ABSTRACT

Expansion of information and increasing demands on semantic processing Web applications have pushed software systems to their limits. To address this problem, we propose a semantic-based formal framework (ADP) that makes use of promising technologies to enable knowledge generation and retrieval. We argue that this approach is cost-effective, as it reuses and builds on existing knowledge and structure. It is also a good starting point for creating an Organizational Memory and providing Knowledge Management functions.

BACKGROUND

The era we are living in is characterized by an unprecedented explosion of information that is digitized and available to large audiences through online, distributed, and open-ended environments. Presented with it are also opportunities to exploit and benefit from it. Organizations have to quickly adapt to this new phenomenon. Software applications, database and expert systems designed and run by a closed group of software and knowledge engineers who had centralized control over the lifecycle of IT artefacts seem to be outdated. Moreover, the distributed nature of IT systems has experienced a dramatic explosion with the arrival and revolutionary use of the Internet and its associated technologies—hypertext and XML-based
documents, online databases, terminological repositories, Web services, and blogs—which continually challenge the traditional roles of IT in our society.

One promising approach for IT system architects is to use intelligent knowledge management (KM) methods to cope with this expanding nature of distributed systems in a global scale. At the cornerstone of most of these tools lies the buzzwords of semantics technologies that are deployed in the Semantic Web (SW). Semantic technology is a broad term coined recently in the business domain to refer to technologies ranging from ontologies and information extraction on the SW to ebXML schemata and service-oriented architecture based systems. This term enables synergies in distributed systems that automate semantic (meaning) interoperability between processes and services.

The successful blending of semantic technologies with the traditional KM systems starts from a fundamental part of any business: process. For more than 10 years, the values of process-oriented approaches, such as BPR (business process reengineering) and BPI (business process improvement) are well-recognized. Today, it is one of the fundamental steps to radically improving organizational performance. Processes are treated as tangible entities that can be formally captured, analyzed, incrementally, and radically modified to change organizational behaviors and achieve goals. Recent KM that have taken process-oriented approaches are exemplified in Schreiber, de Hoog, Akkermans, Anjewierden, Shadbolt, and Van de Velde (1999) and Abecker, Bernardi, Hinkelmann, Kuhn, and Sintek (1998).

KM is no longer just about identifying and storing knowledge, but also about providing efficient ways to retrieve, disseminates, and use knowledge to achieve goals. It embeds “KM processes” as a part of normal business practices, so no more than necessary efforts need to be spent to benefit from KM. Furthermore, KM as a discipline can benefit from process-oriented approaches. KM tasks can be described in learnable processes that can be compared with business processes, analyzed and improved upon. In addition, in KM, the human is the central issue—they are the key knowledge creators, holders, and users; organizational memories (OM) are often the main tool to hold and provide information central to an organization. In this chapter, we therefore examine the roles played by human, OM, and business processes in an organization and how they relate to each other. We also speculate that formal logical methods, such as the proposed semantic-based Actor, Data and Process-oriented (ADP) framework, can interface these fundamental organizational components to help improve the utilization of an OM, thus leading to organizational performance enhancements. We start our exploration of KM support for enterprise distributed systems by focussing on a core component of many enterprises: the OM.

ORGANIZATIONAL MEMORIES

We witness a shift in the decision support literature from data-oriented processing systems to ones integrated with human intellect and organizational processes (Carlsson & Turban, 2002). These have been studied in the context of KM and OM to provide means for easy access and retrieval of information for users. In parallel, we see recognition that the goals of KM will be most effectively realized through actions connected to normal day-to-day business processes (Breuker & Van de Velde, 1994). This makes it easier to demonstrate value-added contributions to an organization, which is better than isolated KM efforts (Abecker et al., 1998). An ideal OM could assist in effective decision-making, which means information regarding the organization could be made easily accessible.

However, there is little support to help create an OM. It is difficult to identify the right information to include. This process is time-consuming, manual, and error-prone, given the diversity, quality, and quantity of resources to be analyzed for reliability and relevance. Semi-automatic methods do exist, but these are bound to individual technologies. It is always the user who has to initiate search in the OM. But this requires the user to be able to formulate a query, with or without automated help; the OM system must be able to correctly parse this query, retrieve relevant information.