Organisational Knowledge Management Systems in the Era of Enterprise 2.0: The case of OrganiK[1]

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Abstract. The increasing need of small knowledge-intensive companies for loosely-coupled collaboration and ad-hoc knowledge sharing has led to a strong requirement for an alternative approach to developing knowledge management systems. This paper proposes a framework for managing organisational knowledge that builds on a socio-technical perspective that considers people and technology as two highly interconnected components. We introduce a knowledge management system architecture that merges enterprise social software characteristics from the realm of Enterprise 2.0, and information processing techniques from the domain of Semantic Web technologies, in order to deliver a KM approach that could assist in reducing the socio-technical gap.

Keywords: knowledge management, socio-technical approach, enterprise social software, semantic web technologies, system architecture.

1 Introduction

Small knowledge-intensive companies are constrained by resource scarcity and cannot compete with large companies in terms of tangible resources, such as capital,

[1] Research project OrganiK (An organic knowledge management system for small European knowledge-intensive companies) is funded by the European Commission's 7th Framework Programme for Research and Technology Development under Grant Agreement 222225 (Research for the benefit of SMEs).

labour, equipment or physical commodities. However, an intangible asset such as knowledge is an invaluable resource that can be utilised by small firms. Knowledge, if properly harnessed, will enable Small-Medium Enterprises (SMEs) to stand out in the competition and outperform their rivals, thus maintaining a competitive edge [1]. Despite this pressing need, it is widely accepted that small companies – even the most knowledge-intensive ones – are characterised by a lack of uptake of knowledge management initiatives, while at the same time many of their large counterparts are effectively practicing knowledge management [2].

1.1 Motivation

The majority of today's enterprise knowledge management tools, techniques and methodologies have been developed with large firms in mind [5], and thus adhere to requirements that are inevitably in conflict with the peculiarities of small knowledge-intensive companies [3]. Current Knowledge Management (KM) systems are not only expensive to purchase, but also necessitate the commitment of significant resources to their deployment, maintenance, and daily operation. The amount of effort required for performing activities core to KM systems, such as designing taxonomies, classifying information, and monitoring functionality [2] is disproportionate to the resource capacity of most SMEs. Moreover, typical KM systems place emphasis on predetermined workflows and rigid "information-push" approaches [4] that reflect the philosophy behind working practices in large enterprises. In contrast, SMEs rely mostly on informal person-to-person communications and people-centric operations [3] that take place in largely ad-hoc and non-standardised ways [2]. By and large, SMEs have a set of distinctive needs that call for the deployment of a new breed of digital environments for generating, sharing, and refining organisational knowledge.

The management of knowledge in idiosyncratic environments such as those of small knowledge-intensive firms can significantly benefit from key characteristics of enterprise social software, like lightweight deployment, flexibility and simplicity of use, emergent and self-organising knowledge structures, and collaboration-oriented philosophy. Nevertheless, in the absence of a knowledge representation scheme to assist in the interpretation of the accumulated information, the evolution of content in a bottom-up fashion may hinder the effectiveness of managing this information and eventually prevent knowledge workers from transforming it into knowledge. To that end, the enhancement of enterprise social software with intelligent information processing capabilities through the use of semantic technologies appears as a rather promising direction. Such a blend would result in considerable improvements to the usability and effectiveness of enterprise social software, and would enable an SME-focused KM system to demonstrate the immediate and profound evidence of benefits needed for knowledge workers to accept it and use it in their every-day activities [2].

The underpinning motivation in this paper is that by leveraging enterprise social software applications with semantic information processing and contextual awareness, we can achieve significant benefits in managing content and knowledge, while allowing for informal, people-centred and ad hoc every-day procedures to be employed.

1.2 Contribution

The aim of this paper is to propose an alternative approach to developing organisational knowledge management systems for small knowledge-intensive companies. In contrast to typical approaches, where knowledge management systems require specific processual use, we suggest that focus should be shifted to delivering solutions that can organically adapt to their every-day work practices and problem solving activities without imposing them from outside or above [6]. This approach to enterprise knowledge management aims at the creation of an environment where encouragement of active social interaction between individuals and teams, empowerment of participation, and self-motivated engagement can promote innovation and assist in attaining sustainable competitive advantage. This perspective suggests a combination of the up to date largely disconnected social and technical organisational system views.

2 Socio-technical Knowledge Management Perspectives

Knowledge management literature has often focused on disjoint approaches of people-centred and technology-centred strategies [7]. These fragmenting perceptions are based upon a focus of discussion and debate on the distinction between explicit and tacit knowledge utilisation: easily codified and documented knowledge should be managed through technology-oriented approaches, whereas knowledge that resides on people's thoughts and beliefs requires people-oriented actions [8]. Nevertheless, it is proposed that overly stressing the importance of either technological or social components of knowledge management can sometimes be misleading and conducive to less effective organisational initiatives, since these two approaches may, in some contexts, be of equal usefulness [9].

