

Informal Learning with Semantic Wikis in Enterprises

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Abstract: Information overload is a severe challenge, both on the Web and on corporate intranets. In order to be productive, organizations and their employees depend on finding information that meets their current demands. Traditional courses or learning management systems are not the right tools, since tasks are short term and frequently shifting. In the paper at hand, we suggest to use Semantic Wikis for the organized provision and efficient retrieval of information, since they have a structured body of information. First, situation and challenges are outlined, informal learning as the central form of learning in organisational context and the social semantic web are introduced, and finally a scenario is given.

Introduction

Since the establishment of the Internet as a global network, the amount of information created worldwide has increased every year. A study conducted by IDC in 2007 shows impressive numbers on information growth (Gantz 07). IDC estimated that in 2006 the total amount of digital information was about 161 Exabyte, which is around 32 times more than reported for 2003 in a Berkley study *How much Information?* (Lyman & Hal 03). IDC also estimated a further increase up to 1 Zetabyte, again a six fold increase, until 2010. Since the emergence of Web 2.0 and its easy to use web based applications, ordinary internet users are empowered to generate content themselves (O'Reilly 04) which significantly contributes to information growth. During the last two years, it has become quite popular to externalize knowledge on the web by using social media tools including amongst others Wikis and Weblogs. While in the past users mostly only consumed information, now they are actively producing content. The enormous growth rate of the blogosphere (Duarte et al. 07) as the collection of all Weblogs on the Web is a clear sign of an age of user generated content. However, information overload does not only exist on the Web. Also, corporate Intranets include amounts information of different types, often unstructured and above all distributed across different repositories. However, for efficiently performing organizational tasks, employees depend on retrieving information artifacts and learning according to their demands, which is a challenging undertaking. The contribution at hand addresses this issue.

Since it is not conceivable that we will overcome the resulting information overload without the help of information technologies, we urgently need tools that help us to cope with the effects of rapid information production. Of course, Information Retrieval and Knowledge Discovery techniques are one option. However, in this contribution, we do not want to go into algorithmic details, but we present how information within the organisation can be prepared with

the help of a Semantic Wiki in order to make it better manageable and more useable. By addressing relations between knowledge objects, a Semantic Wiki helps to structure the created information efficiently and makes it more easily available to the employees. Traditional knowledge systems are not appropriate for supporting employees in their dynamic everyday work, because they are all too static and standardized. For that reason, knowledge discovery, transfer, and acquisition must be organized in a way that makes it easy for the user to survey the loads of information on demand. This approach is in line with the concept of workplace learning (Smith 03, Eraut 04, Ley 05).

In the following sections, we briefly introduce the concept of informal learning, which is a widely used practice in the corporate context as well as Semantic Wikis. In a scenario, we show how a Semantic Wiki supports the employee in discovering, navigating, searching, and acquiring knowledge.

Basic Concepts

Before we describe how a Semantic Wiki might support employees, we introduce and discuss the concept of informal learning and its importance. Also, the basic idea behind a Semantic Wiki and common features are outlined.

Informal Learning

Informal learning usually means unconscious learning in absence of a predefined structure and material (Livingstone 01). Formal learning means that there is a curriculum, that learning happens at the same time and the same place with other people and that in the end there is some recognition such as a degree or certificate. Informal learning is like learning to speak or learning who you are. It happens all the time and is never finished. The most powerful learning technology is human conversation. Social networks are thus vital to informal learning. Since Web 2.0 is all about participation and conversation, and the Web is the greatest convergence of humans ever seen, informal learning is a perfect match for Web 2.0 (Cross 07), especially Social Software as one aspect of it.

Informal learning is not only an idea, but practiced reality. As we know from studies, employees apply less than 30% of the knowledge they have acquired in formal learning situations in a later working context (Robinson 03). About 80% of the knowledge which is required for performing work is acquired in informal learning situations (Raybould 02, Cross 07), and formal learning is only about 10%-20% of learning at work (Cross 03). These figures show that informal learning plays a major role in knowledge acquisition and hence should be supported accordingly. This coincides with what the Chief Learning Officer Magazine states in the Business Intelligence Industry Report 2007 (Chief Learning Officer 07). Respondents estimate the degree to which learning is informal to be up to 70%. Accordingly, there is a growing tendency to support informal learning. Even though classroom training is the most widely used method, at least 40% of the respondents reported a decrease of that method during the last 12 to 18 months prior to the survey, and 72% and 62% expected to increase asynchronous and synchronous eLearning, respectively.

Since knowledge acquisition preferably happens in informal situations, and the Web 2.0 supports informal learning, it is obvious to introduce e.g. Wikis or Weblogs. However, it is important that the often comprehensive and rather unstructured results of conversations and collaboration recorded in Wikis or Weblogs are given structure – not in the sense of a curriculum but in the sense of interrelating information in a way so that its utilization and learning is optimized. This seems to be an easy task at first sight, but is rather complex since it must be done according to the individual application area. In order to meet the claim for structure, we suggest using a Semantic Wiki. We introduce how a Semantic Wiki might support informal learning situations in a corporate context. In the following section, we discuss Semantic Wikis and related concepts, and then introduce a scenario based on a Semantic Wiki.

