Chapter XX
POVOO:
Process Oriented Views on Ontologies Supporting Business Interaction

Eva Gahleitner
voestalpine IT GmbH, Austria

Wolfram Wöß
Johannes Kepler University Linz, Austria

ABSTRACT

Ontologies still lack in including and considering the dynamic aspects of business processes. Therefore, existing ontology-based information systems provide only static information which does not suit the actual working context of a user. In this project we extend information retrieval techniques with ontologies through a process oriented view on ontologies (POVOO). The purpose is to satisfy a user with information that depends on the current process the user is working on. Due to a context aware approach, it is possible to adapt the information to the user's current working situation dynamically. We introduce a methodology for generating views on ontologies and we illustrate how an application can use them to query highly specialized knowledge bases.

INTRODUCTION

Ontologies are widely used in the area of computer science, but did not really step into the area of commercial business engineering. Semantic enrichment has an important impact in the business process area to gain a representation of the knowledge which is nowadays implicitly defined in single processes or a business process chain. In this context the emphasis is on machine-based interpretation of processes and, ultimately, autonomous operation. This is equally important to reach the global goal of autonomous business interaction. Context aware systems which are able to interpret business processes automatically based on the semantics they represent, are a prerequisite for this challenge.

Whereas in the field of information retrieval (IR) ontologies emerged as a major support for improving the recall and precision of search mechanisms, they only play a subordinate role in process modeling. Within business process modeling, ontologies are used to represent explicit formal specifications of the terms in the entire process management domain and relationships among them. Nevertheless, in daily work business processes are often the starting point for software development and define requirements for software systems. Research and industry have addressed the alignment of business processes and information technology (IT) only marginally. This leads to separate modeling areas: one for information management and retrieval and one for business engineering.

Ontology-based query techniques suffer from a number of disadvantages which have major impacts on their usage in business process modeling:

- Ontologies provide a single monolithic structure; splitting them up into small units is hardly possible.
- Ontologies do not consider dynamic aspects. A process is typically characterized by a dynamic sequence of events and operations. The need for knowledge may change according to these different process events and operations. For example, a technician who designs a new car engine needs information which is different from the information a worker at the assembly line or a car dealer requires for the customers.
- As the size of the ontology raises, so does the complexity of its structure and therefore the complexity for a user to find the right concepts (highly specialized ontologies in medicine like UMLS (2006).
- The context in which a user (an employee in a department, a user of a software application, etc.) works determines the user's view on the available knowledge. Much work has already been done in the field of context-based ontologies for certain users or user groups, but little for particular views on knowledge in the context of business processes (Abecker, Metzas, Legal, Ntioudis, & Papavassiliou, 2001).
- One structure does not fit all: information can not easily be categorized within a single (tree) structure, so that users will always find what they are looking for. This is due to the multidimensional nature of the information. Any piece of information can be categorized according to one or more facets. Such a multi-faceted categorization better reflects the different viewpoints one can have on a single piece of information.

In this work we introduce our approach to integrating views on ontologies in the information retrieval process with specific consideration on business processes. The acronym POVOO stands for process oriented views on ontologies. The purpose of POVOO is to satisfy a user with information that depends on the current process the user is working in. We propose a context aware solution which considers a user's working process and the corresponding information required by a user during certain tasks in this process. For example, when office workers are working on a specific task, they are working in a certain context, thus only specific information is necessary to get the work done. Working contexts differ according to the required information and the involved people. This characteristic of work is exploited in the IR mechanism of our approach where views on ontologies represent the working contexts. In this way the system can search and present relevant information in the current context.

For highly specialized knowledge bases which can be found, for example, in medicine or biology, we assume that the information itself, which is relevant to execute a certain task (the documents in a knowledge base), stays the same, whereas the relationships, the various specialization and generalizations, the integration of various concepts in a new one, the ordering of the concepts, and so forth, may differ depending on the user or the actual business process step. We therefore emphasize an approach which uses ontologies not only as simple vocabulary to define a lingua franca in business process engineering but rather as a way