

Can Intra-Organizational Wikis Facilitate Knowledge Transfer and Learning? An Explorative Case-Study

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Abstract: We describe concept and implementation of a wiki-based application facilitating knowledge transfer and learning within the enterprise. Building on two interviews with managerial experts responsible for the roll-out and an online survey of 59 non-executive employees targeted by this new solution, we present the results of our evaluation. Our contribution was highly motivated from the continuing discussion on the potential and pitfalls of Web 2.0 technologies and applications underlying technology enhanced learning and the lack of empirical studies in contrast.

1 Introduction and motivation

Technology enhanced learning looks back on a fifteen years long history governed by both technical innovations and conceptual developments. From the one-way provision of standardized learning materials within monolithic platforms to service based collaborative modular systems, technology enhanced learning is yet moving forward [TG08]. Innovating the way people create and share information on the Web, the so called Web 2.0 [OR05] has a strong impact on knowledge transfer and learning. As a socio-technical conglomerate, the web has begun to (r)evolutionize towards a more participative environment allowing everyone to easily contribute without needing any special expertise. It is much easier than ever before to exchange knowledge and find rich sources for knowledge acquisition.

Not only educational institutions, but also enterprises have already acknowledged the value of Web 2.0 for knowledge transfer and learning. Driven by the aim of holding and increasing their competitiveness, enterprises are forced to always be on the lookout for better models and technologies which facilitate intra organizational knowledge transfer and

learning. Knowledge within an enterprise is virtually worthless, if not effectively exchanged and used. For this reason organizational knowledge has to be easily transferable amongst all employees to gain advantages in business [AL01]. With regard to the adoption of Web 2.0 structures and properties within enterprises, [Mc06] coined the term Enterprise 2.0. Enterprise 2.0 thereby refers to the support of knowledge workers through Web 2.0 applications and technologies including the two most popular entities wiki and weblog. The valuable contribution of both tools is to improve the output of knowledge work by facilitating knowledge transfer and learning from each other. In the contribution at hand we will have a closer look at the effects of utilizing wikis in the enterprise context.

[LC01] define a wiki *as a freely expandable collection of interlinked Web pages, a hypertext system for storing and modifying information [and] a database, where each page is easily editable by any user*. Wikis are web-based authoring tools supporting collaborative creation of content. Being conceptualized as an open platform, wikis allow everybody to read and edit content at the same time. The underlying wiki-software exhibits an organic character, enabling the evolution of wiki-content based on concrete user needs [MG08]. Wikis are determined by the four notions connectivity, adaptivity, self-organization and constructivism [HI06].

Unfortunately, there is very little empirical evidence from academia on how enterprise wikis are effectively used in terms of knowledge transfer and learning. More studies are required to understand process, context and the specific phenomena being observed. [WL07] discussed their preliminary findings on wikis in the workplace gained by conducting semi-structured telephone interviews surveying usage. [DS08] described design and deployment of a wiki within a 900 member research organization aiming at broadening collaboration amongst all researchers. [HP07] examined a single-case, where a wiki was rejected as a knowledge creation tool due to the lack of management support. Apart from their corporate use, there exist a number of empirical studies on wikis in the classroom [FB06], [Wa05], but we must expect structures and properties in enterprises to be completely different to those of classrooms.

Our motivation for this paper resulted from the lack of empirical studies investigating how enterprises may facilitate knowledge transfer and learning through wikis. The explored object of investigation was the Austrian subsidiary of a large-scale multinational enterprise well known for developing highly innovative technical parts for automotive industry and industrial electronic. We probed an internal wiki-based solution implemented by the local support department, henceforth called SUP-DEP.

This new solution aimed at fostering internal knowledge transfer among all employees in this department and beyond the entire site, occupying more than 200 researchers and developers in total.

2 Methodology and study design

We chose an explorative case-study as research strategy. According to Yin [Yi84] *a case study is an empirical inquiry that investigates a contemporary phenomenon within its real life context, especially when the boundaries between phenomenon and context are not clearly evident*. Case studies especially fulfilled our needs, because we intended to study foremost the surrounding conditions of the phenomenon expecting to generate most valuable findings by investigating the context. In our interviews and questionnaire we therefore asked many explorative “*how*” and “*why*” questions.