Semantic Wiki

Both the Semantic Web and Social Software as one aspect of the Web 2.0 are congenial developments with a high technological and functional complementarity (Mika 05). Social Software comprises tools that support human

communication, interaction, and collaboration and includes Wikis, Weblogs, Instant Messaging, Social Bookmarking, Social Media Sharing and Social Task Sharing. While Social Software mostly deals with social connections and human readable content, the Semantic Web deals with formal content and its formal connections (Schaffert 06). Web 2.0 can be associated with a human web, which builds on user generated content, while the semantic web constitutes a machine-readable web of data. In the recent years, there is an increasing convergence between social media and semantic systems (Pellegrini & Blumauer 07). Semantic technologies are used for structuring user generated content: data created by the users is stored in a machine-readable form and annotated according to an underlying semantic logic. We may speak of a Social Semantic Web that uses semantic technologies to support connection, communication and collaboration of users in social networks.

In the case of Semantic Wikis, the inherent structure of a Wiki is made accessible to machines (Schaffert 06a). Semantic technologies such as RDF or OWL extend the Wiki with an underlying structure that goes beyond structured text and hyperlinks. This makes it possible not only to store information but also meta-information and relations between different information objects. Common features of Semantic Wikis are as follows (Schaffert 06a).

- Typing/Annotating of Links: knowledge elements are connected via annotated links that state the type of association between the elements. Such an annotated link could be *works in*, connecting a person and an organisation.
- Context-Aware Presentation: since both links and knowledge elements are annotated, semantically related pages embed the content into a context. This means that content is semantically enriched. So pages about e.g. a city in a certain country might be enriched with other cities located in that country.
- Semantic Navigation: relational information added to the viewed content facilitates orientation. Information about a certain person could be enriched with information about user affiliation or connections to other people. Links such as *works in* or *knows* would contain this information.
- Semantic Search: semantic search means that one cannot only search for knowledge elements but also for links or combinations of elements. When searching for *works in organisation a*, the system would deliver all the employees working in that organisation.
- Reasoning Support: since links relate knowledge elements to each other, additional information can be deduced. When it is specified that a person works in an organisation, it can be derived that she is an employee.

As said earlier, the authors suggest using Semantic Wikis to structure workplace related information in order to facilitate knowledge discovery, navigation, search, and acquisition. We do not discuss content production here, even though content production is a central issue regarding Wikis and Semantic Wikis. In our opinion, using Semantic Wikis for structuring content could be especially interesting for small and medium sized enterprises that do not have the financial resources for purchasing expensive knowledge systems or that need a small solution because of their size.

A Scenario: Learning About the Organisation

Consider the situation of an employee arriving in a company: besides working in a defined project matching her qualification, one of the first challenges she has to face is to learn about the company. Which topics does the company address? Who are the partners of the company? Who is working on what topics? Which kinds of projects does the company work on? Learning about all these things usually happens by reading project reports, talking to colleagues, participating in meetings. Bit by bit, information is collected and composed, which is a laborious task. The period of vocational adjustment usually takes weeks to months. However, it is in the interest of both the employer and the employee to shorten this time in order to achieve maximum productivity as soon as possible.

The solution would lie in a comprehensive overview about all this information. This overview should not only present information elements but also the relations between them. Thereby an employee could much easier build up a coherent understanding.

Of course, knowledge management systems or other types of systems often contain the relevant information. However, these systems usually are rigid and information is hardly connected. It takes some time to find out which information is filed where and how it relates. One alternative to prepare company related information in an easy to

navigate way would consist in deploying a Semantic Wiki. However, in order to utilise this application, a knowledge structure that fits the individual purpose has to be developed first. Theoretically, the structure could span an arbitrary amount of information and relations, but it becomes more complex and difficult to develop and to understand the broader the focus is.

Therefore, the first step consists in deciding about the domain that the Semantic Wiki should cover. In this scenario, the domain refers to person- and topic-related information in the context of projects, excluding commercial and administrative issues. The purpose would consist in giving employees in general and new employees in special an idea about the mentioned domain. Based on this domain, the relevant information elements must be determined. The following (Fig. 1) illustrates the relevant information elements and relations for this scenario. The relations are meant to be bidirectional. Only for the reason of a clearer representation, in (Fig. 1) there is only one direction displayed. We are aware that the knowledge elements, their attributes and the relations are not exhaustive. However, for reasons of clarity and a good understanding only subsets were used.