This paper adopts the view, following Lytras and Pouloudi [10], of "knowledge management as a socio-technical phenomenon where the basic social constructs such as person, team and organisation require support from Information and Communication Technology (ICT) applications". A socio-technical approach to leveraging organisational knowledge considers people and technology as two highly interconnected components of a single system and is applied to the study of the relationships and interactivities between the social and technical structures of an organisation [11]. Undoubtedly, the tension between the social and technical sub-system can be difficult to harmonise, thus leading to what has become known as the socio-technical gap [6], as illustrated in Figure 1. In particular, it appears that social requirements are often neglected in the process of designing organisational knowledge management solutions.

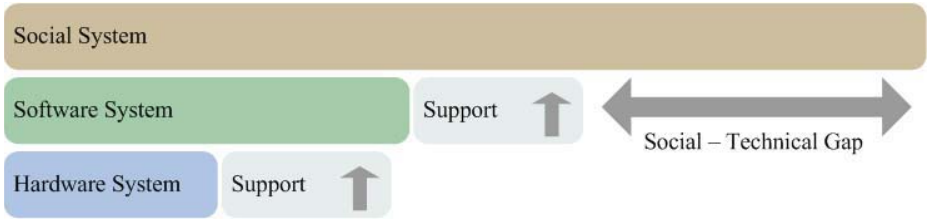

Fig. 1. Socio-technical gap: software and hardware systems provide support for the technical subsystem, while the social subsystem remains virtually unsupported (adapted from Patrick and Dotsika [6]).

We propose an organic perspective to organisational knowledge management system development [6], [12], in which the characteristics of the resulting technical sub-system emerge from a continuous negotiation procedure among the social actors of the organisation and adaptation through user involvement and engagement. This approach attempts to create an iterative dialogic relationship between the social and technical sub-systems that can promote the creation of a collaborative environment for creating, sharing and distilling information in organisational settings.

3 An OrganiK Approach to Knowledge Management: Towards a Socio-technical fit

The vision of the proposed approach is to enable knowledge workers in small knowledge-intensive companies to effectively collaborate and utilise organisational knowledge with the support of an organic knowledge management framework. As stressed above, this approach is founded on a socio-technical perspective, and identifies the effectiveness of interactions among people and technology as a major challenge. As illustrated in Figure 2, the major components of the proposed knowledge management framework are the following:

- A *people-centred* knowledge management conceptualisation focusing on social processes, *ad-hoc* work practices and organisational structures (i.e. individual, team, business units). Situated *innovation management* processes, cultivation of *communities of practice* and project *adaptation procedures* comprise fundamental components of this socially-focused processual approach.
- A *technology-centred* knowledge management conceptualisation focusing on the integration of *enterprise social software* applications (wikis, blogs, collaborative bookmarking tools and search engines) with *semantic technologies* (ontology-based annotation, semantic text analysis, logic-based reasoning).

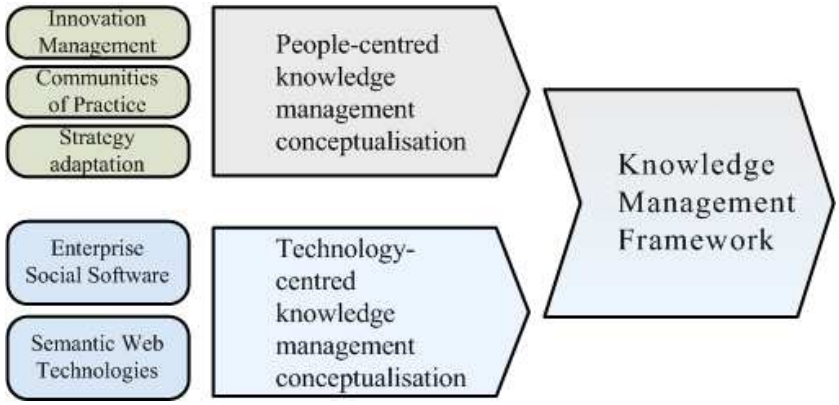

Fig. 2. The proposed OrganiK knowledge management framework.

