

Henri Pirkkalainen

Globally Distributed Knowledge Sharing in Social Software Environments: Barriers and Interventions



JYVÄSKYLÄ STUDIES IN COMPUTING 196

Henri Pirkkalainen

Globally Distributed Knowledge
Sharing in Social Software Environments:
Barriers and Interventions

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ABSTRACT

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The benefits of adopting social software in organizational knowledge sharing activities have been argued to improve communication and outreach to key stakeholders. In such situations, social software, collaboration and networking enabling tools are adopted to support both formal and informal exchanges of knowledge. These attempts to integrate social software into distributed collaboration very often fail in both private and public organizations. As an example, there is a high amount of interest toward the uptake of social software to support the knowledge sharing of educators in educational institutions. Still, most of the services and tools fail to attract users. Investigations explaining the reasons for the failed attempts have reported a variety of interpersonal and organizational barriers that disrupt adoption. The available knowledge about overcoming these barriers for the successful usage of social software in distributed knowledge sharing is still shallow. Previous studies have overlooked the interdependencies of the barriers affecting adoption, and especially, the role of cultural barriers in the knowledge sharing activities that are supported by social software. This thesis addresses the research gap by investigating the context-specific and interrelated barriers that need to be understood to find suitable and sustainable interventions to overcome the barriers. The empirical investigation that applies both quantitative and qualitative methods to study the identified research gap was situated in the open education domain. This dissertation provides organizations with a basis for implementing their knowledge management strategies on social software. The findings point out how the barriers to knowledge sharing in social software environments can be explained through organizational, social, cultural and technical dimensions. The results indicate that the barriers truly are interlinked, and are context- and even age-dependent. Of the identified barriers, cultural ones are most likely to lead to the decreased motivation of the users of social software. This dissertation offers a framework to support the coordination activities of knowledge management when social software is being considered for adoption. The results from the empirical studies provide evidence and analysis support for finding sustainable ways to overcome the barriers. As most of the barriers are not technical, the interventions to overcome them have to be addressed in a holistic manner, from both organizational and technical perspectives.

Keywords: barriers, knowledge sharing, social software, open education

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- I. Pirkkalainen, H., & Pawlowski, J. (2014). Global Social Knowledge Management – Understanding Barriers For Global Workers Utilizing Social Software, *Computers in Human Behavior*, 30, 637-647.
- II. Pirkkalainen, H., & Pawlowski, J. (2013). Global Social Knowledge Management: From Barriers To The Selection Of Social Tools, *Electronic Journal of Knowledge Management*, 11 (1), 3-17.
- III. Pirkkalainen, H., & Pawlowski, J. (2012). The Knowledge Intervention Integration Process: A Process-Oriented View to Enable Global Social Knowledge Management, *International Journal of Knowledge Society Research*, 3 (3), 45-57.
- IV. Pirkkalainen, H., Jokinen, J.J., & Pawlowski, J. (2014). Understanding Social OER Environments – a Quantitative Study on Factors Influencing the Motivation to Share and Collaborate, *IEEE Transactions on Learning Technologies*, pre-print available.
- V. Pirkkalainen, H., Jokinen, J., Pawlowski, J., & Richter, T. (2014). Overcoming Cultural Distance in Social OER Environments. In S. Zvacek, M. Restivo, J. Uhomobhi, & M. Helfert (Eds.), *CSEDU 2014: Proceedings of the 6th International Conference on Computer Supported Education: Vol. 1 (15-24)*. Portugal: SCITEPRESS – Science and Technology Publications.
- VI. Pirkkalainen, H., & Pawlowski, J. (2014). Collaborating on ideas: Tackling Barriers to Open Education. In *World Conference on Educational Multimedia, Hypermedia and Telecommunications: 1/2014 (1844-1850)*. Chesapeake: Association for the Advancement of Computing in Education.

Henri Pirkkalainen was the first author in all papers and did the majority of the work for each article. In all of the papers, Prof. Jan Pawlowski helped in steering the work in the right direction as a supervisor. He also reviewed all intermediate versions of the papers, providing his comments and improvement ideas. In Articles IV and V, Jussi J. Jokinen provided his help in the data analysis, in using SPSS and also in reporting the results in a concise format. In Article V, Thomas Richter was invited to co-author the theoretical background of the paper as it touches upon the cultural aspects of E-learning, an area within which he has vast knowledge of both the topic and the research.

1 INTRODUCTION

Managing knowledge is a complex process in globally distributed organizations, and in distributed collaboration in general. As organizations are heading toward global markets rapidly, researchers and practitioners are looking for ways to improve the efficiency and effectiveness of distributed communication and collaboration (Krishna, Sahay and Walsham, 2004; Richter, Stocker, Muller and Avram, 2013). The evolution of collaboration technologies, and web services and techniques has enabled new types of browser-based, lightweight and cost efficient tools to emerge for both private and organizational usage (Levy, 2009). These workspaces and networking tools, which are often referred to as social software, have been seen as a potential solution for supporting the exchange of knowledge across global settings (Avram, 2006; Zheng and Zheng, 2010). One of the greatest opportunities of these technologies is the variety of modes of collaboration they support. While social software can be adopted as an enterprise platform to support the primary interactions of the employees (McAfee, 2006), it can also be adopted as a support mechanism to improve interpersonal communication (Zheng and Zheng, 2010) or as a networking tool to manage outreach to relevant communities of practice (Kaplan and Haenlein, 2010). At best, social software is even seen as a cure for the lack of physical collocation (Kärkkäinen, Jussila and Väisänen, 2010; Zhang, 2010).

