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A framework for increasing business value from social media

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ABSTRACT

Organisations are investing heavily in various social media applications. Several case studies show that such undertakings may be promising at first glance, but often amount to little. More attention has to be paid to the factors that influence the business value of a social media application. The paper proposes a framework which argues that the business value of a social media activity depends on having a correctly identified purpose of its implementation (scope and targeted benefits), on the technological solution and also on user involvement (user groups, users' motivation and skills). The framework is evaluated with a longitudinal case study of a wiki in a software development company where an assessment of the business value of the wiki at two different points in time was made. The case study shows how the interplay of components led to failure at one time point and success at the other.

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1. Introduction

Organisations in virtually every industry are investing heavily in various social media applications such as blogs, wikis, and public and enterprise social networking sites (Kaplan & Haenlein, 2010; Levy, 2009; Panahi, Watson & Partridge, 2013; Shen, Cheung & Lee, 2013; Sultan, 2013). The pervasiveness of social media and relevance of user-generated content means that their influence on organisations is increasing (Kaplan & Haenlein, 2010; Mihalič, Praničević & Arnerić, 2015; Shen et al., 2013; Sipior, Ward & Volonino, 2014) and much is known about the use of social media in marketing (Biloš & Kelić, 2012). However, studies related to the use of social media in the workplace are still scarce (Charoensukmongkol, 2014).

A number of companies have succeeded in using social media internally to reduce costs, increase revenues and achieve competitive advantage (Huy & Shipilov, 2012). However, many have also failed to obtain benefits, and the risks of implementing social media are particularly high. There seems to be very limited understanding of its use for work purposes (Huy & Shipilov, 2012; Leftheriotis & Giannakos, 2014; Roberts & Piller, 2016; Sipior et al., 2014). Many executives thus eschew or ignore this form of media because they do

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not understand what it is, the various forms it can take, how to engage with it, or how to generate business value (Kietzmann, Hermkens, McCarthy & Silvestre, 2011). The definition of the business value of information systems is still ambiguous (Lee, DeLone, Tan & Corrales, 2014). In general, its dimensions depend on a variety of factors, including the type of a system, management practices, organisational structure and the environment (Melville, Kraemer & Gurbaxani, 2004). For the purpose of this paper the business value can be defined as the impact of investments in social media on the performance and capabilities of economic entities (adapted from (Schryen, 2013)).

Appropriate use of social media tops the agenda of many organisations (Chua & Banerjee, 2013). Previous research has contributed to the understanding of what drives people to mass collaboration, such as open-source software development or Wikipedia (Arazy, Gellatly, Soobaek & Patterson, 2009; Trkman & Trkman, 2009). Still, many questions need to be explored across different social media applications (Panahi et al., 2013). Too little is known about their success and failure factors (Ardichvili, Page & Wentling, 2003), and the extent to which firms are able to derive business value has not been systematically examined (Dong & Wu, 2015). How organisations determine when and how to use social media is one of the main questions awaiting further research (Ford & Mason, 2013). Even more important is what determines whether an internal social media initiative will lead to business value (Huy & Shipilov, 2012). Therefore, the main research question in this paper is to determine which factors influence the success of social media application implementation and should thus be considered in either planning or evaluation. To answer this question, a framework is proposed with carefully defined components that quantify the business value of a social media activity. The framework's evaluation of the business value is based on the following main components: purpose, technological solution, and user involvement.

An extensive literature review is used to develop a framework that attempts a holistic overview and categorisation of issues that need to be considered either before implementation of a social media application or in the analysis of its success. The use of the framework is demonstrated on a case study where the business value from a wiki is analysed at two different time points.

The structure of the paper is as follows: First, it highlights the need to further study the impact of social media. Then an extensive literature review is used to develop the proposed framework. The use of the framework is demonstrated on one longitudinal case study of a wiki as a knowledge management tool in a software development company. In the conclusion, the limitations of the study and future research ideas are outlined.

2. Background

Before analysing the use of social media within organisations in detail, the inconsistently used terms such as Web 2.0, social networking sites and social media need to be properly defined (Saxton, Oh & Kishore, 2013). Even in recent years some authors still use the terms 'social media' and 'Web 2.0' as synonyms (Reddick & Norris, 2013) while others even talk about 'Web 2.0 social media' (Korda & Itani, 2013) or consider social media as a subset/part of Web 2.0 (Dang et al., 2014).

The view that currently seems to be most widely held is that social media are the product of Internet-based applications that build on the technological foundations of Web 2.0, through which users create online communities to share information, and that collective

intelligence of users encourages more democratic use (Berthon, Pitt, Plangger & Shapiro, 2012; Kamel Boulos & Wheeler, 2007; Kaplan & Haenlein, 2010). *Social media* is a collective term for the various platforms and applications that allow user-generated content to be created and shared. It includes social networks, wikis, content communities, sharing sites and blogs. It has transformed Internet users from passive recipients of information into active participants in the generation of content (Hanna, Rohm & Crittenden, 2011; Kaplan & Haenlein, 2010; Mangold & Faulds, 2009). Social networking is a narrower term to describe a specific type of social media that allows individuals to construct a public or semi-public profile within a bounded system, and articulate a list of other users with whom they share a connection (Boyd & Ellison, 2007).

