

TOWARDS ENCOURAGING CONTRIBUTION TO A SEMANTIC WIKI-BASED EXPERIENCE REPOSITORY

Alessandro dos S. Borges and Germana M. da Nóbrega
Mestrado em Gestão do Conhecimento e da Tecnologia da Informação
Universidade Católica de Brasília
SGAN 916 - Asa Norte — Brasília, DF, CEP 70.790-160, Brazil

Keywords: Experience Factory, Semantic Wiki, incentive mechanism.

Abstract: Recent trends on organizational context include tools allowing collaboration under a perspective of emergent structure rather than a priori embedded one. While these new tools are suitable for promoting spontaneous large-scale content evolution and/or communication, bringing them to companies intranets seems still a challenge. In educational settings, findings when applying mechanisms that provide awareness on community needs improve quality and help to achieve on-time content evolution. We are currently defining a mechanism inspired both in a particular company and based on theoretical background from previous work from literature.

1 INTRODUCTION

A few years ago, within the context of Knowledge Management (KM), Mark McElroy advocated in favor of a different view of the field to overcome the so-called First-Generation KM (FGKM) and its “technology-centric brand of thinking” (McElroy, 2003). For McElroy, this Second-Generation KM (SGKM) is more inclusive of human resource and process initiatives. Also, SGKM should privilege knowledge construction and team work.

While a new perspective for KM was born, as attested by that second generation knowledge management, a number of open issues from the FGKM seemed to concern yet the community. More critically, such problems have proven as an inherited barrier against SGKM directives. These included, for instance, lack of commitment and motivation for knowledge creation, sharing, and reuse, as discussed in (Malhotra and Galletta, 2003). The authors pursue an empirical study relying on theoretical basis of commitment and motivation, as an attempt to contribute for answering questions like “why do organizations often struggle with incentives for knowledge sharing for users of KM systems when sharing of knowledge occurs without any incentive whatsoever in several public online communities?”

An example of a successful public community is the Wikipedia project. The underlying technological model - the Wiki approach - is one of the components of what Andrew McAfee has recently called

the “Enterprise 2.0 technologies” (McAfee, 2006). As highlighted by McAfee, the design principles of these technologies are grounded on two rules, namely, (i) the usage facility, and (ii) the reduction of a priori structure. In the specific case of Wikipedia, an attempt to explain content convergence and quality seems to meet the question of incentive, assigned to one’s desire to author, and to a somewhat democratic community regulation. On the other hand, McAfee points out to some challenges for companies when bringing up these technologies to their intranets. One of these challenges are related to how managers will deal with control face to these “voice-giving technologies”. The author suggests that one delicate role for leaders to play in this incoming scenario is to “encourage and stimulate use of the new tools”.

The purposes of our current work are more modest than achieving an answer to those questions, but rather, we intend to step towards the matter of encouraging contribution in enterprise Wiki, by providing peer-rating of contributions and rendering explicit to employees its impact. The methodology guiding the organization of this short paper is coherent with the current state of the corresponding work. In the above introduction we just presented the overall context of the problem being addressed, going up to identify open issues pointed out in recent relevant management literature, out of which we draw our research question: *how to encourage employees to contribute to a Semantic Wiki-based Experience Repository?* In section 2, we present the main pillars on which we

are currently building up a solution. In section 3, we introduce the company environment being exploited as a case study and then we describe our in-progress solution, in terms of a compound gathering those pillars. Finally, in section 4, we present our concluding remarks.

2 FOUNDATIONS

In this section we present the main pillars, from literature, on which we are building a solution towards a mechanism to motivate knowledge sharing in a Semantic Wiki-based Experience Repository. Firstly, from Software Engineering (and under a KM perspective), we borrow the Experience Factory approach (Basili et al., 1994). Then, Wikis (Leuf and Cunningham, 2001) are being considered for their increasing use worldwide also within organizational context, and particularly Semantic Wikis (Schaffet, 2006) for their more expressiveness power. Finally, a mechanism to encourage participation in on-line communities (Cheng and Vassileva, 2006) is being adapted from educational context to fit our purposes.

2.1 The Experience Factory

Experience Factory is an example of a knowledge management approach for software organizations. The Experience Factory (Basili et al., 1994) is defined as a logical and/or physical organization that supports project developments by analyzing and synthesizing all kinds of experience, acting as a repository for such experience, and supplying that experience to various projects on demand. It packages experience by building informal, formal or schematized, and productized models and measures of various software processes, products, and other forms of knowledge via people, documents, and automated support. The main idea is that organizations need to learn from their past experiences in order to deliver products faster, cheaper, and with higher quality than before.