Given all of the promises and expectations about support for the knowledge sharing of the key stakeholders in organizations, the adoption of social software has not been as smooth as expected. Previous studies have shown how the integration efforts of these technologies into organizational knowledge management suffer from many types of barriers that have either been witnessed or assumed to be the cause of the failed attempts (Leonardi Huysman and Steinfield, 2013; McAfee, 2006). As an example of such a barrier, the adoption of social software in organizations often lacks managerial direction and coordination and leads to poor results (Briones, Kuch, Liu and Jin, 2011; Kärkkäinen et al., 2010). The challenge of maintaining interpersonal relationships has also been argued to be a big concern when collaborators are globally distributed and used to different ways of working (Cachia, Compano and Da-

costa, 2007; Zhang 2010). These barriers have been reported for varying settings, from the business to business sector (Kärkkäinen et al., 2010) to academia (Matešić, Vuckovic and Dovedan, 2010) and schools (Agarwal, Tan and Poo, 2007).

Previous studies have been rather shallow when it comes to explaining ways to overcome the critical barriers to social software usage within specific organizational activities in globally distributed settings. As elaborated by Riege (2005) and Wang and Noe (2010) regarding knowledge sharing, barriers are often intertwined, related to one another and might not be handled separately. This dissertation looks into the interdependency of the barriers to knowledge sharing activities in social software environments, with the aim of identifying interventions to overcome the critical, intertwined barriers. The empirical investigation will especially focus on globally distributed knowledge management in the educational domain. The studied domain is extremely relevant, because the effort to adopt social software in cross-border teacher and student collaborations continues to increase, but so far, has been highly unsustainable and unsuccessful.

1.1 Theoretical foundation and research context

This section describes the key components of the dissertation. As the thesis has a strong focus on globally distributed knowledge sharing that is supported by social software, the theoretical background will highlight how that is addressed by previous research. The section concludes by explaining the implications and relevance of the topic in the educational domain, where the empirical investigations of the PhD research were conducted.

1.1.1 Sharing knowledge in organizations

Improving the communication of key stakeholders in organizations for the sake of efficiency and success continues to be a crucial topic for both research and practice (Alavi and Leidner, 2001; Richter et al., 2013). Studying knowledge sharing practices has been seen as a vital part of identifying ways to make organizational collaboration more transparent and to avoid a lack of information in relation to tasks that depend on the constant exchange of knowledge between individuals (Riege, 2005; Alavi and Leidner, 2001). While organizations strive to optimize their work practices and the ways people work together (Lee and Sukoco, 2007), it is not always easy to define moments when people need to find and construct new knowledge (Janz, Colquitt and Noe, 1997).

In relation to improving organizational performance through knowledge sharing, a variety of considerations and characteristics have been given to what *knowledge* is. Additionally, epistemological debates about the perspectives and nature of knowledge re-occur constantly in the literature. As argued by Alavi and Leidner (2001), defining *knowledge* is an important matter to understand the

context you are dealing with while searching for the “universal truth.” One definition for knowledge was given by Davenport and Prusak (1998), who explained it as a combination of experiences, values, contextual information and expert insights that enable the evaluation and construction of new experiences and information.

As a concept, knowledge is usually distinguished from data and information (Tsoukas and Vladimirou, 2001). While data can be seen as a sequence of items or events that does not have a meaning in itself (e.g., a list of numbers), information is a context-based arrangement of these items or events that shows the relationships of those items or events to something meaningful for a person (Ackoff, 1989). Finally, knowledge is a context-driven judgment on the significance of these items or events (Bell, 1999). Alternatively, as defined by Ackoff (1989), knowledge is a deterministic process that combines information into something useful. Knowledge can be viewed from the point of view of a state of mind that involves the learning of individuals or as a process that consists of knowledge flows between individuals and teams (Alavi and Leidner, 2001). Knowledge is usually addressed in research from a personal perspective, but epistemology can also be discussed at the corporate level, theorizing why and how organizations know (Krogh, Roos and Slocum, 1994). While the definitions of knowledge go beyond what is described above to levels of wisdom and understanding (Ackoff, 1989), the focus in this thesis is on the experiences and contextual information that are shared and constructed by individuals, according to the previous definition by Davenport and Prusak (1998).

Organizational knowledge sharing has been a crucial, but not yet fully understood aspect in Information Systems (IS) research, focusing mainly on collaboration in teams (Storck, 2000; Noll, Beecham and Richardson, 2010). The key aspects of knowledge sharing are related to turning tacit knowledge into explicit knowledge, and transferring that knowledge from one person to another (Nonaka and Takeuchi, 1995). While explicit knowledge, often discussed as information, can be transmitted through systematic language, tacit knowledge is hard to formalize because it relates to a person’s own understanding and involvement in a specific context (Polanyi, 1966). The approach for managing such transformation is especially challenging when the size of the project and the number of distributed individuals within the team increases (Desouza and Evaristo, 2003). However, as argued by Zack (1999), not all tacit knowledge should be made explicit, because one’s knowledge is an asset in a competitive environment.