The professional press is full of hype concerning the benefits of implementing social media (Leuf & Cunningham, 2001). Yet, beyond this hype, experience shows that social media within a company often remains an underused tool for either information technology or other departments. The briefly presented case studies in the professional press can serve as commercials and certainly inspire managers to embark on similar ventures. However, their analyses rarely go beyond 'the importance of a knowledge-sharing culture' and cannot serve as guidance. Too often the adoption of social media is not controlled (Oliveira & Watson-Manheim, 2013). Without a systematic approach to managing social media success, enthusiasm for social media applications will fade (Hirschheim, Murungi & Peña, 2012).

Many authors have extensively studied critical success and failure factors of software projects (Trkman, 2010; Vrhovc, Hovelja, Vavpotič & Krisper, 2015). Most concluded that corporate social media applications lack efficient information organisation, give little credit for users' contributions, leading to decreased participation, and low-quality assurance (Lykourantzou, Papadaki, Vergados, Polemi & Loumos, 2010). While these factors are no doubt important, they are more a consequence of bad planning than reasons for failure. A thoughtful decision regarding the initial adoption and building of communities is crucial (Culnan, McHugh & Zubillaga, 2010).

The benefits can vary for different social media applications and kinds of shared knowledge (Haas & Hansen, 2007). They may include the quicker integration of new employees, better collaboration of geographically dispersed units, timeliness of information and increased efficiency (Ardichvili et al., 2003). Yet the frequent assumption that the adoption of viable and usable knowledge management tools will ultimately lead to time and cost savings due to their ease of use and collaborative nature (Grace, 2009) is very dangerous. As stated above, this increased performance can materialise in different ways.

In this respect, the main question is whether the value from social media applications differs from 'normal' information systems and, consequently, whether a special focus is needed at all. Critical success factors from 'normal' information systems obviously apply here as well, such as the support of top management, proper leadership, communication, quality of information systems and motivation and training of end-users (Petter, DeLone & McLean, 2008; Trkman, 2010). However, social media applications are different for several reasons (Kane, Alavi, Labianca & Borgatti, 2014; Shen et al., 2013):

1. Social media pose challenges for governance and credibility or verification of content (Bertot, Jaeger, Munson & Glaisyer, 2010; Matthews & Stephens, 2010). In a typical information system, an administrator controls the content and operations. Furthermore, strict rules exist regarding who has permission to access or edit which

part of the data, and define the role of the information system in the company's operations. This is usually not the case in a social media application; as a result, its purpose can quickly be lost. Therefore, social media initiatives have elevated the importance of information technology (I.T.) governance and broader guidelines are needed (Deans, 2011).

2. Regarding user involvement, social media changes the conditions for user participation (Johnson & Hyysalo, 2012). Users can be forced to enter data about a customer in, say, an order management or accounting information system. Furthermore, the completeness and quality of those entries can be controlled. It is much harder to force a user to improve a wiki post or to share knowledge on Yammer because it is hard to specify what improvement means or what a good post is. The role of user involvement is thus different depending upon whether the use of the system is mandatory or voluntary (Hartwick & Barki, 1994)
3. Similar challenges arise in measuring a social media application's impact (Murdough, 2009; Neiger et al., 2012). Managers demand evidence of potential return on an investment before investing money or time (Guinan, Parise & Rollag, 2014). Even if a manager nominally supports a social media application and attempts to reward contributions to it, the lack of measurable outcomes makes this support short-lived. A typical story is a fresh-out-of-university software developer whose boss first instructed him to update the company's knowledge base in a social media application as frequently as possible. After two months, the same boss criticised him for doing so: *'We cannot bill this to our clients!'*
4. The low costs of implementing and running social media applications are exciting (Kaplan & Haenlein, 2010), but may be problematic. First of all, most costs can be hidden since the employees themselves often do the work. Even more importantly, low costs can make a developed solution fly below the radar of the management. As one senior consultant says, *'The company needs to pay at least \$100,000. Otherwise, they do not take you seriously.'*

Because of these differences the social media applications require new frameworks for either planning or evaluating the achieved business value. Therefore, the next section proposes a new design science artefact – a framework for increasing business value from social media.

3. Proposed framework

3.1. Design science approach

The paper follows the design science research paradigm which can be seen as a quest for understanding and improving human performance. It is solution-oriented, using the results of description-oriented research to produce knowledge that can be harnessed when designing solutions to field problems (van Aken, 2005). Key elements distinguishing design research from behavioural information systems research are the ability to explore new, as yet un-theorised areas and the use of constructivist rather than statistical methods (Kuechler & Vaishnavi, 2012).

