Chapter 19
Rule-Based Approach for a Better B2B Discovery

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ABSTRACT
This chapter improves the exchange model proposed in Aklouf and Drias (2008). This model has three levels; the authors focus on the discovery level and how organizations find each other more efficiently through the use of a Web service directory like UDDI. The discovery approach that this chapter depicts strengthens the partner discovery process. With the evolution of organizations’ Web services and their widespread use, searching for them based on what they provide has become a real challenge. A functionality-based Web service discovery mechanism is then necessary since the functionalities are the most important thing partners look for. This chapter presents an approach that targets the discovery of organizations’ Web services according to what they provide to other organizations that might become potential partners using a functionality-based model. The proposed model attempts to express without ambiguity the functionalities of the organization’s Web services operations by using an ontology. Moreover, the proposed approach exploits expert systems that aim at adding new business functionalities to Web services according to their rule-base defined by the organization knowledge engineer or the system administrator. The authors have also added a semantic layer between the ontology and the expert systems to make them more ontology-aware. A JAVA implementation has been done to validate the authors’ proposal.

INTRODUCTION
As B2B architectures become increasingly more complex though the discovery of what organizations provide is still limited, the actors in a B2B exchange should know what other organizations provide in terms of their Web services functionalities to choose the appropriate partners to deal with. The classical discovery process is made through Web services directories like ebXML and UDDI which
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are a bit limited in describing the Web services functionalities and what they provide to other businesses.

Web services discovery and ontology usage have become a must in business to business (B2B) interchanges, we noticed this need through some B2B-related works (Aklouf, Y., Pierra, G., Ait Ameur, Y., & Drias, H., 2005). The necessity to discover and publish Web services in a centralized environment has given birth to the UDDI standard (UDDI specification, n.d.) that allows the Web services publication and discovery. This standard has become very popular since it permits the publication and diverse discovery methods of Web services, but the evolution of the business world has provoked a set of critics on that standard, these critics are numerous, we’re going to state some of them that we have addressed on this chapter.

The Web services discovery with UDDI is purely syntax-based, this made the UDDI registry little efficient with the evolution of the users’ requirements, in a business environment, it would be well to introduce some discovery mechanisms that are more accurate and less ambiguous.

The diverse searching modes provided by the UDDI inquiry API (tModel name, business name, service name, etc…) don’t always reflect the Web service functionalities. It would be useful to have a formal way to look for the functionalities provided by the Web services.

The Web services publication methods provided by the UDDI publish API don’t imply a formal model to express what the Web services provide to users (business capabilities), thus, the discovery of the Web services functionalities can’t be performed efficiently.

Numerous related works have been done to improve the UDDI registry by integrating some semantic Web techniques, for example the approach (Sivashanmugam, K., Verma, K., Sheth, A., & Miller, J., 2003) aims at introducing semantic annotations within the description of the Web service (WSDL) (Patil, A.A., Oundhakar, S.A., Sheth, A.P., & Verma, K., 2004). This led to a semantic discovery of Web services (WSs) based on multiple parameters (IOPE: Input, Output, Pre-condition, Effect), this model has the advantage of allowing a semantic Web services discovery but the WS publisher must be aware of the semantic specification in order to make his Web services reachable with a semantic discovery, in addition, this approach doesn’t express efficiently what the Web service really provides to users.

Another approach has been proposed (Patil, A.A., Oundhakar, S.A., Sheth, A.P., & Verma, K., 2004), it consists of publishing for each Web service its corresponding DAML-S profile that contains pertinent information concerning the Web services like the IOPE, this approach is efficient, but it doesn’t adhere to the WSDL standard which represents the WS description. Moreover, the Web service publisher must know how to describe his Web services with DAML-S.

Multiple other related works have been done like Akkiraju, R., Farrell, J., Miller, J., Nagarajan, M.Schmidt, M., Sheth, A., & Verma, K. (2005); Benna, A., Boudjlida, N., & Talantikite, H. (2008); and Aklouf Y., & Drias, H. (2007) which tend to integrate the semantic Web with the Web services technology, in order to have a semantic-based Web services discovery, but these approaches still remain incapable to truly express the functionalities provided by the Web services.

In our approach, we focus on what the Web services provide (their functionalities or business capabilities), to achieve this, we have proposed a formal model to express the Web services functionalities supported by an ontology. We have also made the discovery more dynamic by introducing expert systems that aim at adding new capabilities (functionalities) to the Web services.

This chapter begins with an overview of the exchange model we want to improve, then, we present a brief description of the approach objectives. These objectives are detailed from section 4 to section 8, we present the conceptual architecture of the proposed approach in section 9. Section 10