3.1 Proposed Architecture

The proposed architecture that this paper puts forward for reducing the socio-technical gap among work practices in small knowledge-intensive firms and present-day knowledge management systems, combines key elements from the domains of Enterprise 2.0 and Semantic Web technologies. Regarding the Enterprise 2.0 domain, the system architecture employs the SLATES framework [12]:

- *Search*, to provide mechanisms for discovering information.
- *Links*, to provide guidance to knowledge workers in order to discover the needed knowledge and ensure emergent structure to online content.
- *Authoring*, to enable knowledge workers to share their opinions with a broad audience.
- *Tags*, to present an alternative navigational experience exploiting unhierarchical categorisation of intranet content.
- *Extensions*, to exploit collaborative intelligence and recommend to knowledge workers contextually relevant content.
- *Signals*, to automatically alert knowledge workers for fresh available and relevant content.

The aim is to provide knowledge workers with a collaborative workspace that comprises a set of integrated Web 2.0 applications (a wiki, a blog, a bookmarking system and a search/recommendation engine), augmented with natural language processing and semantic information integration capabilities that enable the combined use of folksonomies and ad-hoc tagging with thesauri and shared ontologies. The use of semantic technologies in the envisaged solution comprises the following key functions:

- *Semantic knowledge representation*: representing knowledge in a formal, machine understandable manner.

- *Semantic resource annotation*: annotating knowledge artefacts and other resources by reference to concepts defined in an ontological model.
- *Semantic inference*: performing automated logic-based reasoning to infer new, implicit knowledge based on what has been already asserted in an explicit manner.
- *Semantic search and discovery*: using ontological terms to describe a search query and rely on logic-based reasoning to derive the matching results.

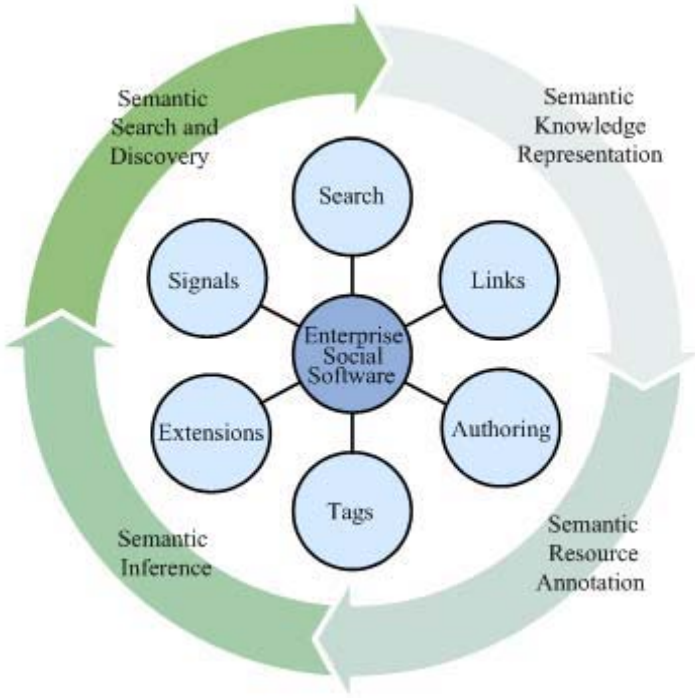

Fig. 3. Integrating components of the SLATES framework with machine processable semantics.

Each of the aforementioned social software functions corresponds to one or more of the components of the SLATES framework, and, as illustrated in Table 1, corresponds to a specific component in our proposed architecture.

Table 1. Association among components in SLATES and our proposed architecture.

SLATES Framework	Proposed Architecture
Search	Semantic Search
Links	Collaborative Bookmarking
Authoring	Wiki and Blog spaces
Tags	Collaborative Bookmarking, Wiki and Blog spaces
Extensions	Recommender System
Signals	Really Simple Syndication (RSS)

A conceptualisation of the proposed architecture is illustrated in Figure 4. As seen in the *Client Interface Layer*, the collaborative workspace that is offered to knowledge workers comprises a wiki, a blog, a social bookmarking tool and a search interface. Each of the client interfaces corresponds to a server-side component in the next layer of the architecture; the *Component Interface Layer*. The server-side building blocks that comprise the *Business Logic Layer* are a recommender system, a semantic text analyser, a collaborative filtering engine and a full-text indexer. The *Metadata Layer* refers to repositories used for the persistence of syntactic and semantic metadata supporting the functionality of all server-side components, while the *Datasources and Back-Office Integration Layer* refers to business information systems and any form of resource container that an enterprise may depend on for its daily operations.