Design science research involves the construction of a wide range of socio-technical artefacts such as decision support systems, governance strategies, and methods for evaluating information systems (Gregor & Hevner, 2013). Design science research should be used to

develop practical knowledge not only for the design of novel I.T., but also for its governance and management (Carlsson, Henningson, Hrastinski & Keller, 2011).

Design science was traditionally considered the provenance of technical disciplines such as computer science (Hevner & Chatterjee, 2010). However, it is now a well-established research methodology in the information systems discipline in which new knowledge is produced by the construction and evaluation of 'artefacts' (Kuechler & Vaishnavi, 2012). The result of design science research is, by definition, a purposeful I.T. artefact created to address an important organisational problem (Hevner, March, Park & Ram, 2004). Artefacts should be created in such a way to enable the representation, analysis, understanding and development of successful information systems within organisations (March & Storey, 2008).

The objectives of the proposed artefact need to be clearly identified (Peffer, Tuunanen, Rothenberger & Chatterjee, 2007). In this case, the overall objective is the development of a 'framework for increasing business value from social media applications'. The main problem is that many companies which invest in social media applications do not know how to manage them to drive an increase in the business value. To answer that question, the framework offers an organised set of components.

Previous research has elucidated components that affect the likelihood of a social media application bringing business value. Among several research papers, the most interesting include a framework for the wiki adoption process (Grace, 2009) or an exploratory model to guide organisations in adoption of knowledge maps (Lee & Fink, 2013). Yet, despite previous attempts, an easily usable framework generally applicable to various types of social media applications is still missing.

A company needs to develop a strategy congruent with and suited to different social media functionalities and the goals (Hovelja, Vasilecas & Rupnik, 2013; Kietzmann et al., 2011). Therefore, the framework needs to be quite broad and generic. The differences between organisations mean that the approach of one organisation may not work for another (Levy, 2009). In addition, the framework should deliver the necessary measures to not only use social media applications for knowledge exchange (Matschke, Moskaliuk & Cress, 2012), but also to increase the likelihood of their positive impact.

The framework stipulates that an increase in business value from social media requires: a clearly identified purpose of the social media application (what is the intended scope and which problems it attempts to address), a carefully chosen technological solution and proper involvement of users (which are the main user groups, why the users will be motivated to participate, and how they will acquire the needed skills). Afterwards, one can expect a large group of readers and consequent business value (for example, improved knowledge of individual employees, better decision-making, and lower costs of information management). Figure 1 summarises the framework's (sub)components.

3.2. Purpose

3.2.1. Scope

'Artificial' communities (those initiated by a company) need a careful ex-ante analysis of the desired scope of the content. An attempt to capture all knowledge individuals possess will lead to chaos, not comprehensiveness. This is even truer of social media applications, since they can serve a variety of purposes. As an example: a wiki can be merely a project documentation repository, but can also aid software development, e-learning, project and

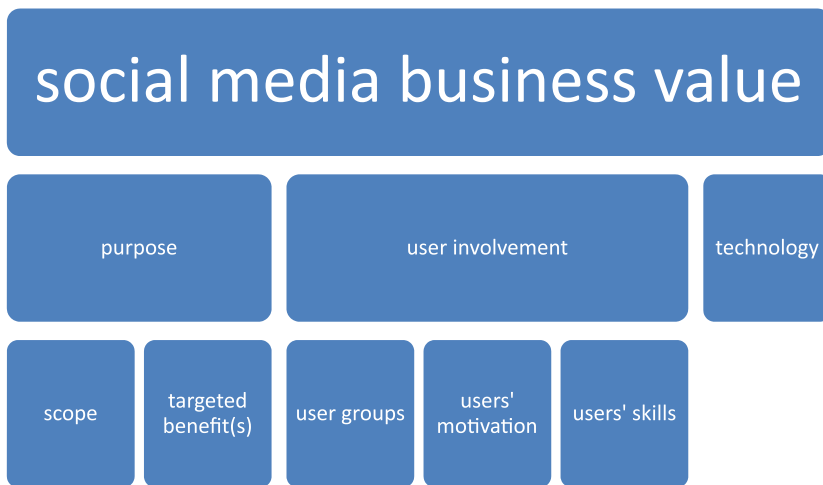


Figure 1. A framework for increasing a business value of a social media application. Source: Authors.

knowledge management, tech support, innovation and customer relationship management (Bastida, McGrath & Maude, 2010).

The easiest way to identify the scope is to provide social media support for already existing communities. Consider the case of Xerox and its Eureka system that supports the exchange of knowledge between technicians. The technology did not create a new community, but provided support for an already existing one: technicians sharing ‘war stories’ about successful equipment repairs. Over 95% of Xerox service technicians access Eureka daily, with cost savings for Xerox estimated at over USD 30 million annually (Gordon, 2010).

