Simple Back-end Services for Corporate Semantic Web

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Abstract. In order to be adopted within corporate environments, Semantic Web applications must provide tangible short-/medium-term gains. Although corporate Semantic Web offers enterprises new possibilities for enhanced integration of heterogeneous business data, information discovery, and advanced automation of tasks, a cost-benefit analysis is in any case essential. In this paper, we argue that the main costs of ontology development and maintenance can be reduced by either licensing the use of that ontology by other organizations or by outsourcing those tasks to external providers. We also briefly point to the short-/medium-term benefits of corporate Semantic Web arising in the areas of data integration, semantic search, and personalization. This paper concludes with an example of a real-world company providing back-end services for corporate Semantic Web.

Keywords: Corporate Semantic Web, Semantic Web Applications, Cost-benefit Analysis.

1 Introduction

Companies overwhelmed with heterogeneous data from their intranets and with information from the Internet seek innovative approaches for managing and utilizing knowledge required for their business processes. In this regard, Semantic Web may offer promising solutions for many lines of business.

Nonetheless, the global deployment of the Semantic Web vision [1] still remains unfulfilled, facing some unresolved problems like scalability, broader adoption of commonly shared ontologies, and trust issues. However, since the corporate world offers a controlled environment, many of those current dilemmas do not arise there: information can generally be trusted, adoption of common ontologies can be enforced more easily, and there are much looser requirements regarding scalability.

By focusing on the application of Semantic Web technologies within a controlled corporate environment we contribute to the further maturing of those technologies. Furthermore, we aim at providing enterprises with scientific and application oriented solutions for improving their competitive advantages through enhanced knowledge management and discovery of semantically rich data.

In the era of the information society a long-lasting competitive advantage of business organizations greatly depends on the ability to create, manage, and effectively use corporate knowledge. Semantic Web Technologies offer new possibilities for enhanced integration of heterogeneous business data, information discovery as well as advanced automation of sophisticated tasks [1] [7]. The realization of Semantic Web applications requires semantically rich formalizations of business data based on commonly shared and well defined concepts in form of ontologies. In a corporate setting, the process of creating and utilizing ontologies occurs in a collaborative manner, involving individuals playing different roles within business enterprises and having various degrees of domain knowledge.

In order to be adopted within corporate environment, however, Semantic Web applications must provide solutions to perceived problems or methods to exploit perceived opportunities. Mere innovation is not enough.

2 Corporate Requirements

From the corporate perspective the introduction of Semantic Web applications must result in tangible gains like expansion of business, a wider set of business opportunities, or cost reduction of current business processes. This can be realized by providing a superior level of service. Moreover, in order to gain acceptance within enterprises, Semantic Web applications should quickly evolve into something perceived as indispensable, conferring benefits on their users without extra costs or steep learning curves [8]. Although, there are evident opportunities for knowledge-based tasks or enterprises to improve their performance once information sources are integrated and more intelligent information processing is automated, a cost-benefit analysis is in any case essential [3].

2.1 Costs

There are different kinds of costs enterprises are facing when planning to embrace Semantic Web technologies [8]. This requires resources for the development of smart ontology formalisms that are representationally adequate but also, which is even more challenging, their population with content of sufficient depth to provide utility in a real-world scenario [4]. Such a process, for most organizations, is associated with steep learning curves and therefore very costly. Moreover, the migration costs include resources to support the annotation of legacy data, much of which, in corporate context, is stored in relational databases. There is a risk for many enterprises that all of those efforts may generate hefty sunk costs which may prove an extensive barrier to future change.

The maintenance of ontologies is another cost-driving factor, which has to be taken into account, especially in very dynamic domains, where ontologies have to be updated rapidly [4]. Although this area is the focus of research efforts [6], it is still unknown how expensive ontology maintenance would be over time.

For enterprises, there are some possibilities of reducing the costs of developing and maintaining Semantic Web applications. This can be achieved by increasing the user

base through supporting the emergence of communities of practice within or across companies. Moreover, once an ontology has been developed the sunk costs can be offset by licensing the use of that ontology by other organizations from the same domain, provided that the ontology itself does not generate a competitive advantage. Respectively, an organization may also decide to outsource the task of ontology development and maintenance.

2.2 Benefits

The adoption of Semantic Web technologies within business enterprises requires discernible benefits for those organizations. Such benefits may arise from better service quality leading to expansion of business, a wider set of business opportunities, or optimization of business processes. Whereas Semantic Web applications developed in academic research are mostly concerned with long-term benefits arising from network effects, business organizations are rather interested in short-/medium-term and individual gains, independent of any future network effects. This, however, does not mean that network effects should be overlooked.