Despite the long traditions in organizational knowledge sharing research, recent studies have still pointed out related barriers that are poorly understood and solved in organizations. As a persistent issue, keeping knowledge sharing active by avoiding lack of motivation and engagement of employees is a constant struggle in organizations (Wang and Noe, 2010; Hau, Kim, Lee and Kim, 2013). As argued by Kotlarsky and Oshri (2005), the focus of the IS studies on social aspects was, until recently, on co-located project teams. However, organizational practices have changed rather dramatically because of globalization

(Kotlarsky and Oshri, 2005) and the potential of using tools and technologies to support distributed working (Noll et al., 2010). The research conducted within the IS discipline for globally distributed working in software development has been paving the way for improving knowledge sharing in distributed settings. The studies on *global software development* have largely focused on collaborative practices in organizations (Noll et al., 2010; Herbsleb and Moitra, 2001). Within these investigations, the topics of organizational culture (Denison and Mishra, 1995), geographic distance (Carmel, 1999), management issues (Ågerfalk, Fitzgerald, Holmström, Lings, Lundell, and Conchúir, 2005) and trust building (Pyysiäinen, 2003; Sarker et al., 2011) have been observed. As argued by Gregor and Hevner (2013) and Kotlarsky and Oshri (2005), as an interdisciplinary research domain, IS research must not focus purely on technical issues but look at social aspects in relation to technology usage.

The research on virtual teams has focused on these social aspects. *Virtual teams* have been described as internationally distributed workers within an organizational mandate, working together in a technology supported way and making decisions that are complex and strategic in nature (Maznevski and Chudoba, 2014). The studies on making virtual teams successful can shed light on the issues that are crucial for working in distributed settings. The role of social issues related to trust and communication has been argued as a critical factor in the success of virtual teams (Sarker, 2011). Griffith, Sawyer and Neale (2003) showed how successful virtual teams need consideration when applying information technology to bridge individual and organizational knowledge. Sivunen and Valo (2006) argued that the technological choices for supporting virtual teams are poorly known. Within this thesis, the role of social software in supporting distributed knowledge sharing will be studied. The research conducted on knowledge management has been crucial in setting the theoretical foundation that extends and contributes to the perspectives presented above.

1.1.2 Knowledge management in research and practice

Knowledge management (KM) in an organization is defined as comprised of the phases of knowledge generation, transfer, accumulation, adoption and diffusion (Disterer 2001). In addition to providing organizations with a theoretical view on building and transferring knowledge, research on KM has provided input on making knowledge visible, improving knowledge sharing practices and building a knowledge infrastructure in organizations (Davenport and Prusak, 1998; Alavi and Leidner, 2001). The concept of knowledge management has received criticism because of the fuzziness of the terms related to it. One example of such criticism was directed by Wilson (2002) toward IS researchers who actually focus on information sharing instead of knowledge sharing, as “knowledge” cannot really be managed by people. Wilson’s argument is correct in the sense that the terms *information* and *knowledge* are often used interchangeably in IS literature. However, knowledge management builds on components and approaches that go beyond knowledge sharing to organizational decision making (Choo, 1998) and to management practices and strategies (Ala-

vi and Leidner, 2001). Additionally, KM approaches can be specific to cross-cultural and distributed settings. The approach of *global knowledge management (GKM)* focuses on those in specific (Desouza and Evaristo, 2003). Research on GKM relates to the previously presented focus points on globally distributed knowledge sharing and can inform on the critical implications of distributed settings to KM.

Several approaches for managing knowledge in organizations have been proposed in recent years. Some of the approaches present a more human-driven approach, some focus on technological support (Choi & Lee 2002). The studies focusing on human-driven approaches build on topics similar to virtual teams and globally distributed collaboration. Focusing on such individual and organizational aspects of knowledge sharing has been common, as seen in Riege et al. (2005) and Vuori and Okkonen (2012). The technical perspective has focused mainly on knowledge management systems (KMS) that include IT systems to support knowledge creation, storage, transfer and usage (Alavi and Leidner, 2001; Wang and Noe, 2010). The successful implementation of KM has been argued as having taken both human and technical perspectives into account, although the role of technology should not be overestimated when reaching for successful KM (Mills and Smith, 2011). The views on social software supported KM will be presented later in this thesis.

The mechanisms for bridging the human- and technology-driven approaches of KM have been discussed within process-oriented KM (Maier and Remus, 2003). *Process-oriented knowledge management (PKM)* is a KM approach that aims at a definition and a description of organizational processes and knowledge flows, and from that, create interventions for KM strategies, instruments and systems (Maier and Remus, 2002). PKM can be seen as an analysis tool and management function for maintaining, implementing and selecting strategies for organizational knowledge management (Maier and Remus, 2003). The need to define and analyze the key *processes* that consist of the activities and events of an organization is important to recognize the required knowledge in specific activities as well as to improve the efficiency and transparency of knowledge (Remus and Schub, 2003). As indicated by Crowston (2000), processes enable organizations to accomplish desired goals. Several types of critical processes are discussed in KM and PKM literature. One way to describe them is to separate the knowledge processes from the knowledge-intensive business processes (Maier and Remus, 2003).