Often a social media implementation group very strictly defines what information should be added to the application. One I.T. service company with 750 employees clearly stated it should include certain data about customers and projects. This encompassed glossaries, frequently used terms, project names and explanations. However, meeting minutes, project-relevant knowledge, knowledge related to interpersonal communication were not to be included to avoid confusion with the existing intranet (Stocker & Tochtermann, 2011). This last point is especially important – regardless of the scope of a new application, it is very likely that several similar tools are already being used. Companies should delineate the scope of the new one and, if necessary, bring the operation of the existing tools to an end.

The purpose of a social media application can even be embedded in its ontology or semantics. One wiki intended as a quality management system for software development projects had semantic web ontologies which captured its core purpose (García et al., 2010). Thus, while the content of a social media application is left to the users, its purpose is firmly set by its creators.

This importance of an embedded purpose may seem in direct contradiction with the best-known wiki, namely Wikipedia. Wikipedia is sometimes portrayed as lacking oversight, allowing everyone to publish anything. However, closer analysis shows that even Wikipedia is an organisation with highly refined policies, norms, and a technological architecture that supports organisational ideals (Forte, Larco & Bruckman, 2009). Wikipedia has well-developed governance and a clear purpose that arose from a unique set of circumstances and

pressures from different stakeholders and regulating influences at different points in its history (Forte et al., 2009). It is highly unlikely that such a clear purpose and well-developed governance would arise in company's social media application without careful ex-ante planning.

3.2.2. Targeted benefit(s)

A social media application should not simply be a new exciting tool for management or the I.T. department. To provide value to an organisation, it must address a clearly specified organisational problem. A broad goal such as 'knowledge sharing' is too fuzzy. Various possible benefits include improving knowledge capture, easing transfer of knowledge, improving project or software documentation, and providing greater traceability. The identification of targeted benefits is thus even more important because they provide the basis for setting the appropriate metrics. An organisation should carefully consider what success of the social media application actually means in its particular case and how it should be measured.

A company should therefore define what success means for the various stages, starting from initial implementation to yearly benchmarks (Thackeray, Neiger, Smith & Van Wagenen, 2012). The value of such exercises goes beyond the tracking of progress; it serves to assure that all stakeholders (for example, different top managers, middle managers and key users) share the same view of the targeted benefits.

3.3. Technology

The purpose of a social media application is closely connected with the choice of a proper technological solution (Berthon et al., 2012; Kovačič, Bosilj Vuksić & Lončar, 2006). For example, in the case of wikis many different wiki software items exist (see <http://www.wiki-matrix.org>) including open-source software such as MediaWiki, TWiki, WikiWikiWeb, and commercial solutions such as Confluence and Socialtext (Kiniti & Standing, 2013). With so many alternatives, it is important to identify the advantages and disadvantages of each. TWiki pages can include forms for use in issue tracking or building other wiki applications. MediaWiki lacks such features but is popular as a project cooperation platform because it is familiar (thanks to its use by Wikipedia) (Louridas, 2006). Yet a few desirable functionalities are missing. While they can be provided with the installation of various extensions (Trkman & Trkman, 2009), this requires extra effort by developers and consequently raises the implementation costs.

Guides to social media implementation often assume its applications are easy to install and even easier to maintain, requiring no work from I.T. except installation and regular backups, as well as being easy to integrate into existing technology infrastructure. There should almost never be any problems and the training and troubleshooting should be minimal and require very little additional time investment. The nature of the software and ease of its use should draw users in naturally (Bastida et al., 2010).

However, this is a dangerous assumption, far from the reality. Several important questions regarding the technology need to be answered. They include installation requirements, ease of installation, support for attachments, permissions, page locking and other authentication features, and which third-party installable extensions are available. Novell, for instance, uses TWiki because it offers one crucial function: the ability to put access control on certain

pieces of content. Selected content should only be shared within the team, not around the company (Weinschenk, 2007).

3.4. User involvement

For any social media application to add value, user involvement is crucial. Success is not possible without user-generated content and users' creativity (Kiniti & Standing, 2013). Low employee acceptance is the main impediment here, so it is important to understand employees' motivation for usage (Leftheriotis & Giannakos, 2014). To ensure the active involvement of users, the following subcomponents are important.

3.4.1. User groups

Only a small proportion of users are likely to actively contribute. For example, only 0.1% of Wikipedia visitors are active contributors. Companies cannot rely on such a low percentage to develop a vibrant community in their social media application since collaborative tools often support relatively small groups (Arazy et al., 2009; Garcia-Perez & Ayres, 2010). It is thus highly unlikely that random activity by users will generate enough knowledge base to serve as a good starting point for enhancements of information and structure. To be vibrant, a community needs a proper combination of active (those posting new contributions) and passive (those reading, using online search or posting questions) members (Ardichvili et al., 2003; Trkman & Trkman, 2009).

