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## Synergy of Services within SOA

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### Abstract

The enterprises need to react promptly and efficiently to any technological or economical demand, despite the fact that globalization causes different-nature challenges nowadays. One of the main technical issues is complicated heterogeneous systems. Mainly, these systems have grown over years, and caused different technological and economic problems. With introducing Service Oriented Architecture (SOA) and its services, it started to be possible for companies to operate against these complications. For this reason, we investigate in this paper the synergy challenges within SOA services, including Web-, Grid-, Peer-to-Peer-, and Cloud-related ones.

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### 1. Introduction

Modern companies have to face many different challenges nowadays because of globalization of business. They have to react quickly and effectively to all kind of requests, whether they are technical or economic nature. A reason, what it makes so difficult for companies to meet the requirements, from a technical standpoint from, are complicated heterogeneous systems. In most cases, these systems have grown over years, and caused a lot of technical and economic problems. Service Oriented Architecture (SOA) came as an approach to help companies

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operate against these problems<sup>1,2,3</sup>. Besides, SOA is an application architecture, in which all functions are defined as independent services with well-defined invocable interfaces, which can be called in defined sequences to form business processes. Thus, in SOA: all functions are defined as services, including business functions, business transactions and system service functions; all services are independent; and, interfaces are invocable, whether the services are local or remote. Furthermore, interworking is one of the main benefits of SOA. But, the vast amount of emerging standards makes it difficult to understand and utilize the potentials of eServices technologies those enabling interworking<sup>34,36</sup>.

Thus, we study in our paper eServices, such as - Web, Grid, Peer-to-Peer and Cloud ones. The first description of them was done briefly described below<sup>4,5</sup>.

Web services assure standards and tools to simplify the integration of information systems and services within the company or with business partners. Acronyms such as SOAP, WSDL and UDDI are the terms when it comes to the integration of information systems<sup>6,7</sup>.

Grid Computing is an attempt to use heterogeneous resources across administrative domains<sup>8,9</sup>. Grid technologies enable the sharing and coordinated use of resources in dynamic virtual organizations. They perform not only file exchange, but also access to computers, software, data and other resources. There are various possible forms of virtual organizations. What unites them is an approach to computing and problem solving based on collaboration in computation and data rich environments<sup>10,11</sup>.

The Peer-to-Peer (P2P) technologies are still not well defined field<sup>4</sup>. It is difficult to describe P2P and delineate it from Client/Server networking. Efforts for defining specifications are made by the P2P Working Group, whereas two standardization initiatives are Jabber and JXTA<sup>4,12</sup>.

The Cloud computing supports both - hardware and system software as well as the use of services over the Internet. There are advantages for both, end users and providers. End users can access the service anytime and anywhere they want. Providers are able to simplify software installation, maintenance and have centralized control over versioning. Furthermore application providers can deploy their product without operating a data-center<sup>13,14</sup>. Cloud computing allows enterprises to share computing resource globally through the Internet, it involves a set of key technologies to address resource sharing based on business requirements<sup>15,16</sup>.

## 2. Synergy or Interworking of eServices within SOA

The synergy or interworking is an ability of systems, applications and services, to communicate, exchange data and files, work together or operate on behalf of one another<sup>4,17</sup>. In the next subsections we analyze in detail the synergy within Web, Grid, P2P and Cloud Services.

### 2.1. Web Services Interworking

There are currently three initiatives, the World-Wide Web Consortium (W3C) initiative, the semantic web services (SWS) initiative and the ebXML<sup>37</sup> initiative working on web services standards. They conform to the same basic operations (publish, find and bind)<sup>18,19,20</sup>. Umaphy and Puro<sup>18</sup> identify the following Web Service standards: WSDL for publishing; UDDI for finding; and SOAP for binding, see Fig. 1. These web service standards and enabling technologies address interworking/interoperability on a technical level. The issue of web service interoperability is addressed at a conceptual level by the W3C's Web Services Architecture shown in the graphic on the next page<sup>4</sup>. The web service architecture involves many stepped and interrelated technologies. There are many ways to visualize these technologies<sup>21</sup>. Based on this web service architecture Tsalgatidou and Koutrouli<sup>4</sup> identified a need for enhanced interoperability in all web service operations. Potential for improvement has been identified is mainly:

- Description should also include semantic information; this would improve interoperability between different web services.
- Management should likewise have a common semantic, which should be understood by the requester and provider entities.

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