Knowledge processes are often described in the form of a knowledge life-cycle (KLC) that consists of several *activities*, such as creating, acquiring, identifying, adapting, organizing, distributing and applying knowledge (Ward, 2004). These knowledge processes are meant to support the knowledge flows between business processes and actors (Maier and Remus, 2001). There are many theories in KM that explain how knowledge is created and shared between individuals in organizations. The work of Nonaka and Takeuchi (1995) focused on explaining the process of knowledge conversion as a spiral model where the engagement and interaction process results in personal development and the in-

ternalization of knowledge through various steps of observation, practice and integration. The Wiig (1994) KM model explains principles for organizing knowledge, which then makes it useful for the recipient. Similar models have also been expressed within the organizational context. One of such approaches was provided by Meyer and Zack's (1996) KM cycle that describes a process to acquire, refine, store, distribute and present knowledge in the design and development of information products. Similarly, the sense-making KM model by Choo (1998) explains how organizations need to be strategic on sense making, knowledge creation and decision making. Recently, Maier and Schmidt (2014) proposed a theory on knowledge maturing, describing how organizational knowledge creation is not a linear process but matures through alternating phases of stability and changeability. The previous theories show the importance of knowledge sharing and why it has been continuously raised as the cornerstone of the KM strategy of globally operating organizations (Disterer 2001; Bureš 2003; Riege 2005). These models that say what is, how, why, when and where can be argued to be type II theories in IS as categorized by Gregor (2006).

Knowledge-intensive business processes contain core processes along the value chain of an organization (Remus and Schub, 2003). The modeling and analysis of the knowledge and knowledge-intensive business processes should clarify what type of tools, instruments or methods are necessary to support the successful flow of knowledge between various tasks and individuals in the organization (Remus and Schub, 2003). Such understanding of organizational processes is relevant for the creation of process theories. *Process theories*, as described in the IS domain, focus on the performance and sequence of events that take place in organizations (Crowston, 2000; Mohr, 1982). Process theories can describe and help to understand complex causal relationships by showing how individual and organizational inputs and outputs are related (Mohr, 1982). While developed theories should aim toward both explanation and prediction (Gregor, 2006), the attempts to theorize knowledge flows and processes in knowledge management literature can hardly be witnessed.

The previously introduced theories and models for knowledge life-cycles can explain how knowledge is likely to be transferred and made useful. However, much is left unexplained regarding what factors influence such settings. As argued by Wang and Noe (2010), valid and reliable instruments for measuring knowledge sharing are almost non-existent and need to be developed further. While the managerial issues of the organizational processes are a crucial part of KM research, the thesis especially focuses on how knowledge sharing between individuals in globally distributed organizations is affected by a variety of intertwined barriers.

1.1.3 Barriers to knowledge management

The organizational efforts in the global marketplace toward new territories bring complexity to the management of knowledge flows and communication (Desouza and Evaristo, 2003; Nunamaker, Reinig and Briggs, 2009). While vari-

ous success factors and steps were identified for successful projects on knowledge management almost two decades ago (Davenport and Prusak, 1998), many *barriers* are constantly re-occurring. The focus on these barriers differs in the literature. They can be:

- Factors and issues that hinder knowledge sharing (Disterer, 2001);
- Issues that keep organizations from reaching their goals (Noll et al., 2010);
- Challenges set by diverse workers, hierarchies and cultural influences within an organization (De Long and Fahey, 2000);
- Obstacles in adopting a specific technology (Baltatzis, Ormrod and Grainger, 2008); and
- General issues on challenges related to the collaboration of employees in global software development projects (Noll et al, 2010).

These barriers include time zone differences, cultural differences and different working styles, as well as the loss of communication richness (Nunamaker et al, 2009). Such challenges (commonly referred to as *barriers*) are often discussed in the knowledge management literature from the viewpoint of an individual or group of people working within an organization toward the same goals (Riege, 2005). Based on these characteristics, a *barrier* was defined for the purpose of this thesis as “any challenge, risk, difficulty, obstacle, restriction or hindrance that might prevent a single person, a group or an organization from reaching an objective and success in a specific context when the challenge is related to acting or working in a collaborative cross-border setting.”

A vast number of studies have focused on the barriers to collaborative efforts when working in virtual teams (Noll et al, 2010). The authors of the related studies do point out that such barriers are context-specific (Sclater Grierson, Ion, and MacGregor, 2001; Nunamaker et al., 2009). Barriers can also be highly intertwined or related to one another (Riege, 2005) and also share similarities between contexts, as shown within this dissertation. Researchers of knowledge sharing have repeatedly emphasized how crucial it is to understand the causal relationships of these barriers before proper interventions can be found to overcome them (Wang and Noe, 2010; Riege, 2005). However, these interrelationships of barriers are barely touched upon in KM or virtual team research. When studying the barriers to successful knowledge sharing between individuals, none of the previously mentioned perspectives on barriers should be overlooked. The implications of the globally distributed settings and the cultural differences within these are especially poorly known (Wang and Noe, 2010).

The recent KM literature has emphasized social software to offer a cure for some of the critical barriers (Kietzmann et al., 2011; Wamelen and Kool, 2008). These technologies will be studied within this thesis.

1.1.4 Social software

The development of web standards and protocols, often referred to as Web 2.0, that enable easier integration and data sharing between applications has been one of the driving factors for the rapid expansion of browser-based software for social interaction and collaboration (Levy, 2009; Wamelen and Kool, 2008). Lately, the massive popularity of sites such as Facebook, Twitter and LinkedIn made the industry and public sector realize the potential and benefits these tools offer (Kietzmann, Hermkens, McCarthy and Silvestre, 2011). While the aforementioned sites for social networking and micro-blogging are surely some of the most powerful channels for marketing and engagement with relevant stakeholders (Archambault and Grudin, 2012), they only use a few of the functionalities and purposes social software is good for.