Companies should put a core group of users in charge of preparing the initial content. These users can then provide the motivation, guidance and useful content to other potential users. Even the Wikipedia community, which seems disorganised at first sight, has remained healthy due to continued presence of 'old-timers' who carry a set of social norms and organisational ideals (Forte et al., 2009).

An interesting example of assuring users' proper involvement is a wiki implementation at Hewlett-Packard Analytics. It appointed 4% of its employees as so-called single points of contact to serve as wiki champions for their department/group. Hewlett-Packard Analytics had about 40 such employees meant to drive the wiki's development further (Teo, Nishant, Goh & Agarwal, 2011). In a similar fashion, a German commercial bank officially asked key employees to dedicate a certain percentage of their working time to develop the content.

In a more open way, active users do not necessarily have to be the company's employees. A social media application can extend beyond knowledge management within an organisation to allow customers to participate in joint content development and 'peer production' of content (Sipior et al., 2014; Wagner & Majchrzak, 2006–2007). For example, if a customer needs access to project documentation, they can be provided with access to the wiki. In addition, the customer can also contribute to developing that documentation. An important decision in this regard is who can have active or passive access to the content. Often a department within a company may be unwilling to reveal its knowledge to outsiders from a different department or even a different company. Managing the risks connected to knowledge sharing and overall use of social media is thus vital (Trkman & Desouza, 2012).

3.4.2. User motivation

A well-known fact from 'conventional' information systems is that systems do not increase business value; users do. If the desired improvement conflicts with user motivation, a system

alone will not solve the problem; either people's incentives or the system should be changed (Markus & Keil, 1994).

The main motives for participation in a social media application are the perceived value of own contributions, the expectation of individual benefits, perceived enjoyment, and encouragement from colleagues. In addition, expected reciprocity and social ties play a crucial role (Stocker & Tochtermann, 2011). Colleagues can have a positive influence on an application's acceptance, but can also have a negative one if some do not believe in it or consider it a waste of time (Lee & Fink, 2013). Although sharing knowledge can enhance the sharer's reputation and expand his/her influence (Lin, 2007; Wasko & Faraj, 2005), these benefits may not be persuasive enough when sharing one's knowledge is seen as costly. The perceived costs do not just include invested time but also a threat to self-interest, potential abuse of knowledge by the recipient or the giving away of power.

Top management needs to think about how to assess and reward individual contributors and the community as a whole. While selection of domain experts as a core group sounds logical, they are normally also the busiest individuals and thus need proper extrinsic motivation, such as an enhanced reputation or even financial benefits. The individual's sense of self-worth through sharing knowledge needs to be assured (Alberghini, Cricelli & Grimaldi, 2014; Bartol & Srivastava, 2002). Financial incentives may not be most appropriate in all cases. In one such case, many employees interpreted this as a coercive measure and posted entries of questionable quality simply to satisfy the directive (Huy & Shipilov, 2012). Therefore, anticipated extrinsic rewards can harm individuals' knowledge-sharing attitudes (Bock, Zmud, Kim & Lee, 2005).

In some cases, such as a wiki, authorship might not be claimable, although various techniques can estimate the quantity and quality of contributions (Arazy et al., 2010). If employees perceive editing as a waste of time or think that others will not make an effort, their own effort will also be limited (Seba, Rowley & Delbridge, 2012). Over time, initial efforts to motivate users should lead to a virtuous circle, with the success of the social media application driving the motivation of existing and new users. Wikipedia is an ideal example of this, as is Novell, where over the years the open-communications mentality has really taken hold (Weinschenk, 2007).

3.4.3. User skills

An obvious barrier to implementing social media is that employees lack I.T. and communication skills (Berthon et al., 2012). A social media application is often deemed easy to use (and often has a 'what-you-see-is-what-you-get' editor). A typical expert's comment regarding such an application was that *'the use is as simple as writing text with Microsoft Word'*. However, an immediate response to that was: *'Word is simple only when you know how to use it'* (Trkman & Trkman, 2014). Training is thus an important factor in the adoption of a social media application and key users should be helped to develop the necessary skills (Huy & Shipilov, 2012; Lee & Fink, 2013; Sipiior et al., 2014). Management should organise formal training for them, preferably even before the pilot version is developed. Formal training also reduces uncertainty about the new application and improves perceptions of it (Agarwal & Prasad, 1999). The employees would thereby be competent to give suggestions about the initial structure, design and content. If employees can influence implementation, they are more likely to take the results seriously.

Furthermore, training is not solely about providing the skills needed to use the application. It also gives users a clear message that the organisation supports the use and is willing to invest time and resources in it. Basically, it gives a clear signal that this is not 'just another information system' that does not need special attention, an attitude that can be one of the main impediments to the adoption of a social media application (Vuori & Okkonen, 2012). Training is also another opportunity to make people comfortable using the social media application (Costello & Bosque, 2010) and to resolve potential issues regarding its purpose and technological capabilities. To ensure high user involvement both autonomous motivation and ability are crucial (Reinholt, Pedersen & Foss, 2011).

