Guest Editorial:
Special Collection on Ontologies and Semantics in Communication Systems and Networks

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Ontologies and semantics have emerged as a fundamental research topic in the information systems area to knowledge representation, making explicit the meaning of information, to share information and to achieve interoperability between. Thus, ontologies and semantics are being used in different fields such as Semantic Web, e-Business, information integration, data mining, database design, etc. But its use can be extended beyond information systems and can be applied in networked systems. In these systems ontologies can provide the basis for the automation of information exchanges, dynamic configuration of systems, detecting attacks into the systems, reasoning on behaviour and context that allow dynamic and context-aware applications, etc.

The purpose of this Special Collection was to collect innovative and high-quality research contributions regarding the role played by ontologies and semantics in networked systems. This special collection aims to investigate the synergies between these technologies and give insights on the recent advances in these topics by soliciting original scientific contributions in the form of theoretical and experimental research and case studies.

This Special Collection has received a total of 17 submissions. Only 35% of the submissions could be accommodated into the Special Collection, and the publication of various interesting works had to be unfortunately rejected.

A brief introduction to each selected paper is presented in the following paragraphs.

The use of ontologies, agents and semantic information has been considered a long time ago as the silver bullet for knowledge management and electronic commerce (Fensel, 2001). As a proof, the benefits that the application of these technologies can provide to electronic commerce, in the first paper, entitled "Enhancing Agent Mediated Electronic Markets with Ontology Matching Services and Social Network Support" (Nascimento, Viamonte, Canito and Silva), Nascimento *et al* present the AEMOS (Agent-based Electronic Market with Ontology Services) system, which is an agent-mediated e-commerce platform that supports the conversation between heterogeneous agents through the recommendation of ontology alignments that are improved with the information captured in social networks.

However, not only electronic commerce can take advantage of ontologies but also recently its use has been broadened to other fields such as security, privacy and distributed systems as we will

mention next. Thus, in the second paper, entitled "Application of Ontologies and Formal Behaviour Definitions for Automated Intrusion Response Systems" (Mateos, Villagrá, and Berrocal), Mateos *et al* propose an ontology which define all the information and behaviour needed in the intrusion process performed by an Automated Intrusion Response System (AIRS). The authors explain how to integrate it in ontology-based AIRS and present a use case.

Continuing with the contributions in the field of Intrusion Detection Systems, we can also count on the Frye *et al* proposal titled "TRIDSO: Traffic-based Reasoning Intrusion Detection System using Ontology" (Frye, Cheng, and Heflin), where they present a system named TRIDSO, which monitors the network traffic and by using an ontological representation allows the modelling and the detection of complex attacks and attempts of attacks on a network.

In ubiquitous computing infrastructures, context awareness is the cornerstone of adaptive applications (Baldauf, Dustdar and Rosenberg, 2007). Currently, many middlewares manage context information through a centralized server. However, a distributed model can facilitate the development and deployment of this kind of service in a more efficient and scalable way. Regarding this issue, Garcia-Sola *et al* in their paper titled "Reasoning with Modular Ontologies for Context-Aware Applications" (Garcia-Sola, Garcia-Valverde, Muñoz and Botia) present a distributed and modular reasoning architecture based on ontologies where ontology and rules are distributed among context information consumers.

Nowadays the protection of user privacy is the focus of an intense research activity (Smith, Dinev, and Xu, 2011) due to user activity and someone's personal identifiable information can be collected from their browsing activity or communications on the internet. Between the different dimensions that information privacy covers, access control is a fundamental one. Regarding this issue, recently some privacy-aware access control models have been developed. In particular, in this Special Collection, Antonakopoulou *et al* in "An Ontology for Privacy-Aware Access Control in Network Monitoring Environments" (Antonakopoulou, Gogoulos, Lioudakis, Mousas, Kaklamani and Venieris) present an ontology that considers privacy and context aware characteristics derived mainly from personal data protection legislation and constitutes the knowledge base for effective and expressive access control in network monitoring systems.

Finally, in "A Function-Oriented Ontology Tool for Solving Inventive Problems" (Estrada-Contreras, Cortés-Robles, Alor-Hernández, Juárez-Martínez and Rodríguez-González), Estrada Contreras *et al* present how ontologies can be used in the field of inventive problems. Namely, they propose an ontology-based tool oriented to help in solving inventive (innovation) problems and capitalizing knowledge.

Rodríguez-González (Polytechnic University of Madrid), Giner Alor Hernández (Orizaba Technology Institute), Ghassan Beydoun (The University of Wollongong), Ebrahim Bagheri (Athabasca University), Jim Tao (Oracle), Sanjay Chaudhary (Dhirubhai Ambani Institute of Information and Communication Technology – DA-IICT), Mara Abel (Instituto de Informática UFRGS), César A. Marín (The University of Manchester), Jason J. Jung (Yeungnam University), Cleyton Rodrigues (Federal University of Pernambuco), Eila Ovaska (VTT Technical Research Centre of Finland), Antti Evesti (VTT Technical Research Centre of Finland), Fernando M.B.M. Castilho (Pontifícia Universidade Católica do Rio Grande do Sul), Martin Kost (Humboldt-Universität zu Berlin), Hai Wang (Saint Mary's University), Renata Slota (AGH University of Science and Technology), Farid Cerbah (Dassault Aviation), Mario Arrigoni Neri (Universita' degli Studi di Bergamo), Stéphane Negny (Ecole Nationale Supérieure des Ingénieurs en Arts Chimiques Et Technologiques), José M. Álvarez Rodríguez (University of Oviedo), Joel Luis Carbonera (Universidade Federal do Rio Grande do Sul).

References

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SMITH, H.J., DINEV, T. and XU, H. (2011): Information Privacy Research: An Interdisciplinary Review. *MIS Quarterly* 35(4): 989–1015.

Biographical notes

Antonio Ruiz-Martínez is an assistant lecturer in the Department of Information and Communications Engineering at the University of Murcia (Spain). He also serves as ViceDean of Quality Affairs and Innovation at the Faculty of Computer Science. He received the B.E., M.E. and Ph.D. degrees in Computer Sciences from the University of Murcia. His main research interests include electronic commerce, electronic payment systems, security, privacy, electronic government and web services, where he has participated in several research projects in both national and international areas. He has published over 40 papers in journals, conferences and book chapters. He also serves as a technical program committee member in various conferences, and reviewer and member of the editorial board in several international journals.

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