Social software can be defined as browser-based tools that enable interactive collaboration by managing content and networking with others (Wever, Mechant, Veevaete and Hauttekeete, 2007). It is still a source of terminological confusion because of the variety of tools and purposes for its use. It is often used interchangeably with the term *social media* in the knowledge management literature. Social media has been argued to include the following characteristics: 1) the participation of anyone interested, 2) free access, 3) enabling two-way conversations, 4) allowing communities to form, and 5) connectedness and interoperability between other sites (Zheng and Zheng, 2010). Social media is often, but not exclusively connected to, participation and engagement that takes place in public websites dedicated to social networking, media sharing and social bookmarking (Leonardi et al., 2013; Kietzmann et al., 2011; Kaplan and Haenlein, 2010). Social software, on the other hand, can be seen as sharing the characteristics above, but is often described as supporting private communication, e.g., between two people through the use of instant messaging (Avram, 2006) or as a group of technologies that can be extended from simple social networking or wiki functions to enterprise solutions within company firewalls (Richter et al., 2013, Leonardi et al., 2013). The boundary between public and private use is often not clear as the tools might offer support for both (Levy, 2009). Within this thesis, the online tools that enable networking, interaction and the exchange of user-generated content within organizations (Kaplan and Haenlein, 2010) will be referred to as social software.

1.1.5 Social software in GKM

The opportunity to integrate such easy-to-use and easily accessible tools that people have become accustomed to using in their everyday lives is intriguing for organizations (McAfee, 2006). It is also one of the main reasons why social software has been applied in organizations as a tool for managing knowledge and collaboration (Avram, 2006; Leonardi et al., 2013). The richness of these modes of collaboration has been acknowledged for knowledge management and for different types of knowledge activities in an organization. While these social technologies are often discussed as a means for supporting informal

knowledge sharing, they also make other types of stakeholder engagement possible with a careful selection of the tools (Kietzmann et al., 2011). These possibilities range from intra- and inter-organizational collaboration to customer management (Wamelen and Kool, 2008). One way to differentiate between the settings where social software is applied in organizational practices is to separate the enterprise systems that support formal organizational processes (McAfee, 2006) from workspaces for individuals or communities of practice in order to support both formal and informal organizational practices (Pawlowski et al., 2014). The enterprise solutions are often referred to as enterprise 2.0 in the literature (McAfee, 2006).

As indicated by Kärkkäinen et al. (2010), studies on the adoption of social software in organizations and specific business functions are currently limited, while the changes toward adoption in organizations are very rapid. The studies that bridge social software and knowledge management are often focused on organizational workspaces and intra-organizational knowledge sharing (Richter et al., 2013). Social software research has included a vast number of conceptual studies addressing the potential as well as the problems of supporting organizational activities. Conceptual studies on social software have set the basis for understanding the potential of its use, arguing about how managers can take action by selecting the right tools for the key activities of their organizations. As an example, Kaplan and Haenlein (2010) provided and explained managerial guidelines for the usage of tools ranging from social networks to blogs. Similarly, Kietzmann et al. (2010) explained how managers could select the right social software by analyzing the characteristics the tools are built from. Zheng and Zheng (2010) presented a holistic perspective on the capabilities and building blocks of social software and explained how they support knowledge activities within organizational knowledge management. New corporate social software prototypes have also been developed and introduced to support knowledge management (Grace, 2009; Holtzblatt, 2010). These articles have argued for the benefits of social software in knowledge management. However, researchers across a number of domains have reported a variety of barriers to the adoption of social software.

Barriers to the adoption of social software have been reported as related to managing knowledge in the business to business sector (Kärkkäinen et al., 2010), supporting knowledge evolution, using and sharing in organizations (Zheng et al., 2010), managing reputations in academia (Matešić et al., 2010) or sharing knowledge in schools by teachers and students (Agarwal et al., 2007). Some of the key barriers have been argued to be a lack of steering and support from management (Katzy et al., 2012) and a lack of understanding of the possibilities of the tool (Kärkkäinen et al., 2010). What often goes unheeded is the fact that social software is only a tool for managing activities, such as networking and collaboration, not a silver bullet for solving all barriers to KM (Leonardi et al., 2013). This is why the barriers that were identified for interpersonal and organizational issues are still relevant and have to be addressed somehow. Similarly

to KM research, the interrelations of the critical barriers to social software supported KM are poorly understood and welcome more research.

Social software supported knowledge management requires the consideration of issues related to team members and team leaders, the provision of IT support, coordination, the sharing of knowledge, trust, conflict and culture (Pawlowski et al., 2014). As pointed out by Fiedler and Welppe (2011), it is crucial to look further and study how social software could be taken up successfully in the specific KM processes and activities of global organizations. The study of social software integration into KM processes is important for finding sustainable interventions (Fiedler and Welppe, 2011). *Interventions* can be defined as organized actions that can be both technical and organizational that put KM in use (Samiotis and Poulymenakou, 2003). The wide range of issues to consider during adoption in an organization and the evidence of failed attempts point out the need for researching these interventions further. However, social software related studies have placed little emphasis on the implications of the global component on the barriers organizations and individuals have. Managing knowledge flows and the active participation of globally distributed workers was one of the crucial topics identified in the KM (Desouza and Evaristo, 2003) and global software development literature (Noll et al., 2010). Finding out the implications of such GKM settings for social software use would be crucial for the identification of both critical barriers and the interventions. What makes this important is the research showing that more complexity is expected when knowledge sharing is managed in a globally distributed manner (Kotlarsky and Oshri, 2005).