The Experience Factory is supported by a methodological approach named Quality Improvement Paradigm (QIP). QIP emphasizes the continuous improvement by learning from experience, at the level of organizations. It builds on experimentation and application of measurement. QIP consists of the following six steps (Basili et al., 1994): *(i) characterize*, understand the environment based on available models, data, etc.; *(ii) set goals*, on the basis of the initial characterization set quantifiable goals for success and improvement; *(iii) choose process*, on the basis of the characterization and of the goals,

choose the appropriate process to improve; *(iv) execute*, execute the process constructing the products and providing project feedback based upon the data on goal achievement that are being collected; *(v) analyze*, at the end of each specific project, analyze the data and the information gathered to evaluate the current practices, identify problems, record findings, and make recommendations for future projects improvement; *(vi) package*, consolidate the experience gained in the form of new, or updated and refined, models and other forms of structured knowledge gained from this and prior projects, and store it in an experience base so it is available for future projects.

A more recent approach to the Experience Factory was proposed on the basis that it takes a relatively long time to generate experience packages available for the organization, since the data collected from the projects need sophisticated analysis and synthesis phases (Basili et al., 2001).

2.2 Semantic Wikis

Wikis are initiatives about the collective organization of non-structured information on the Web, that are widely used by domain experts. The first Wiki (WikiWikiWeb) was conceived by Cunningham in 1995 as a freely expansible interconnected collection of Web pages, a hypertext system to store and modify information - a database, where each page is easily editable by any user that has access to a Web browser capable of dealing with forms (Leuf and Cunningham, 2001). In (Schaffet, 2006), the author points to a variety of uses for Wiki systems, as: encyclopedia systems like Wikipedia, coordination in software development, project management, personal knowledge management and collaborative editing.

The above mentioned uses of Wiki systems have increasingly been brought to workplace, both in small and large companies. As highlighted in (Leuf and Cunningham, 2001), "the workplace wiki provides a central repository allowing distributed updates for everyone [...]". On the other hand, as the authors advise, other applications might be more convenient whenever rigid format adherence is required or if security is a concern. Success uses of Wiki in large companies are reported (e.g. in Motorola), with pros and cons in terms of people who showed resistant to the tool, missing features, as well as its effectiveness as a communication tool for relatively small size group.

More recently, a case study based on Wikis in a small size company was conducted by Chau and his team (Chau and Maurer, 2005). Their work was related to information organization in experience repositories (on software development) specifically lying

on the Experience Factory approach. The study revealed that self-organized maintenance of the repository content among ordinary users (the ones that participate in development activities) can be a consequence of the open edition nature of Wikis.

In the direction of more expressiveness of information represented, semantics are today being considered in several Wiki projects. A Semantic Wiki (Schaffet, 2006) is a Wiki with augmented functionalities based on Semantic Web technologies. Usually, the additional knowledge is made available through the use of formal languages, allowing inferences of new facts based on the ones represented in the knowledge model. This formal knowledge allows more efficient searches compared to syntactic searches using keywords. One of the differences between Wikis and Semantic Wikis lies in what can be formalized. In the case of Semantic Wikis, it is possible to create types for pages, categories and links.

2.3 Motivating User Participation in Online Communities

As highlighted by the authors in (Cheng and Vassileva, 2006), one major problem within small online communities is how to encourage individuals to contribute. In a project named Comtella, the researchers have been addressing this issue in the context of under-graduating education, in which sharing course-related digital resource is a task assigned to the students. The researchers are concerned with regulating not only quantity but also quality of contributions as well as to ensure a sustainable level of participation. They propose to reward specific forms of participation according both to the community needs and to the user's reputation. For such, it is necessary to build and to dynamically maintain a community model as well as individual user models. The former allows to inform the user what kind of contribution is needed at the current moment. The latter allows to anticipate user contribution by taking into account his/her previous performance. Adaptive rewards are then shown to the user such as to help him/her to take an action. The case studies within educational context points out to benefits the incentive mechanism brings to render stable user participation and also to prevent information overload.

