Chapter 19
Semantic Web Services-Based Knowledge Management Framework

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ABSTRACT

In this chapter, a Semantic Web services-based knowledge management framework that enables holistic knowledge management in organizations is presented. As the economy is becoming one single global marketplace, where the best offer wins, organizations have to search for competitive advantage within themselves. With the growing awareness that key potentials of an organization lie within its people and their knowledge, efficient knowledge management is becoming one of key focuses in organizational activities. The proposed knowledge management framework is based on Semantic Web technologies and service-oriented architecture, supporting the operational business processes as well as knowledge-based management of services in service-oriented architecture.

INTRODUCTION

In modern global economy it is very hard for organizations to retain competitive edge over competitors. To be able to succeed in this highly competitive environment, organizations have to find value added in themselves and transform that to the market. Many authors are discovering, that organizations' greatest asset are their employees and knowledge they possess (Bergeron, 2003). In this manner knowledge management is becoming one of core processes in daily life of modern enterprises. Information technology can provide means to better acquire, organize and use knowledge in organizations.

By analyzing modern information systems, we have found a gap between technology and needs that arise in organizations (Zack, McKeen & Singh, 2009). It is not uncommon, that technology is being push factor for changes in organizations. While this is positive in some situations, it often has negative impact over time. The danger is that information

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technology could become the purpose for itself and it would not support business processes and business opportunities in a way that maximizes organizations' success and effectiveness (Zack, McKeen & Singh, 2009).

We argue that knowledge, not information technology, provides competitive advantage for organizations. In this manner, knowledge should be the driver for changes in organizations. The role of information technology should be to help to identify opportunities, follow and support changes. In this chapter we provide a framework for holistic knowledge management and integration it with modern IT architecture that enables business agility.

We identified two types of knowledge that appear in organizations:

1. Organizational knowledge
2. Operational knowledge

The former is knowledge about the organization itself, its structure and processes, while the latter is knowledge that is used for operational work in the organization. In this manner organizational knowledge is used by management, whose goal is to enable that business processes are able to run optimally, while the role of operational knowledge is to support optimal execution of the business processes.

The other very important element in modern organizations is information technology (IT). The role of IT is in many organizations limited just to support operational knowledge. In our opinion it is at least equally important the support for organizational knowledge. This enables managers to manage IT in such way, that technology supports business processes at the highest rate possible. According to that, management also has to have knowledge about IT implementation in the organization as also about dependency between IT implementation and business processes. We shall call this type of knowledge IT support knowledge.

In this chapter we present a framework that is suitable to capture both organizational and operational knowledge as also IT support knowledge. The framework is built upon semantic web technologies (SWT) that use semantic networks for knowledge representation (Davis, Shrobe & Szolovits, 1993). Because its flexibility and expressiveness, it is possible to model, bind and manage knowledge from different domains.

The framework we present also builds on concepts from service oriented architecture (SOA) that empowers organizational agility by providing flexible and robust architecture (Erl, 2005). By semantically annotating services in a SOA environment, we are able to incorporate knowledge about services in organizational semantic network (Akkiraju, 2006). That way, all three identified types of knowledge are represented in the semantic network. This integrated organization knowledge enables knowledge driven change, while service orientation provides better support for implementing these changes in the organization.

There is some related work done in both functional parts of our framework. Huang and Diao studied ontology based enterprise knowledge integration (Huang & Diao, 2008). The framework that we present in this chapter extends the described architecture by using service orientation concepts (Akkiraju, 2006). There is some related work done also in the field of incorporating semantics into SOA. Most notable are SESA (Anicic, et al., 2007). and METEOR-S (Rajasekaran, Miller, Verma & Sheth, 2005). The main difference to our approach is that they are targeted at open world environment, trying to provide automated discovery and mediation of web service, while our approach is targeted at closed world environment, where mediation is modeled in ontology. Other significant difference is that SESA uses WSMO for implementing SWS, while our approach uses SAWSDL.

The organization of the chapter is as follows. In section 2 we briefly present semantic web