Previous social software studies have shown differences in the factors that influence workers' willingness to adopt social software in knowledge management (Leonardi et al., 2013; Von Krogh, 2012). Some of the differences can be witnessed when comparing enterprise social software in virtual teams where work-related activities are contractual obligations (Vuori and Okkonen, 2012) against environments where the engagement is based on voluntariness and both personal and professional interest. Examples of the latter include user generated content sharing in Wikipedia (Yang and Lai, 2010; Tseng and Huang, 2010), developer interactions in Open Source Software (OSS) communities (Roberts et al., 2006), online collaboration in non-governmental organizations (NGOs) (Matschke, 2012) and social software that is built for both educators and students (Ha et al., 2010). The purpose of social software usage as a support for formal organizational activities within virtual teams (McAfee, 2006) as compared to informal activities in community workspaces (Pawlowski et al., 2014) is different by nature as well. This has implications for the motives for engagement and participation in online collaboration, and eventually, for the barriers and ways to overcome them. However, the successful adoption of social software in globally distributed knowledge management (here referred to as *global social knowledge management, GSKM*) requires a proper investigation of the context and the barriers within before interventions can be identified and designed.

Selecting a context of inquiry is crucial for new information to emerge. As explained previously, research on enterprise social software has been commonly used to understand the key issues for improving KM in organizations. However, the research related to workspaces for individuals or communities of practice to support both formal and informal organizational practices has been less targeted. Common for both enterprise social software and workspaces for communities of practice, the interdependencies of the barriers have not been studied for social software. And thus, the ways to overcome the critical barriers are poorly known. The empirical investigation within this dissertation focuses especially on the workspaces for communities that are currently one of the least studied areas of GSKM.

1.1.6 Application in the educational domain

For a long time, the educational community was dominated by technologies that supported learning in a school or university in a closed environment (Van Rooij, 2011). The movement toward openness and transparency has increased as teachers and students have started adopting social software for both formal and informal education (Lai and Chen, 2011; Wever et al., 2007). One of the recent developments toward social software in knowledge management involves tools that are applied by both educators and students to manage international collaborations and networking (Ha et al., 2012; Sotiriou et al., 2013). This use of social software to support informal organizational activities presents one of the least researched perspectives on GSKM. Some of the latest developments on this can be witnessed in the *open educational resources* (OER) movement that was brought to the awareness of the educational community by United Nations Educational, Scientific and Cultural Organization (UNESCO) in 2002 (D'Antoni, 2009). Around this time, Massachusetts Institute of Technology (MIT) released their educational materials openly through the OpenCourseWare platform (Hatakka, 2009). UNESCO (2002) described OER as the "technology enabled, open provision of educational resources for consultation, use and adaptation by a community of users for non-commercial purposes." Since 2002, many initiatives have been implemented that have provided services and tools around OERs (D'Antoni, 2009). Many of these have resulted in a variety of repositories that collect and store educational resources that are provided by the educational institutions or the teachers themselves (Ochoa and Duval, 2009).

The services and environments around OER have lately been moving toward collaborative functionalities and supporting the creation of teacher and learner communities (D'Antoni, 2009; Sotiriou et al., 2013). Many initiatives are basing their OER services and environments especially on social software-like functionalities that place educators and learners as key users to share, discuss and work collaboratively on OERs (Ha et al., 2011; Sotiriou et al., 2013). The OER environments still fail to attract and reach a sustainable user-base (Ochoa and Duval, 2009) and educators are often merely passive users of the knowledge provided by the other members of the community (Hatakka, 2010). Previous research has identified a variety of barriers to OER adoption. The

works of Chen (2010), Hatakka (2010) and Yuan et al. (2008) have provided a rather extensive range of social, organizational and cultural barriers that either stop or hinder the adoption of these environments. However, the existing research has not considered the influencing factors or barriers to engagement in the newly developed social software-like community workspaces for OER, here referred to as *social OER environments*. Knowledge sharing within these environments has not been investigated, nor have the factors that influence the users' engagement in collaboration with their peers.

1.2 Research objectives

Given the research gaps for social software supported knowledge management, RQ1 aimed to identify the barriers to GSKM that could provide information on the issues that are critical but at the same time have had poor intervention in organizations. As the previous research has focused on knowledge management and social software related issues in a variety of contexts, a cross-disciplinary study (Article I) was needed that could identify the critical barriers.

- RQ1: What are the barriers to global knowledge management when collaborating and interacting through social software?

Previous studies have identified potential ways of addressing social software in knowledge management. These range from conceptual understanding and the implications of social software to knowledge management (Avram, 2006; Zheng and Zheng, 2010) to the detailed and even informal activities these technologies can support at work (Zhao and Rosson, 2009). Many studies have also indirectly provided evidence for how social software could be applied to knowledge management. One example is Kietzman et al.'s (2011) study, which explains how publicly available social media sites offer functionalities from group building to conversations to sharing that support activities such as identity building and reputation management. Recognizing these important studies, a comprehensive analysis was needed (RQ2, Article II) that could inform how social software has been implemented in various globally distributed knowledge management activities. This analysis would also highlight the key barriers within these settings.

- RQ2: To which types of GKM activities does social software apply?