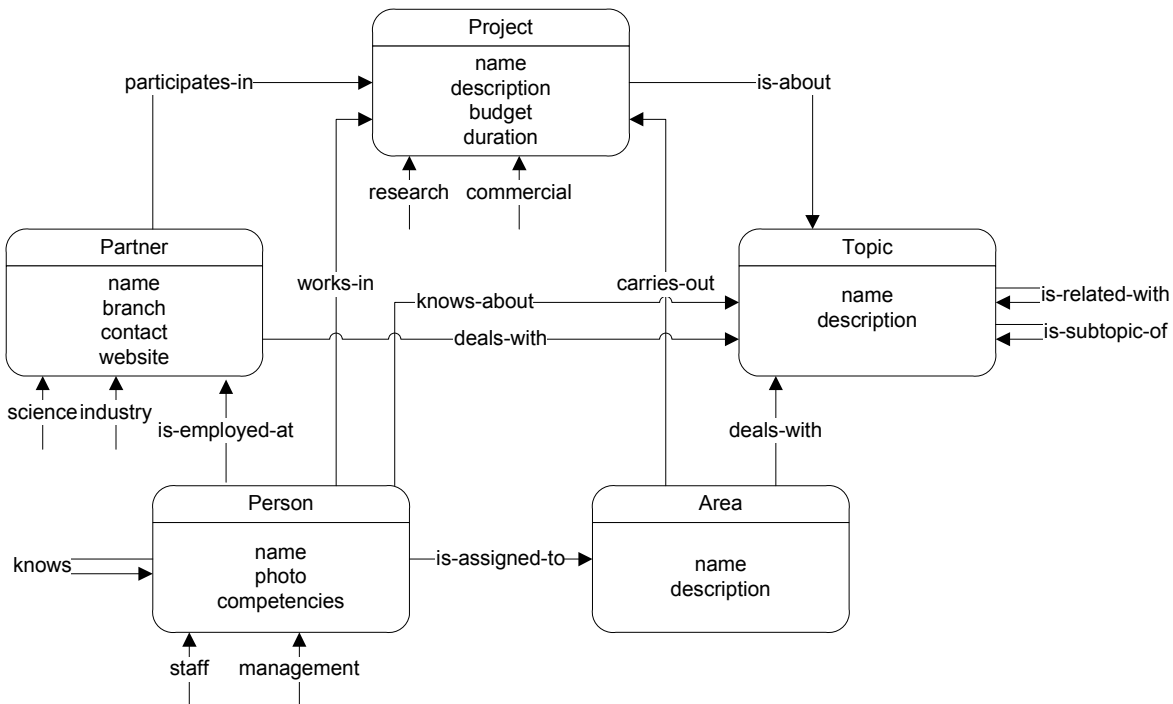


Figure 1: Knowledge elements and relations among them

If information is organized alongside the defined structure and properties are defined, it is much easier for the employee to discover, navigate, search, and acquire knowledge in regard to the previously mentioned questions.

Imagine the following situation. The new employee just participated in a meeting where she got to know a colleague from another area. She remembers his name but knows nothing else about him. Therefore, she makes a subject search whose result consists in all relations and objects the subject is associated with. If the search term is *Steven Bowers*, the results could be as follows:

- Steven Bowers knows Anton Brighton
- Steven Bowers is assigned to Web Development
- Steven Bowers works in Web Services II
- Steven Bowers knows about Service Oriented Architecture

As can be read from (Fig. 1), Anton Brighton is of type Person, Web Development is of type Area, Web Services II is of type Project, and Service Oriented Architecture is of type Topic. Each of these types contains further

information defining the properties. So, name of area and description would represent the type Area. The types can also be categorized. So, a project could be a commercially or research oriented project.

The results listed above are based on the annotated links and semantic navigation feature. With this search results, the new employee gets a lot of information about Steven Bowers, which otherwise she would not have found, or at least not in such a complete manner and with much more effort. Since the employee is involved in a project about Service Oriented Architecture, her next subject search is on that topic. Amongst other information, the search result is that also John Meyers and Carla Neil are both concerned with the topic Service Oriented Architecture. If she has any questions about that topic, she now knows whom she could contact. Because of the context-aware presentation feature, the employee also gets information about domains related to the domain Service Oriented Architecture such as Web Services. Since she wants to know who is concerned with Web Services, she makes a semantic search for *knows about Web Services* and gets a list of all colleagues who are familiar with this topic. Since Web Services is also an area, because of the reasoning support feature, also this information is delivered.

Conclusion

In this paper it has been introduced how a Semantic Wiki might be used in the organisational context for knowledge retrieval and acquisition purposes. However, even though the application seems rather intuitive and helpful, a company must be aware of some specialties. So, the underlying model has to be defined a priori which means that a company has to think carefully about which entities and relations should be defined. It is not so much a problem to add an entity or relation but rather to delete entities or relations. Because of deletion, it could happen that inferences that are drawn from the initial model may no longer be valid. Moreover, companies usually do not store their information within one system which is why the organization must think about which other sources to connect to the Semantic Wiki so that search and inferences also work across system borders. Another issue that must be object to further investigation is the usability of the system. Evaluations should e.g. answer whether an employee actually saves time and can find information more efficiently.

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