Guest Editorial: Special Section on Requirements Engineering for Services—Challenges and Practices

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SINCE the first IEEE International Requirements Engineering for Services (REFS) workshop took place in the historical capital of China, Beijing, on 23 July 2007, three editions of the workshop have been running as a series at the COMPSAC conference, serving as an interactive forum for in-depth discussion of all issues related to requirements engineering for services. Researchers from the diverse areas of requirements engineering, services engineering, and services management presented and debated major issues, challenges, trends, and technical advances in requirements engineering for services.

Service orientation, first as a rapidly emerging network computing paradigm, and now also a de facto leading business paradigm, has a common feature across all levels, that is, the need to understand and characterize what service consumers want—from socio-technical constraints to the design and provisioning of services. In software and systems engineering, Requirements Engineering (RE) has become established as a critical area, as many system engineering projects fail due to poorly understood, ill-defined, or ill-conceived requirements. Many of the concepts and techniques from Requirements Engineering could potentially be applied to services with the benefit of systematic methods and scientific inquiry. However, service orientation introduces many new challenges.

The success of service orientation as a business and computational paradigm depends on how well the two sides of a service, i.e., service providers and service requesters, can understand the requirements and constraints of each other. Ill-defined and misrepresented requirements of services could lead to poorly designed services or service breakdowns in the worst case. Thus, requirements engineering has a crucial role to play in services engineering. In order to achieve effective service design, publication, discovery, binding, and evolution, there is a dire need for systematic methods and automated facilities to handle requirements for services. Some of the

major questions explored at the REFS workshop series include: Will existing requirements engineering methods and techniques be suitable for a service-oriented environment? What adaptations, extensions, or re-conceptualizations will be needed? How can requirements engineering contribute to a new discipline of services science, management, and engineering? Will service orientation lead to a rethinking of the field of requirements engineering?

Based upon the ranking of papers assigned by the program committee in the workshops, a collection of six research papers from the workshop, together with two main conference papers on relevant topics, were invited to submit a revised and extended version to the *IEEE Transactions on Services Computing (TSC)*. Of these, two papers are included in this first special section on REFS.

A major consideration in service orientation is Quality of Service (QoS). The first paper in this special section is titled "Requirements for QoS-Based Web Service Description and Discovery," contributed by Kyriakos Kritikos and Dimitris Plexousakis. The authors start by introducing what QoS is and the role it plays in Web services management, followed by an analysis of the requirements for semantic QoS-based Web service description and discovery. Next, the paper proposes an approach for producing a semantic-enhanced QoS broker, which complements the existing functional service registry. Finally, the responsibilities of the participants are analyzed.

Requirements monitoring has always been recognized as an important and difficult technical theme in RE research. Service orientation adds an online, dynamic dimension to the requirements monitoring setting. Thus, in the services era, the online monitoring of service requirements becomes even more crucial for the assurance of service functionality and quality. The second paper in this special section, titled "An Online Monitoring Approach for Web Service Requirements" is contributed by Qianxiang Wang, Jin Shao, Fang Deng, Yonggang Liu, Min Li, Jun Han, and Hong Mei. While the first paper emphasizes the importance of nonfunctional requirements for services, this paper focuses on the functional behavior of services. The paper first proposes a pattern-based constraint specification language, WSCDL, which supports the definition of value and event constraints. Then, a framework which supports the automated generation of monitors from the specification is introduced. Tool prototypes, example cases, and experiments results illustrating the proposed technical solution are then described in detail.

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The papers in this special section provide a glimpse into the wide open area of Requirements Engineering for Services, and the many challenges that lie ahead.

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Guest Editors

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