Knowledge management in organizations can be handled with a variety of strategies, depending on what the organization wants to achieve (Desouza and Evaristo, 2003; Choi & Lee 2002). The PKM view of knowledge management discusses the integration and refinement of organizational processes for a more successful implementation of KM projects (Maier and Remus, 2002). Previous

efforts to integrate social software into global KM strategies have not offered the required mechanisms to complete an analysis related to the key barriers and interventions arising from the integration of these technologies. A study was needed that would explain the integration of social software activities into organizational processes and practices, informing KM strategies with the required steps to complete such tasks (RQ3, Article III).

- RQ3: How can GSKM be integrated into KM strategies and process models?

The context dependency and interrelationships of the barriers to knowledge sharing and distributed collaboration have been acknowledged as unexplored and as critical issues for overcoming the barriers (Riege, 2005; Noll et al., 2010). Too often, the adoption of social software in organizational knowledge sharing and KM projects that aim to support this integration fail (Richter et al. 2013). Article II explained how each domain has its unique barriers that need to be recognized when adopting GSKM. More research is needed to explain the interrelationships of these context-specific barriers to GSKM and their influence on the activities and processes social software is used for (RQ4, Articles IV and V).

- RQ4: How do the context-specific barriers to GSKM affect knowledge sharing activities?

Identifying and understanding the barriers can be seen as a necessary step to overcome them. This type of thinking is supported by a variety of research approaches from constructive (Crnkovic, 2010) to design science research (Peffer et al., 2007). In knowledge management and distributed collaboration, sustainable solutions for identified problems have been a constant discussion due to their complexity (Richter et al. 2013; Noll et al., 2010). Interventions for the identified problems of GSKM require further research (RQ5, Articles V and VI) to inform and advance the theoretical knowledge about GSKM and to provide solutions for organizations that are adopting social software in their organizational knowledge management.

- RQ5: What types of interventions are needed to overcome the critical barriers to GSKM?

The research effort was divided into six included articles that address these guiding research questions. Figure 1 shows the relationship of the articles to the bigger picture.

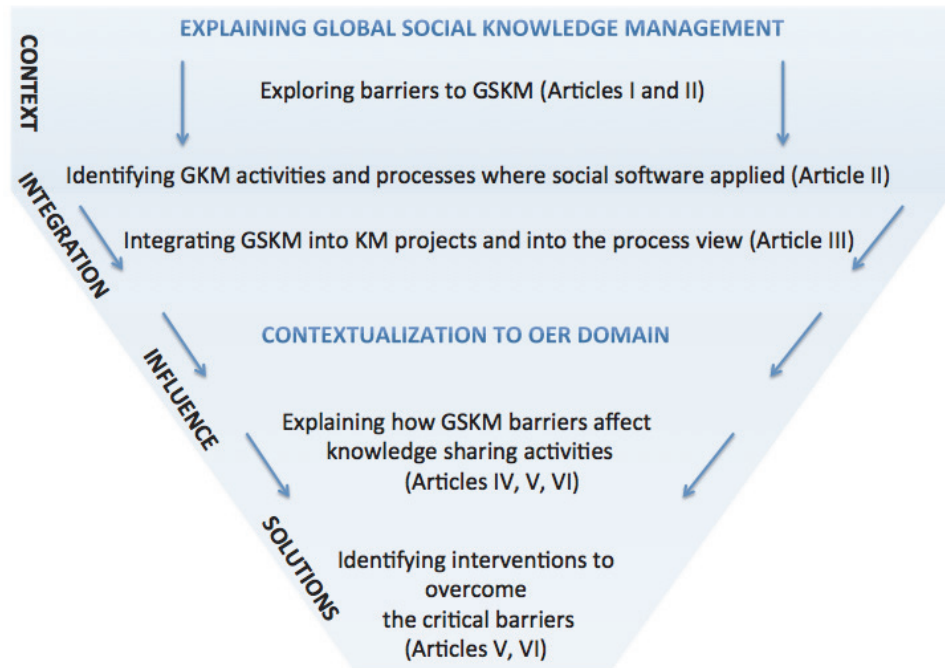


FIGURE 1 Relationships of the included articles

2 RESEARCH METHODS AND APPROACH

This section explains the selected research approach and the methods that were required to study the research questions. Inquiring about the barriers of GSKM to identify the dependencies and ways to overcome those barriers has implications on the research design of such an approach. These implications are addressed first by a search for a fitting research design, and second, through methods that can be incorporated into the research approach to provide explanations for the research questions. The section concludes in a detailed description of the research steps conducted within this PhD effort, explaining the related methods as well as the selected approach for both data collection and analysis.

2.1 Design and action in research

As a research discipline, the information systems field is a fine example of an applied science that addresses theories from other disciplines to solve IT-related problems (Peffer et al., 2007). One of the typical approaches has been to conduct *behavioral research* that has originated from the natural and social sciences, seeking to explain organizational and human perspectives around information systems (e.g., perceptions of the system's users) (Hevner et al., 2004). As another approach, design-oriented research, or *design science*, has been commonly applied when new and innovative IT artifacts are being created for identified research problems (Hevner et al., 2004; Gregor and Jones, 2007). Often, the research effort is incorporated into a specific organization in which the researcher is tightly involved, striving toward an *action* that is an intervention and improvement within the organization (Baburoglu and Ravn 1992).

The research objectives that were explained earlier in the thesis go toward design and action research, simultaneously addressing the user perceptions with behavioral insights. The following sections describe the foundation set for design and action research, explaining how these perspectives are addressed within the thesis.