Our study used both quantitative and qualitative data in order to create a valid study according to literature [Ei89], enabling triangulation of evidence. In the first step, we conducted a structured interview of three hours with the two employees responsible for the wiki project, the department-manager of SUP-DEP and a quality assurance manager. We thereby asked them about 40 questions on the motivation for the wiki, concept and implementation, and foremost the actual results obtained on individual and organizational levels. Our empirical findings were documented within a ten page report delivered to both interviewees to comment upon, ensuring all details to be interpreted correctly to assure construct validity [Yi84]. Responding to the call from organizational knowledge management literature [HA06], we emphasized on knowledge transfer from non-executive employees’ perspectives, too. On this account, we surveyed them with online questionnaires in a second step, receiving 59 valid answers from 210 overall contacted employees resulting in a satisfying response rate of 28%. Our online questionnaire included 17 closed questions on reading and writing behaviour, (knowledge) work practices, motivation, received benefits and perceived obstacles.

3 Case study results

In this chapter we introduce the situation and demands of SUP-DEP before the wiki was implemented, the reasons for selecting a wiki as knowledge

transfer tool as well as the quantitative and qualitative results of our evaluation.

3.1 Qualitative results

Starting Point: SUP-DEP supported researchers and developers by providing special guidance in technical and methodical issues. For these purpose each member of SUP-DEP was located within a group of researchers being responsible for this group only. Decentralized working environments caused a limited knowledge transfer between SUP-DEP members: Internal face-to-face meetings were very limited, yielding to heavy email-traffic and constant reinventions of the wheel.

A wiki was considered to raise efficiency and effectiveness of SUP-DEP's core business. The goal of this new solution, introduced one and a half years before conducting our investigation, was to foster knowledge transfer and interconnectedness of SUP-DEP's employees. Scopes of the wiki were collection, documentation and transfer of support-oriented knowledge to all relevant knowledge seekers. The new solution was supposed to be built according to the requirements of SUP-DEP.

SUP-DEP's department-manager perceived a wiki as most suitable platform for knowledge transfer and learning. (1) Wiki-typical simplicity, (2) perceived high acceptance of wikis as observed from the Wikipedia, (3) special functionality of wikis, (4) platform independence, and first and foremost (5) the well-known wiki-principles, allowing every person to read and edit Wiki-articles at the same time, illustrated his main arguments. MediaWiki was favoured as underlying wiki-software, taking its high degree of popularity and its proof of scalability into account.

Implementation and usage of the wiki: The wiki was introduced top-down by SUP-DEP's department manager, who was directly reporting to the local site-manager, allowing the necessary project commitment to be sent on the way with. Besides, the local site-manager was highly supporting all activities connected to the wiki project. Basic wiki-structures had been eagerly discussed within internal group meetings, but no strict definitions were agreed upon. Creation of new articles was supposed to happen self-organized and bottom-up. A strong involvement of SUP-DEP in content creation would result in a lively wiki providing up-to-date knowledge.

Due to a number of past internal wiki-projects, much knowledge about the wiki-technology was available. Wiki-content was in some parts migrated

from another system used by SUP-DEP before the wiki had been rolled-out. The Wiki was intended to incorporate articles addressing tool-specific and methodical support for researchers and developers. All wiki-users had to be logged in, providing their real names. Anonymous editing was forbidden and only administrators were explicitly allowed to delete whole wiki-pages. Categories were used for meta-description and structuring of articles. Employees were free to decide on how to express their knowledge within a particular article. However, they should avoid building too hierarchical structures. Such structures were supposed to flood knowledge workers with short pages increasing complexity especially when employees stumble upon such a page when following a link provided by the full-text engine finally getting lost in hyperspace.

A series of actions had been taken to raise both, the degree of awareness of the wiki, and its acceptance within the site. First, the new solution was introduced officially in a jour-fixe. Furthermore, the wiki together with its goals and forecasted benefits was personally presented in face-to-face meetings with executive employees from other departments by the SUP-DEP manager. Lastly, relevant employees were explicitly invited to actively participate within the wiki. A how-to-page explained the accurate wiki-usage. Surprisingly, an enterprise-wide roll out of the wiki as a global support tool was cancelled, fearing the increase of complexity and information overload.

Evaluation concerning operation: After using the wiki for one and a half years, about 500 articles had been created, periodically read by over 70 employees. Around fifteen employees were highly involved in the creation of wiki content. Based upon a current server-log, the wiki had been accessed approximately 130.000 times since its roll-out. Wiki articles had been edited about 10.000 times in total, making each article being edited four times on an average.