The areas within organizations which would benefit most from the adoption of Semantic Web technologies are data integration and semantic search [2] [7], which, as argued, could be accommodated with technologies for knowledge extraction, ontology development and mapping. An integrated information system would be able to manipulate data from heterogeneous corporate sources and using background knowledge represented in ontologies make inferences that were not possible before.

Moreover, semantically rich data can be matched against RDF statements representing personalized profiles to generate recommendations or targeted products. Since customers tend to be more loyal to personalized services [3], such increase in service quality is likely to create another benefit in form of a competitive advantage.

3 Ontonym: Example of a Supplier of Semantic Back-end Services

As was argued above, the costs of developing and maintaining ontologies and services which are based on them can be reduced if this task is either outsourced or if they can be licensed. An independent company which provides ontologies for an entire market segment on the other hand can even deliver its services to competing companies. Let us look how these theoretical considerations map into a real company providing services for Semantic Web applications: Ontonym.

3.1 Costs of Search in Intranets and Portals

Still the results of today's search technology are rather poor, since it does not use background knowledge. Whether search is performed on the internet, within specialized portals or a company's intranet, current search technology leads to a waste of time on the side of the searcher. An IDC report [5] has determined that about 35% of searches within an intranet are wasted. The same report determined that employees

search about 9.5 hours per week for information, of which 3.5 hours lead to no result. Of course, searching for information within a company is only partially a task which is performed with unintelligent search functions. Assume that only 10% of this time could be saved by more intelligent search functions and by using a bit of arithmetic you have found a way to cut down the costs of your enterprise.

If we look at topic specific Internet portals, the situation is not much different. But since the searchers are not employed by the portal provider, higher search efficiency is not an argument for providing a better search functionality. An informal survey between users of job markets in the beginning of 2007, done by the authors, has shown that about 95% of the users would migrate from their favorite job market to a job market which delivers better search result. Obviously, a high churn rate leads to more users, which makes a portal more attractive for paying customers.

3.2 Modelling the Background Knowledge

Building better search and comparison processes means that background knowledge has to account for the language use of users and authors. This means that the relationship between terms needs to be modelled from the users and authors point of view, especially, for the sub-term and synonym relationships. Modelling those relationships is far more than finding the right thesaurus or dictionary and pulling these relationships out. The usage context of these terms needs to be taken into account by the knowledge engineers modelling the background knowledge. Hence, they need to have experience with search processes and need to look at the application domain from a laymen's point of view. E.g. all the German terms „Projektplaner", „Projektant", and „Projektentwickler" are used in job offers or CVs with the meaning "someone who plans projects", even though they will not appear in a dictionary as synonyms.

In order to provide better search functions every company could build the necessary background knowledge on their own. Even if the development and maintenance costs would be reasonable low, this would require, that trained employees exist to perform this task or that the modelling needs to be outsourced. Especially, if the language use of users and authors needs to be taken into account, building such an ontology is still to large parts an intellectual and manual task, which cannot be done completely automatic, but which can be supported by automatic mechanisms.

3.3 Ontonym's Business Model

We founded Ontonym GmbH as a service company in order to perform exactly this task and to provide on this base better search and comparison functionalities for topic-specific internet portals and for companies' intranets. By the time of writing, we have developed an ontology of about 8.600 concepts mainly over jobs, skills, tasks organizational units, and industrial sectors for supporting recruitment processes, job and employee searches.

By modelling ontologies not only for a single customer, but instead for an entire market segment, the ontologies can be developed and maintained efficiently and the development and maintenance costs can be kept low for customers. Moreover, we consider Ontonym as a "business catalyst" which integrates the language use of its customers' users and thus delivers services based on integrated, application-specific ontologies, which none of our customers could build on its own in a reasonable time.

4 Conclusion

Since the corporate world offers a controlled environment, many of dilemmas facing a global deployment of the Semantic Web do not arise there: information can generally be trusted, adoption of common ontologies can be enforced more easily, and there are much looser requirements regarding scalability. In order to be adopted within corporate environment, however, Semantic Web applications must provide tangible gains like expansion of business, a wider set of business opportunities or cost reduction of current business processes. This can be realized by providing a superior level of service. Although Semantic Web Technologies offer enterprises new possibilities for enhanced integration of heterogeneous business data, information discovery as well as advanced automation of sophisticated tasks, a cost-benefit analysis is in any case essential.

The main costs of ontology development and population as well as ontology maintenance may be reduced by either licensing the use of that ontology by other organizations or outsourcing those tasks to external providers and thereby avoiding steep learning curves and hefty sunk costs. The short-/medium-term benefits of corporate Semantic Web arise in the areas of data integration, semantic search, and personalization.

This paper presents an example of a real-world company providing back-end services for corporate Semantic Web. By specializing on development and maintenance of domain specific ontologies, which are utilized for providing enhanced search and comparison functionalities, Ontonym offers companies short-term benefits without the risk of sunk costs associated with ontology engineering.

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