3 TOWARDS A SOLUTION

The Experience Factory (Basili et al., 1994) has proven to be an interesting approach to knowledge

management on software development in large companies. In addition, the study reported in (Chau and Maurer, 2005) brings that approach to the context of a medium-size software company by highlighting the gains from combining the EF to the less structured Wiki approach. Moreover, the Comtella project (Cheng and Vassileva, 2006) has been successfully evolving over the last few years as an answer to the problem of lack or inadequacy of contributions within online communities in educational settings. Our current research agenda includes merging those approaches while adapting them to assist the IT department of an organization having its purpose activity directed toward the valuation of independent and diligent transporters from the Transport Sector in the country. Our assumption is that the Semantic Wiki approach - e.g., (Schaffet, 2006) - may bring significant benefits to information search and retrieval to the Wiki-based Experience Factory, while personalizing community needs and user contributions may lead to more qualitative and on-time content evolution.

The structure of the organization is as follows: an Executive Department, including 2 Superintendent Sections for 11 Coordinating Sections (Outbidding, Human Resource, Marketing, Human Resource Advising, Accounting, Information Technology, Documentation, Legal Assessorship, Communication, and Operational Performance). The Executive Department is responsible for managing 160 branch offices. Nineteen IT people work under the coordination responsible for the projects and activities related to technology. This team is responsible for a cartel of 40 systems running on an infra-structure of 40 servers and attending around 2600 users. The development team includes 8 people, 3 of them being experts in system analysis while the others are programmers. The systems range from simple registering systems to more complex ones, such as decision support systems.

One problem regards information exchange involving the development team and the coordinations responsible for each system. The rotation of the organization is not high, but the employees often neglect appropriate documentation in projects, processes and activities such as to allow reuse, or even to assist novices. A number of other problems in a higher knowledge management level are being identified, but they are omitted here since the classical one just mentioned seems us significant enough to call the less structured approach we are currently working on.

Aiming to achieve the intended incentive mechanism, we are currently working on the following:

- Rewarding contributions. This includes determining what activities within the Wiki are suitable

and when, such as to be able to score individual contribution according to community needs, both in terms of non-answered searches and articles waiting to be rated.

- Providing rating of peer's contributions. This should allow reused information to get rated by a user according to the impact it causes in the accomplishment of a current project. Both the author's and the reader's reputation are being considered to normalize the resulting rating.
- Providing contribution awareness. Contributions ratings should be displayed to the user, as well as frustrated searches under the positive form of wanted information.

4 CONCLUDING REMARKS

Our current work include defining a mechanism to encourage contribution in a Semantic Wiki-based Experience Repository, inspired both in a particular company and based on theoretical background. Future work is foreseen for implementing and testing it into the company.

ACKNOWLEDGEMENTS

The work reported in this paper is under development within the engageGrid project, which is supported by *Conselho Nacional de Desenvolvimento Científico e Tecnológico* - CNPq (Brazil), under the grant MCT/CNPq 15/2007 - Universal - Proc. no. 481602/2007-0.

The authors are grateful to *Serviço Social do Transporte* - SEST/SENAT (Brazil) for rendering available substantial data relevant to develop the work reported in this paper, and also for partially supporting their participation at ICEIS 2008.

REFERENCES

- Basili, V., Costa, P., Lindval, M., Mendonça, M., Seaman, C., Tesoriero, R., and Zelkowitz, M. (2001). An experience management system for a software engineering research organization. In *The 26th annual NASA GODDARD Software Engineering Workshop*.
- Basili, V. R., Caldiera, G., and Rombach, D. H. (1994). The experience factory. In *Encyclopedia of Software Engineering*, pages 469–476.
- Chau, T. and Maurer, F. (2005). A case study of wiki-based experience repository at a medium-sized software company. In *K-CAP 2005*, pages 548–556. ACM Press.
- Cheng, R. and Vassileva, J. (2006). Design and evaluation of an adaptive incentive mechanism for sustained educational online communities. *User Modeling User-Adapted Interaction*, 16(3-4):321–348.
- Leuf, B. and Cunningham, W. (2001). *The Wiki Way: Quick Collaboration on the Web*. Addison-Wesley.
- Malhotra, Y. and Galletta, D. (2003). Role of commitment and motivation in knowledge management systems implementation: Theory, conceptualization, and measurement of antecedents of success. In *36th Annual Hawaii International Conference on Systems Sciences*, pages 1–10. IEEE Computer Society.
- McAfee, A. P. (2006). Enterprise 2.0: The dawn of emergent collaboration. *MIT Sloan Management Review*, 47(3):21–28.
- McElroy, M. (2003). *The New Knowledge Management Complexity, Learning, and Sustainable Innovation*. Butterworth-Heinemann.
- Schaffet, S. (2006). Ikwiki: A semantic wiki for collaborative knowledge management. In *Proceedings of IEEE WETICE'06*. IEEE Computer Society.