Originally, the wiki was intended to stimulate and foster knowledge transfer between SUP-DEP's employees, only. It soon became clear that researchers themselves would benefit much from using the wiki, gaining value when performing ad-doc search on upcoming challenges without personally asking SUP-DEP for assistance. Based upon these findings the wiki target group was successively widened to all researchers at the site. However, researchers were most notably personally supported via face-to-face meetings, telephone-calls and emails. After becoming the beneficiaries of wiki knowledge, researchers were continually stimulated to also actively participate in wiki triggered knowledge transfer. Unfortunately, most of them hesitated to follow these stimulations, clearly preferring personal

guidance. From an individual perspective, it appeared to be more effective to directly request help from SUP-DEP's employees instead of self-organized retrieving wiki-knowledge, especially if such a process was perceived a time-wasting effort. An internal evaluation of the SUP-DEP service clearly proved that hypothesis.

While the Wiki was intensively used within SUP-DEP, the responsible employees still had to convince far more researchers and developers to actively transfer their knowledge with the wiki. Though it had been a well-known fact within the site that researchers and developers always shared their knowledge on request, they lacked motivation to make knowledge explicit in electronic databases. Researchers and developers even requested SUP-DEP members to document their ideas on behalf of them. Employees refusing to use the wiki stated doubts including "*wiki usage is too time-consuming*", "*wiki is too complicated*", "*I am too lazy*", "*I can directly ask a SUP-DEP guy*", or "*I lack time*". The degree of raising one's social or professional reputation by editing wiki-articles was perceived to be very low.

The simple wiki-full-text search was a notable value gain, allowing quick guidance for emerging problems. Wiki articles incorporated formulations of both problems and their solutions on an adequate level for researchers and developers. Another benefit dealt with the transparency gained on support-related knowledge and its holders. Finding knowledge holders using the wiki led to additional information and feedback. Finally, the Wiki allowed easy and foremost platform-independent access to knowledge without passing any special authorization procedures. The most important value of the new wiki on an organizational level was the rise of efficiency and effectiveness of SUP-DEP's core-business, delivering tool-specific and methodological support.

3.1 Quantitative results

Over one-third of all employees was reading wiki-articles weekly. However, almost 50% used the wiki just monthly or less than monthly. With regard to this business case, we assumed the most frequent wiki users to be SUP-DEP department members themselves, referring to our collected qualitative data.

Our investigations revealed that there were much more employees reading articles than editing them. The majority of users edited wiki-articles less than monthly. Only a small employee fraction created articles on a daily basis, apparently SUP-DEP members. This result can be interpreted by

referring to the 'knowledge sharing dilemma' [CC02].

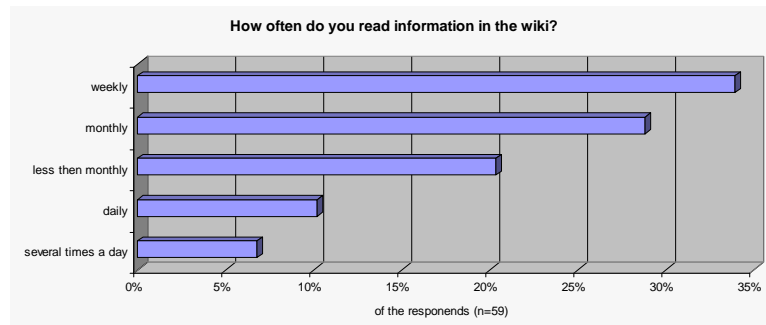


Figure 1: Wiki-reading behavior

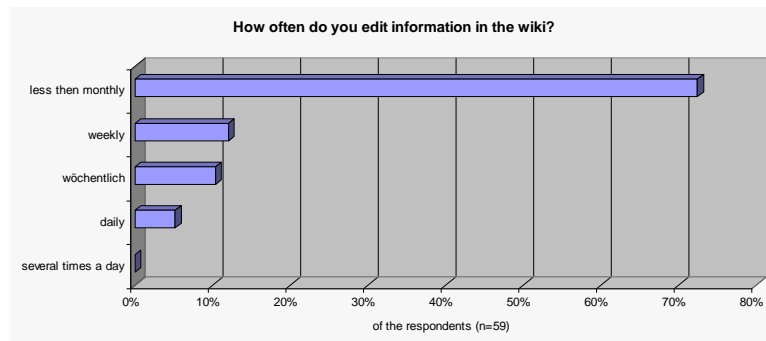


Figure 2: Wiki-editing behavior

When surveyed about their preferred type of wiki-contribution, the majority of employees edited existing articles and created new ones. Almost nobody corrected spelling and/or grammar errors, rewrote whole paragraphs, restored old versions of articles using the history of revisions or commented wiki-content. Many wiki-features appropriate for knowledge transfer and learning with respect to the literature were not used.