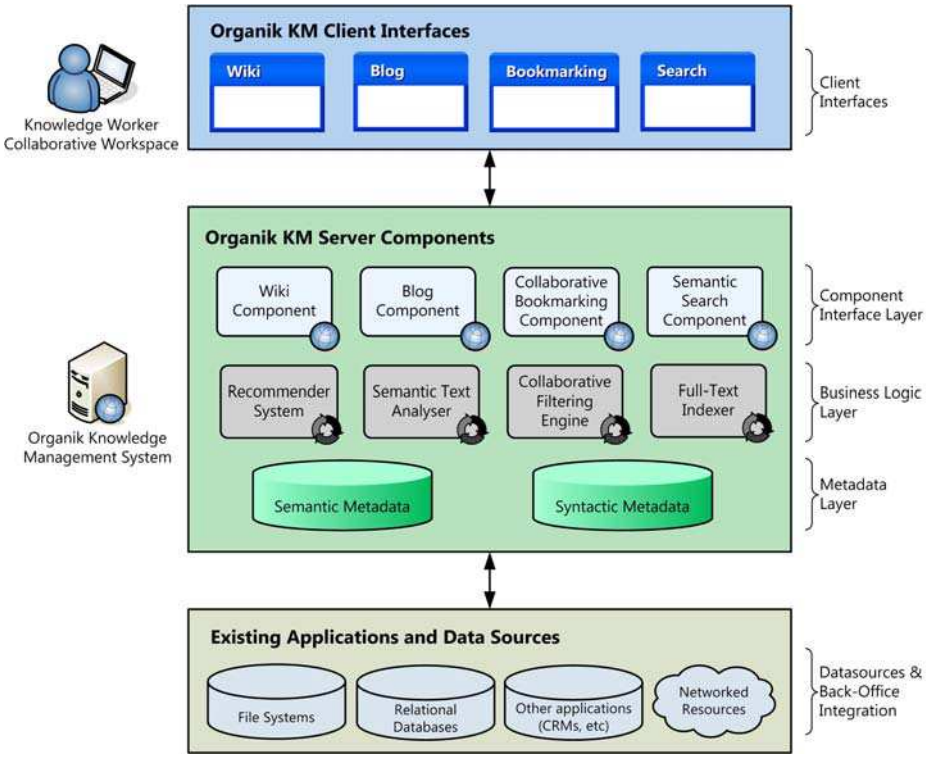

Fig. 4. Proposed conceptual architecture for semantically-enriched enterprise social software.

The functionality of the core components in the proposed architecture is envisaged as follows:

- The *Wiki Component* is a web-based authoring tool allowing knowledge workers to collaboratively create, edit, and share knowledge artefacts such as documents, diagrams, etc.

- The *Blog Component* provides a simple content management tool enabling knowledge workers to build and maintain open project monitoring diaries, complete with links to relevant resources and user commentary.
- The *Social Bookmarking Component* enables knowledge workers to organise and annotate resources relevant to their activities (intranet documents, web resources, wiki entries, blog posts, etc) and share them with their co-workers.
- The *Semantic Search Component* supports browsing, searching, retrieving and displaying knowledge resources leveraging semantic annotation indexing and logic-based inferencing.
- The *Recommender System* focuses on the suggestion of tags and classifications for content added to the system (e.g. wiki entries, bookmarked documents, blog comments, etc), and the suggestion of information items relevant to the search query or feed subscription of a user.
- The *Semantic Text Analyser* employs linguistic and statistical processing functions on the textual content of knowledge artefacts added to the system, in order to perform named entity recognition and term classification. The objective is to identify concepts of interest and establish relationships among resources that can be subsequently used by the Recommender System for suggesting tags and classifications with respect to a taxonomy/ontology.
- The *Collaborative Filtering Engine* enables individual knowledge workers to benefit from the collective experience built within groups of peers. An analysis of subjective views that are explicitly or implicitly expressed by other knowledge workers can assist in the selection and recommendation of resources, as well as influence the ranking of search results.
- The *Full Text Indexer* is an indispensable component of the architecture's Business Logic Layer and complements the content retrieval techniques proposed above.

To summarise, the enhancement of enterprise social software tools with machine-processable semantics and their respective processing techniques is expected to yield significant benefits with respect to efficiency of information management, and contribute towards improving the overall user experience of knowledge workers.

4. Concluding Remarks

This paper theoretically investigates an approach to developing organisational knowledge management systems for small knowledge-intensive companies. In contrast to other approaches employed in present-day knowledge management systems, we suggest that a specific processual use should not be imposed onto knowledge workers, but rather, the provided KM solutions should be able to organically adapt to their every-day work practices and problem solving activities. Despite the fact that the Organik research project is still at a rather initial stage, we envisage a system that is utilised and organically incorporated into every-day *ad hoc* and knowledge-intensive SME work practices. Our objective is to realise a KM system with increased social acceptance and a positive impact on reducing the socio-

technical gap. In particular, we propose an OrganiK knowledge management framework that adopts a socio-technical perspective to leveraging organisational knowledge, and considers people and technology as two highly interconnected components. We adopt the intersection of social software and semantic technologies as the technological baseline towards realising this vision, and present a high-level conceptual architecture of the envisaged solution.

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