Training is important even for computer-savvy users. Anxiety experienced by users is not necessarily related to computer anxiety but can be social media specific. In one experiment, instruction-based training led to better usability ratings than more exploratory learning techniques such as self-use tutorials (Cowan & Jack, 2011). While these findings were the result of an experiment involving first-year students, they are likely to be even truer in a workplace where employees have limited time to 'play' with a new application.

Training is, however, not a one-off activity. Existing and new users should be continually trained. In a successful social media application, the users themselves often do the training. A typical example is the San Diego State University library, where training new staff members how to use a wiki-based intranet shifted from a responsibility of the webmaster to a departmental duty (Dworak & Jeffery, 2009). However, while users are not afraid to ask for help in the anonymous environment of the Internet (Zhang, 2013), employees may be reluctant to ask their colleagues for help, as that might reveal their lack of skills and knowledge (Lee, 1997). More formal means of support, such as a help desk, could reduce this 'fear of embarrassment' (Cimperman, Makovec Brenčič, Trkman & de Leoni Stanonik, 2013).

4. Case study

A longitudinal case study of the use of a wiki was conducted. The wiki was created to be used by a software development department with 45 employees. The implementation lasted from March until July 2007. It included customisation of a MediaWiki with some extensions and the preparation of initial content. One of this paper's authors cooperated in the implementation of the functionalities and the initial content of the wiki. The employees used it for a year without any external influence.

For the ex-post analysis in 2008, a total of 21 surveys were distributed among the employees at that time (see the questions in Appendix 1). 17 questionnaires were returned, constituting an 80.9 per cent response rate. The department's manager was interviewed (the interview protocol and semi-structured questions are in Appendix 2). Both web logs (history of edits, number of edits) and current structure (the organisation of wiki pages as the whole, and the organisation of content within wiki pages) were analysed. The final evaluation of each of the framework's constructs and its impact on business value was carried out by researchers and the department's manager.

Based on the ex-post analysis in 2008, an ex-ante analysis (in the same year) gave formal recommendations for increasing business value. The recommendations were created by a team of external academics and the department's manager. After that, the wiki was used again without external influence for 3 years, followed by a second ex-post analysis in 2011

with the same data collection methods as in 2008. This time 12 employees were surveyed as several of previous employees left the company and the total number of employees decreased.

The framework was used to both analyse the role of frameworks' components in achieving business value (ex-post analysis in 2008 and 2011) and recommended how to influence those components to increase future business value (ex-ante analysis in 2008).

4.1. Purpose

4.1.1. Scope

In 2007 the department manager defined a selection of topics not being covered by available applications. Those topics were tips and tricks for everyday work, protocols for testing software and hardware and the department's documentation under development (e.g., user manuals for a specific device). In addition, links to other useful information on the Internet and intranet were to be added. In the ex-post analysis in 2008, the richness of given topics varied. The richest knowledge base was in two topics: 'tips and tricks', and 'testing protocols'. On the other hand, links to Internet pages were not used since '*Google finds it all*' and the topic 'documentation under development' was poor. Consequently, the 'documentation under development' topic was removed. The reasons for the latter are discussed in Section 4.3. The ex-ante analysis in 2008 recommended that the focus on the topic 'tips and tricks' should remain the same. On the other hand, the topic documentation under development was dropped because the MediaWiki tool proved to be inappropriate to support it. The topic testing protocols should additionally contain testing results which could help developers with more efficient coding. Furthermore, a new topic called 'the big picture of the department' was introduced for the reasons explained in section 4.2.2. The ex-post analysis in 2011 showed three topics existed: 'tips and tricks', 'protocols for testing' and 'the big picture of the department'. The users were in general satisfied with the way in which the scope of the application has evolved.

4.1.2. Targeted benefits

In 2007 the department manager decided to implement a new system, mainly to solve two problems. First, his domain experts (often project leaders) were too occupied with repeated queries from newcomers. The targeted benefit was to lower the number of these and free up experts' time. Second, because of high employee turnover, the tacit knowledge of the employees was being lost. The targeted benefit was to write down the knowledge so it remained available for everyone in the department.

The ex-post analysis in 2008 showed that the first targeted benefit was not achieved. The domain experts had not become any less occupied with repeated queries. However, the second targeted benefit was achieved, since employees' tacit knowledge concerning testing tips, tricks and protocols was successfully communicated through the wiki. The ex-ante analysis in 2008 revealed that the department's manager still wanted to relieve his domain experts, so a new topic, '*the big picture of the department*', was added for the newcomers. The topic was set to contain general information about the department's activities. The development team proposed an extension of the second targeted benefit, that testers' tacit knowledge about testing results should be written down as well, to lower coding error rates.