Information relevant for the business context of employees was mainly received via emails (62% said frequently, 33% sometimes), telephone calls (60% said frequently, 32% sometimes), within informal talks (48% said frequently, 45% sometimes), within formal meetings (48% said frequently, 45% sometimes). Anyhow 19% of the employees were able to extract business relevant knowledge from the wiki frequently and 40% at least sometimes.

Surveying their performed business tasks, almost 50% of the employees

perceived themselves as being experts within their domain (47% said yes, 47% rather yes). Employees found newly generated knowledge to be documented (43% said yes, 48% rather yes) and perceived performing their tasks to require new approaches (41% said yes, 55% rather yes) as well as input from their colleagues (40% said yes, 45% rather yes). Employees were generating new knowledge (34% said yes, 43% rather yes) and strongly identifying with their team (62% said yes, 36% rather yes), their domain (55% said yes, 41% rather yes) and their organization (34% said yes, 52% rather yes).

Half of the employees used Wikipedia regularly and one third at least occasional. Only a very small fraction of employees had been Web (2.0) affine (2% said yes, 7% rather yes), even reading (2% said yes, 5% rather yes) or writing (2% said yes, 5% rather yes) weblogs themselves. Surveyed about their perception of the wiki, employees found the wiki-users rather to be equal in rights (28% said yes, 50% rather yes), the new technology rather easily to handle (26% said yes, 45% rather yes) and the wiki rather to be an enabler of transparency about knowledge in the enterprise (19% said yes, 48% rather yes).

Surveyed about their motivation to apply the wiki in the workplace, employees referred to search and retrieval of business relevant information (29% said yes, 40% rather yes), simplification of their work (21% said yes, 38% rather yes) through wiki knowledge, and information of others about their work (12% said yes, 40% rather yes). However, employees did not perceive writing and/or receiving less emails mentionable reasons.

People regularly editing wiki articles did so most noteworthy, because they expected their contribution as a valuable one (45% said yes, 41% rather yes), realizing an individual benefit out of it (35% said yes, 30% rather yes), triggering colleagues for reciprocity (27% said yes, 50% rather yes), and responding to requests from colleagues (24% said yes, 48% rather yes).

Employees perceived the following individual benefits from the wiki: The wiki was partially able to ease their work (21% said yes, 41% rather yes), leading to more efficiency (19% said yes, 34% rather yes) and more effectiveness (10% said yes, 34% rather yes). They perceived slightly higher benefits for team and organization compared to their individual ones, explainable by referring to the 'knowledge sharing dilemma' [CC02]: Employees found the wiki to improve knowledge transfer (28% said yes, 48% rather yes), raise efficiency (19% said yes, 45% rather yes) and effectiveness (16% said yes, 33% rather yes) of team and organization.

Surveyed about their perceived obstacles preventing wiki utilization, employees stated less content (29% said yes, 41% rather yes), a low number of editors (26% said yes, 45% rather yes) and time consuming editing (21% said yes, 48% rather yes) most notably. Too much transparency as a result of the wiki was not perceived to be an obstacle.

Discussion and limitation of research

From our investigations we found wiki knowledge transfer to work fine between members of SUP-DEP but very limited between or towards other recipients. Although researchers and developers perceived the wiki as knowledge transfer instrument, they hesitated to use it, preferring traditional channels. Comparing the collected qualitative and quantitative data, we found the management to perceive higher benefits from the wiki than non-executive employees. We revealed that wikis in the enterprise suffer strongly from the knowledge sharing dilemma [CC02] while their pendant on the Web, Wikipedia, was able to overcome it, due to its extremely high number of users and derived from that, its still satisfactory number of editors. Unfortunately, enterprise-wiki users are comparable lower in number (cf. figure 1), and so are wiki-editors understandably (cf. figure 2). A clear and sophisticated business case declaring wiki-goals, content and value expected seems to be inevitable to adopt sustainable wiki-practices, which are Web-2.0-typically based on self-organization, within the enterprise.

One limitation of our findings generated is noteworthy: We investigated a single wiki within a single enterprise. Unfortunately, single case studies provide limited utility for generalization [Yi84]. Nevertheless, we perceive our declared goal, the presentation of first systematic findings on how a wiki facilitates knowledge transfer and learning within the enterprise, to be achieved. Future studies may now derive concrete hypotheses from our findings and test them.

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