about the process of self-adaptation is the ability of a system to autonomously monitor its behaviour and eventually modify the same according to changes in the operational environment or in the system itself. A good example of self-adaptive systems can be addressed to contemporary robotics systems that rely on the most recent advances in automation and robotic technologies to promote autonomy and self-adaptation to robotized systems.

The paradigm of self-adaptive systems is closely related to AI, which makes the research and development of such systems extremely challenging and demanding. This is eventually the main reason why today we are just a bit closer to their realization, than we were 13 years ago when Paul Horn coined the term "autonomic computing". Another reason why we witness such a slow progress is the lack of practical focus in research and development, and the lack of thrust in industry.

This journal is meant to play a major role in focusing autonomic computing research and development towards practical results, yet carrying real value for industry.

The "EAI Transactions on Self-Adaptive Systems" seeks contributions from leading experts from research and practice of self-adaptive systems that will provide the connection between theory and practice with the ultimate goal to bring both the science and industry closer to the "autonomic culture" and successful realization of self-adaptive systems. Both theoretical and applied contributions related to the relevance and potential of engineering methods, approaches and tools for self-adaptive systems are particularly welcome. This applies to application areas and technologies such as:

- adaptable user interfaces;
- adaptable security and privacy;
- autonomic computing;
- dependable computing;
- embedded systems;
- genetic algorithms;
- knowledge representation and reasoning;
- machine learning;
- mobile ad-hoc networks;
- mobile and autonomous robots;
- multi-agent systems;
- peer-to-peer applications;
- sensor networks;
- service-oriented architectures;
- ubiquitous computing.

It also holds for many research fields, which have already investigated some aspects of self-adaptation from their own perspective, such as fault-tolerant computing, distributed systems, biologically inspired computing, distributed artificial intelligence, integrated management, robotics, knowledge-based systems, machine learning, control theory, etc.

This inaugural issue presents five invited contributions.

The first article, by A. Nhlabatsi et al., addresses the security issues of self-adaptive systems by presenting an approach for using traceability information, enriched with causality relations and contextual attributes of the deployment environment. The demonstrated approach provides users of cloud applications with better information, explanations and assurances about the security decisions made by a self-adaptive system.

The second article, by C. Schneider et al., contributes to the problem of autonomous fault detection. The paper compares the effectiveness of several types of stochastic primitives using unsupervised learning to heuristically determine the root causes of faults.

The third article, by M. Puviani et al., is about the development and application of patterns for self-adaptation. The authors classify such patterns by using a special taxonomy and simulate the described self-adaptation patterns, in order to better understand the concrete and real features of each pattern.

The fourth article, by T. Göthel et al., describes a design pattern for distributed adaptive real-time systems using the process calculus Timed CSP. The approach enables modular verification, based on the notion of process refinement in Timed CSP. The presented approach is especially important in the industrial development of adaptive systems using languages like SystemC.

Finally, the last article, authored by myself, presents an approach to Autonomy Requirements Engineering (ARE) that targets the integration and promotion of autonomy in software-intensive systems by providing a mechanism and methodology for elicitation and expression of autonomy requirements. This approach relies on the KnowLang formal language to specify captured autonomy requirements. To demonstrate both the ARE's and KnowLang's ability to handle autonomy requirements for self-adaptive systems, the approach is applied to Science Clouds, a self-adaptive cloud platform.

For the preparation of this first issue, I would like to acknowledge the work of all our Editors, reviewers, and invited authors who have positively supported this publication initiative. Special thanks go to the Editors Diana Spears and Genaina Rodrigues for their great support and valuable suggestions.

The Editorial Board will be happy to receive from our readers any suggestions, including possible proposals for future special issues, which may contribute to further maintain the high scientific quality and relevance of this journal. We hope you will find this first issue thought-provoking for your research in the field of Self-Adaptive Systems and worth-considering for your future dissemination work.

About the Editor-in-Chief

Dr. Emil Vassev received his M.Sc. in Computer Science (2005) and his Ph.D. in Computer Science (2008) from Concordia University, Montreal, Canada. Currently, he is a Senior Research Fellow at Lero-the Irish Software Research Centre, University of Limerick, Ireland where he has led and is currently leading a few important projects including the Lero's participation in the ASCENS FP7 project, the Lero's joint project with the European Space Agency on Autonomous Software Systems Development Approaches, and the Lero's contractual project with the European Space Agency and Gaisler AB of Gothenburg, Sweden on a new back end for the Open Source LLVM compiler library to enable it to be used for the LEON chip family.

Dr. Vassev's research focuses on knowledge representation and awareness for self-adaptive systems. A part from the main research, his research interests include engineering autonomic systems, distributed computing, formal methods, cyber-physical systems and software engineering.

Dr. Vassev has published three books and over 120 internationally peer-reviewed papers, including the recently published book on "Autonomy Requirements Engineering for Space Missions". As part of his collaboration with NASA, Vassev has been awarded one patent with another one pending.