The ex-post analysis in 2011 showed that all three targeted benefits were achieved: the domain experts felt less occupied with repeated queries from the newcomers, the tacit knowledge was now written down on wiki, and the perceived error rate in the coding was now lower.

4.2. Technology

In 2007 the department manager looked for suitable software to serve the previously defined purpose. He desired an application that would enable every user to relatively easily edit the content. He chose a MediaWiki tool, which offers many editing functionalities such as an automatically created index of an article, versioning of articles, linking, search box navigation, special pages for administration, and categories. Nevertheless, a few desirable functionalities were missing. While changes to a configuration script were relatively easy, the installation of additional extensions (such as presenting a PDF document within a wiki article) was more challenging.

The ex-post analysis in 2008 showed the implemented extensions were used, but not as much as expected. For example, only one user used an extension called 'Pdf' to contribute to the documentation under development. The trouble was that PDF documents could not be edited, only viewed. Therefore, the user needed to update the document externally and upload the new version of the PDF to the wiki. Another challenge with edits to the documentation under development emerged when users needed to export multiple wiki articles (with text and images) into a custom PDF document. The users concluded that sharing documents under development via shared folders on servers was a better option.

In the ex-ante analysis in 2008, use of extensions was not encouraged since they have caused a lot of user dissatisfaction. No recommendations for changing the technological capabilities were made. At the time of the ex-post analysis in 2011, the technology had not been changed. Nevertheless, some of the users had ideas how the wiki should support the users in a specific manner, which would require a technological upgrade.

4.3. User involvement

4.3.1. User groups

In 2007, domain experts of the department gave the green light: *'yes, let's try to obtain the tacit knowledge of our department through this pilot wiki'*. The users were divided into two groups: 'younger colleagues' and 'domain experts'. The ex-post analysis in 2008 revealed there was no consensus among department members on who was obliged to write or manage the topics. Interestingly, the users of the wiki were not divided into the expected user groups but into 'testers', 'developers' and 'newcomers'. The wiki was beneficial to two groups of users: to testers who were sharing their testing tips, tricks and protocols among themselves, and to developers who read the content about testing protocols. On the other hand, the newcomers did not have their base of knowledge because they did not feel comfortable sharing their perceptions of the domain experts' answers. The recommendations in the ex-ante analysis in 2008 were to focus on the three observed groups and change the wiki's topics and targeted benefits accordingly. The ex-post analysis in 2011 showed that focusing on the three observed groups of users was a good idea, since they all gained targeted benefits.

4.3.2. Users' motivation

In 2007 the department manager thought that the targeted benefits were enough to motivate users to use the wiki. But the ex-post analysis in 2008 revealed that not everybody in the department liked the idea of having a wiki. Some laughed at it openly when seeing incorrect information and could not be convinced it could bring any benefits. Some said: '*it would take ages to do it properly, I do not have time for this*' and '*what do I get from writing my knowledge down? Right now, I am irreplaceable*'. Nevertheless, a smaller group of employees contributed. These employees had at least one of the following characteristics: a great relationship with the department manager, trouble finding domain experts in person, or simply believed that the wiki's content would be beneficial. Also, the testers used the wiki on a daily basis.

The ex-ante analysis in 2008 showed that the testers obtained several additional benefits of their contributions within less than a year which became reasons for further use of the wiki. Better communication supported by the wiki improved their personal relationships, personal performance and, consequently, group performance as well. The motivation for them was clear: being part of an effective testing team. Next, the user group of developers felt motivated to read the testers' content because it carried valuable information which enabled coding with fewer errors. On the other hand, the user group of newcomers did not feel motivated to cooperate in either of these topics. In general, they did not want to expose themselves. The recommendation was that the department's manager and the domain experts should promote the wiki's use to the newcomers by constantly highlighting opportunities for making edits. The domain expert should then check the written text weekly. The ex-post analysis in 2011 showed the newcomers had massively increased the number of their edits.

4.3.3. Users' skills

In 2007 user training was proposed but not approved. The opinion of the department manager and domain experts was that, since the wiki was so easy to use, employees should be able to use it without extra training. This poorly introduced the wiki and its purpose to users.

The ex-post analysis in 2008 showed that users were in general dissatisfied with the wiki's structure of the content. Since the department manager was not keen on training sessions, a dedicated administrator for structuring the content was recommended. Additional suggestions were that the users should systematically use 'categories' to group the common articles.

The ex-post analysis in 2011 showed users were generally satisfied, since they were able to relatively easily find the wanted information in the pool of many wiki articles. The activities of the administrator, the support of department's manager, opportunities and time were key factors for gaining the skills needed to use wiki.

5. Discussion and conclusion

The proposed framework provides a conceptual overview of issues that need to be considered either in either planning or analysing an implementation of a social media application. The *purpose* component focuses on analysing the scope of the content (topics) and the targeted benefits. *Technology* is analysed in terms of the support for users' needs and the content-specific requirements. The *user involvement* component analyses the choice of user groups, their motivation and the needed skills.

