Chapter 13

The Semantic Integration of Information:
A Business Ontology Proposal with Semantic Interoperability

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ABSTRACT

Nowadays, firms need to refocus the way they manage the knowledge generated from business processes in order to optimize their Information Systems' performance. Business ontologies are an excellent tool for this. In this chapter, we briefly treat and highlight how important is companies invest efforts in a closer integration of their systems, with the aim of improving their performance and cooperation. This implies moving towards more efficient systems in their knowledge management. The big challenge for firms now is the semantic integration of information. Essential questions related to this question are synthetically introduced. Then, some of the most significant initiatives and projects on semantic integration of information are presented and compared with a business ontology we have developed for commercial use.

INTRODUCTION

With the first phase of Web connectivity infrastructure consolidation over, the development of electronic commerce is now immersed in a process of vast expansion. Many companies are making economies of scale in order to justify investment, and they demand improved information integration processes. So, the need for process optimization is urgent. More information is required, and more rapidly, to gain better quality knowledge. That is, we are in a phase that requires closer integration

of business information systems to make better use of the enormous quantity of data, by means of an improved and more accurate interpretation of those data. Undoubtedly, this will bring a stark improvement in companies' knowledge generation capabilities (Kambhampati & Knoblock, 2003). Our proposal is based on years of experience around commercial enterprises, with access to their databases, as well as on the analysis of how companies in different branches of industry use Internet (design, electronic commerce, production, electronic administration, integration with clients, suppliers, employees, etc).

In recent years, two facts or situations of great importance have become clear. One, companies increasingly want their information systems to perform better (e.g.: Deveraj & Kohli, 2003). Two, these systems are prone to error, redundancies and even semantic failures, which result in lower quality knowledge (e.g.: Fan et al., 2001). Company data are often scattered over different areas, formats and systems. Such data must be managed by means of processes that are more centralized and sophisticated to exploit their information more effectively and profitably (Lytras & Athanasia, 2006). Therefore, a transition is needed towards systems that are more efficient in their knowledge management.

Many companies that previously used database management systems available in the market in the form of individual software applications have come to manage their information resources via their local networks or the Internet itself by means of the so-called shared environment Intranets, or even sharing information with other companies (associates, clients, suppliers) through Extranets. Today, companies want to grow towards more powerful database management systems able to manage information from the Web, within centralized environments and with the need to integrate as much as possible (e.g.: Su et al., 2006). It is also known that companies see information as a highly valuable asset. To keep this information from its various sources and between companies fresh and integrated is of the utmost importance today. Therefore, applications created especially for working in these environments are necessary, as is a data vision that is new and integrative.

Likewise, companies need to optimize the internal management processes of their resources, which normally leads to changes in the structures of information and the applications used. This involves making databases, tables, attributes, restrictions, etc, compatible. The need for the integration and reorganization of data sources is also evident (de Bruijn, 2004) in the case of the adoption of solutions developed by third parties, for example, SAP, Navision, etc.

The main contribution of this paper is the development of an ontology from a set of company databases to integrate information sources for the companies and to contribute to the logical treatment and strengthening of current databases. The ontology fits between commercial and managerial. This ontology has a series of characteristics that make it highly appropriate for solving current problems of homogenization and integration revealed by the Semantic Web project. The ontology contributes solidity to the renewal processes through which the company modernizes its information systems at the same time that it integrates its various sources into an information model that is coherent, consistent and shared with the other associated companies and with clients and suppliers.

The paper is structured as follows: first, we present various questions related to the background on which our proposal is based, that is: the Semantic Web, the semantic interoperability needed for the integration of information between systems, as well as the role of the ontologies in this process. Then, in section 3, the business ontology we have developed is presented in full. In section 4, we compare our ontology with other important business ontologies. Finally, we present our conclusions and plans for further research.

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