Special Issue on Model-Based Systems Engineering for Next Generation Enterprise Information Systems
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The full papers will be subjected to a double blind review (or to a second round of review if necessary). The full paper version shall follow the Journal author's guidelines and will be submitted to the to the journal website indicating the following article type: "S.I. : Model-based engineering for next-generation EIS".

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Background and Motivation

Transformation of the environment in which Enterprise Information Systems (EIS) are operating today is posing the new challenges to their modeling, design, implementation and use. One of the crucial circumstances of this transformation is removal of their traditional boundaries. The challenges arising from the increased requirements for flexibility in enterprise collaboration put a lot of pressure to the research on EIS integration and interoperability; they also urge for tools and approaches for rapid and active adaption of those EISs to the changing environment . The research and development of multi-agent systems paradigm are enabling EISs with multiple identities which are now representing enterprises in the digital space. The development of the Cyber-physical networks and the Internet of Things expanded the EIS scope, by introducing sensing and location-awareness aspects. The advances in cloud-based computing clearly established the distribution of the EISs' functional and storage capabilities as the default approach to their designs. In a recently submitted position paper, based on the above circumstances, the Technical committee for Enterprise Integration and Networking of the International Federation of Automatic Control (IFAC TC5.3) proposed the concept of the Next Generation EIS (NG EIS), which is federated, omnipresent, model-driven, open, reconfigurable and aware. All these properties imply that the future NG EIS is inherently, natively interoperable.

Goals and Topics

One of the important effects of the foreseen properties, as EISs are becoming more complex, the gap between the problem-level software abstractions of the EIS aspects on one side and their implementations, on another, will significantly increase. This increase will put a lot of pressure on the traditional model-based system engineering (MBSE) theory and practice. In attempt to anticipate the directions for their future development, the special issue aims at addressing the implications arising from the foreseen evolution towards NG EIS. Some of the open problems are described, as it follows:

- Runtime models. Runtime models can facilitate removing complexity from EIS architecture. Hence, in the future, EIS may in fact become core execution platforms which only interpret and execute different models. Is this vision far from reality?
- Context models. The context models can specify the surrounding environment of one EIS, including its behavior and interfaces. They facilitate context-aware applications, capable to respond to the environment's stimuli and then, to adapt themselves and thus diminish the environmental impact to the running system.
- Formal models. Lack of ontological commitment is one of the main obstacles for validation of the designs modeled by the today's system modeling languages and notations. However, despite the strong foundation defined in nineties, ontology languages are not yet used as the tools for system modeling.
- Ontology-driven systems. To which extent current Semantic Web languages are mature to facilitate ontologydriven systems? Are there reasoning performance issues, especially for formal ontologies, or other issues? Are there ontology engineering methodologies to overcome these issues?
- Design-for-interoperability. Interoperability is often defined as "a property of a product or system, whose interfaces are completely understood, to work with other products or systems, present or future, without any restricted access or implementation". Being the inherent property of NG EIS, the interoperability will significantly affect its design and architecture. Which are these effects?
- Models validation. Typically, the models of EISs are extensively large and it is very difficult to query or browse them. More important, in general, there exist no tools for their analysis, e.g. in terms of consistency checking, dependability and completeness.
- Formal models of the business logic. Formal modeling languages are successfully used to model the information artifacts of one EIS. However, there exist very few works which deal with formal modeling of business logic.
- Formal Specification Techniques (FST) (e.g. Z, B, Alloy) are used in the past to address some aspects of the above problem, but with limited integration with widely used formalisms (such as UML, SysUML) and hence, limited impact.
- Model-to-model transformations. Despite many works in the topic, the foundation for specifying model-to-model transformations is not yet built. The model transformations are one of the main facilitators of the systems interoperability - the inherent property of the NG EIS, thus extremely important.
- Model-to-model mapping. Model-to-model mapping deals with semantics representation and knowledge engineering, with a constraint dealt by the inherently multi-disciplinary vision of the design of an information system. The models mapping are one of the important pillars of the systems interoperability.
- CPS and IoT applications models. Cyber Physical Systems and IoT applications introduced new abstractions to EIS modeling and design. How these abstractions work with the existing

system modeling and engineering tools and techniques?

- Demonstration of MBSE approaches in specific domains. Are there evidences of the successful domain or crossdomain applications of the MBSE approaches for information systems that exhibit some of the properties of NG EIS?

Besides the specific topics listed above, the Special issue will also consider other papers of the high quality, with contributions that are moving forward the boundaries of knowledge of the Model-Based System Engineering area.