The use of the proposed framework was demonstrated on a case study of wiki implementation where two types of analysis were conducted, namely, ex-post and ex-ante. The use of the ex-ante analysis proved to be beneficial as it enabled the department to increase the business value from a social media application (as demonstrated by the second ex-post analysis).

An interesting question is its practical contribution, namely how the framework can help other organisations. In planning the implementation of a social media application, the organisation should use the framework to identify the main questions to be solved before the implementation (e.g., who will be the users, why they will get involved, how they will acquire skills, what is the scope, and which are the targeted benefits). Also, it can be used to facilitate discussion in the project team and to prepare a short 'executive summary' (e.g., on one page) of the topics that need to be considered: namely purpose, technological changes that need to be carried out, and the role of users. The team should also write down the main assumptions and targeted benefits. All these can then be used in the ex-post analysis to evaluate whether the expected business value was achieved and, if it was not, which corrective actions should be taken.

The paper has several limitations. Firstly, the selection of the components is partly arbitrary. Qualitative measures were used to measure perceptions, while quantitative measures are missing. They could be used, for example, to measure the number of coding errors for a certain period of time without and, later, with social media application support.

Moreover, measurement scales for each component should be developed. There is a need for the development of theoretically based variables that are more precise, more specific and have scientific and managerial value for testing. This would also allow statistical analysis (such as structural equation modelling) to investigate the proportion of explained variance in business value. Secondly, the framework was applied to only one social media application, a wiki. To confirm that the framework is suitable for various social media applications, further research should analyse cases of the use of public and enterprise social networks, content communities and other social media applications. It should investigate whether important components are missing or whether some (especially technology) should be further divided. Thirdly, while the framework attempted to be generic for all kinds of organisations, both the case study and the reviewed literature referred mainly to companies. For example, non-governmental organisations do not have the same means to develop formal management.

A thorough understanding of the circumstances that enable them to obtain business value from social media applications is needed (Matschke et al., 2012). The components of the framework may still apply, but the nature of the targeted benefits and the possibilities to influence each of the components would vary considerably. In any case, careful consideration of the roles of the framework's components increases the likelihood that a social media application will not just be a fancy new tool for employees or management of the organisation, but will bring measurable business value.

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Appendix 1: Survey questions

Note: Possible answers are given in the brackets. Neopedija is the name of the social media application that a company was using

Answered by everyone:

- To which department do you belong? (testing; development; marketing)
- How often do you search for information on Neopedija? (once per day; once per week; once per month; once per year; never)
- How often do you edit Neopedija's pages? (once per day; once per week; once per month; once per year; never)
- Do you use the following functionalities of Neopedija? (equation editing; articles' categories; dynamic listing; access restrictions; multi-file uploading; PDF)
- Do you click on hyperlinks to other articles? (yes; no)
- How often do you search for hyperlinks? (Likert scale 1–7)
- How often do you edit hyperlinks? (Likert scale 1–7)
- How often do you personally ask domain experts for help? (Likert scale 1–7)
- How often do you first search for answers on Neopedija? (Likert scale 1–7)

Answered only by the developers:

- Do you search for information needed for development? (yes; no)
- If yes, how often? (Likert scale 1–7)
- Do you edit the information on Neopedija? (Likert scale 1–7)

How relevant is information on Neopedija for official development documentation? (Likert scale 1–7)

Answered only by the testers:

- How often do you search for information about testing protocols? (Likert scale 1–7)
- How often do you edit information about testing protocols? (Likert scale 1–7)
- How relevant is information on Neopedija for official testing documentation? (Likert scale 1–7)

Answered by everyone:

- Do you write any other type of information at Neopedija's pages (e.g., customer related)? If yes, what kind of information? (open type question)
- What motivates you to participate (read and/or write) at Neopedija? What do you like or dislike? (open type question)
- Did you first get personal benefits from reading Neopedija before actively editing it? (open question)

- What are your personal benefits of Neopedija? (open type question)
- What are your working group's benefits of Neopedija? (open type question)

Appendix 2: Interview protocol

The following questions were used for a semi-structured interview with the department's manager:

- What is/will be the scope of Neopedija's content? (purpose)
- Which problems of the organisation are to be/will be solved by the use of Neopedija? (purpose)
- Which technology is/will be supporting Neopedija? (technology)
- Who are/will be the users? (user involvement)
- Why do/will the users get involved? (user involvement)
- How do/will the users acquire the skills? (user involvement)

The protocol of the interview was as follows. For the ex-post analysis the questions were in present tense. After the department's manager answers, the ex-post analysis based on the results of the survey, web logs and the content's structure was presented. The wiki's benefits for the organisations were discussed along with existing problems. In ex-ante analysis the researchers and the department's manager set targeted benefits for the Neopedija and, according to them, made plans for the future by answering the six questions in future tense.