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Adaptive Services for the Future Internet

J.UCS Special Issue

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1 Introduction

The Future Internet has emerged with the aim of creating and promoting a novel infrastructure connected to objects or things of the real world to meet the changing global needs of business and society. It offers Internet users a standardized, secure, efficient and trustable environment, which allows open and distributed access to global networks, services and information.

To be consistently adopted, the Future Internet will be enabled through standards-based notations for messaging, semantics, process and state (such as those RDF, OWL, SOAP, REST and WS-BPEL), enabling distributed systems and entities to be described in a scalable and flexible robust dynamic environment. Multi-tenancy will enable their remote access as Software as a Service (SaaS), by performing the integration into larger networks of communicating software (e.g., a mashup or a plug-in to a Cloud platform). Future Internet applications will have to support the interoperability between many diverse stakeholders by governing the convergence and life-cycle of Internet of Contents (IoC), Services (IoS), Things (IoT), and Networks (IoN). These applications should handle dynamic and continuous change. For example, in the provisioning of services, availability of things and contents, connectivity of networks, and diversity of user devices should be handled. They should also be designed to provide a better user experience, through personalized and context-aware contents adapted to their preferences and where users also play an active part in creating or sharing services.

There is a need for both researchers and practitioners to develop platforms composed of adaptive Future Internet applications and services. In this sense, the emergence and consolidation of Service-Oriented Architectures (SOA), Cloud

Computing and Wireless Sensor Networks (WSN) give broad benefits, such as flexibility, scalability, security, interoperability, and adaptability, for building these applications. Although there are already solutions to host software services and data on remote computers and distributed sensor networks, these typically adopt a simple technical approach to localized scalability and availability strategies. Future Internet systems however, will also need to sense and respond to a huge amount of signals sourced from different entities in real-time. For example, if a non-existence of a signal is detected which normally occurs, this may affect the execution of other services. These events would be produced by IoT and processed in the IoS. In order to build business level events Complex Event Processing (CEP) may be used. CEP allows detecting complex and meaningful events and inferring valuable knowledge for end users. The main advantage of using CEP to process complex events is that the latter can be identified and reported in real time, reducing the latency in decision making, unlike the methods used in traditional software for event analysis. Event-Driven Service-Oriented Architectures (ED-SOA or SOA 2.0) are also being used to respond to events that occur as a result of business processes.

It is therefore the aim of this Special Issue to promote the different aspects of *Adaptive Services for the Future Internet*, emphasizing the importance of governing the convergence of contents, services, things and networks in order to achieve building platforms for efficiency, scalability, security and flexible adaptation.

2 Contributions of the Special Issue

We invited the authors of two best papers, which were presented at the Third International Workshop on Adaptive Services for Future Internet (WAS4FI 2013), to submit extended versions of their contributions to this Special Issue. In addition, an open call for submissions was launched. A total of 22 submissions were received for this Special Issue. Each submission was reviewed by three international experts, and also a second reviewing round followed to ensure that the papers were thoroughly improved with the reviewer comments. Finally the following five quality articles came together for this special issue in the Journal of Universal Computer Science:

- *Dynamic Verification of Mashups of Service-Oriented Things through a Mediation Platform,* by Antonio Brogi, Javier Cubo, Laura González, Ernesto Pimentel and Raul Ruggia.
  In this work, the authors present an approach based on mediation techniques and complex event processing for dynamic verification of compositions of things managed as services.

- *An Event-Driven Integration Platform for Context-Aware Web Services,* by Laura González and Guadalupe Ortiz.
  This paper proposes an ESB-based integration platform which, leveraging its mediation capabilities and a complex event processing engine, allows the construction of context-aware web services.

- *Efficient Multi-Objective Optimisation of Service Compositions in Mobile Ad hoc Networks Using Lightweight Surrogate Models*, by Dionysios Efstathiou, Peter Mcburney, Steffen Zschaler and Johann Bourcier.
  In this paper, the authors propose a surrogate-based multi-objective optimisation approach for exploring trade-off compositions.

- *Internet of Things Aware WS-BPEL Business Processes - Context Variables and Expected Exceptions*, by Dulce Domingos, Francisco Martins, Ricardo Martinho and Carlos Cándido.
  This work proposes the use of context variables to monitor sensor values, as well as a *when-then* language construct to detect and handle changes in these values within business processes.

- *Extending Policy Languages for Expressing the Self-Adaptation of Web Services*, by Haithem Mezni, Walid Chainbi and Khaled Ghedira.
  This paper presents a solution to extend the WS-Policy framework to represent capabilities and requirements of self-* Web services, and also to extend UDDI to store and manage service policies; using ECA-based planning.

3 Referees

We are very grateful to all the referees, listed below, who proceeded diligently with the first and second reviews of the submitted papers.

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