2.1.1 Comparing research approaches

The previously stated research objectives, from the identification of barriers related to GSKM to overcoming those barriers, set requirements for finding a suitable research approach. First, a distributed setting had to be identified where social software could be applied. On the other hand, studying the effects of barriers as well as the interventions for overcoming crucial issues required an organizational context where the researcher could be involved in the design and evaluation of the interventions.

In principle, design science research fits well with these research objectives. *Design science research (DSR)* is a process for developing and evaluating IT artifacts that aim to solve organizational problems (Hevner et al., 2004). Artifacts are described within DSR as constructs (vocabulary and symbols), models (abstractions and representations), methods (algorithms and practices) and instantiations (systems and services) that are designed and evaluated within DSR (Hevner et al., 2004). Gregor and Hevner (2013) continued elaborating on what DSR artifacts are, stating that they are socio-technical artifacts that include decision support systems, modeling tools, governance strategies, methods for IS evaluation and IS change interventions.

Before design science was introduced as a research paradigm in IS by Hevner et al. (2004) with guidelines for how to conduct, evaluate and present DSR, design-oriented research had already been identified as a problem solving paradigm for the creation of innovative artifacts to solve problems (Simon, 1996). DSR is based on engineering (Simon, 1996) and systems development research (Nunamaker et al., 1991), applying and refining the principles toward a common research paradigm. While the objectives of the thesis can be pursued as design science research, other approaches that support or extend DSR should be raised.

While DSR sets a basis for research that deals with barriers to and interventions for social software supported knowledge sharing, it does not address the role of the researcher in the organizational context of intervening and driving a change toward improvement. *Action research (AR)* is a widely adopted research approach that is highly iterative, and where the researcher is a part of the organizational context, not only as a researcher but also as an active member, aiming to solve the organizational problems (Baburoglu and Ravn, 1992). Such an approach is needed within this thesis in order to identify, build and evaluate interventions to overcome the key barriers. The combination of DSR and AR is nothing new. *Action design research (ADR)* was introduced by Sein et al. (2011) as a research approach that combines the key principles of DSR (striving toward the creation and evaluation of new and innovative artifacts) with those of AR (the artifact and intervention emerge in interaction with the organizational context).

Both DSR and ADR are explained through certain stages and principles that research projects should follow. The process for conducting design science research was introduced in the form of a *design science research methodology*

(DSRM) (Peppers et al., 2007). This approach introduced a nominal process and a mental model that DS researchers can apply once they implement their research. The DSRM process (Peppers et al., 2007) is explained through the stages of 1) problem formulation, where the gap and importance of the DSR research is explained; 2) defining objectives for the solution in terms of what it should accomplish; 3) the design and development of the artifact; 4) the demonstration of the artifact in a suitable context; 5) the evaluation of the artifact within the context it is applied in; and 6) the communication of the results to the community. The authors of DSRM argue that there are different entry points for DSR: 1) based on a problem, 2) triggered by clear objectives that the solution should correspond to, 3) based on an existing but not yet formally thought solution for the problem domain, and 4) a client/context initiated approach where a solution is worked retroactively through the process to apply rigor to the approach. The projects around DSR are unique, but such a process model can help to explain and guide the research activity (Peppers et al., 2007).

The ADR approach has also been explained through stages that can aid the researcher in positioning and explaining the selected approach. These ADR stages include (Sein et al., 2011):

1. Problem Formulation - "Problem perceived in practice"

Problem formulation includes the following tasks: 1) identifying a research opportunity, 2) setting the research questions, 3) casting the problem to a class of problems, 4) identifying the theoretical basis, 5) securing a long-term organizational commitment, and 6) setting up the roles and tasks. The input for this research step can be triggered by practitioners, existing technologies or a review of the prior research. In practice-inspired research, a research activity is a problem-based one that generates knowledge responding to a class of problems that the specific problem exemplifies (Sein et al. 2011). The step itself is similar to the identification of the problem in DSRM.

2. Building, Intervention and Evaluation (BIE)

The step is about building on the problem framing and designing an IT artifact in the organizational context. The tasks of BIE include 1) discovering the initial knowledge-creation target (object), 2) selecting the type of form the research takes: the research design continuum can have two end points: 1) *IT-dominant BIE*, the creation of an innovative technological design; or 2) *organization-dominant BIE*, generating design knowledge/organizational interventions (such as structuring decision-making situations in an organization); 3) executing the BIE cycle, and 4) iterating as needed. This research step also includes the evaluation of the artifact (Sein et al. 2011). The second stage of ADR combines the three steps of DSRM (objectives, design and evaluation) into one. The focus of the ADR approach also elaborates on the intervention, which can also be organization-dominant. The DSR approach commonly focuses on the IT-dominant constructs of the system, methods and instantiations of the developed systems and tools (Hevner et al., 2004).

3. Reflection and Learning

Within this stage, the building of the solution is refined to address a broader class of problems. The design is reflected on and redesigned, if necessary, and the intervention is analyzed according to the stated goals from the previous stages. The tasks include 1) reflecting on the design during the project, 2) evaluating the adherence to principles, and 3) analyzing the intervention results according to the stated goals (Sein et al. 2011). Overlapping with the evaluation and communication stages of DSRM, this step focuses on the redesign and abstraction of the results, reflecting on the match between the goals and the interventions.

4. Formalization of Learning

The gathered knowledge in the ADR research should be developed into the general concepts of a solution that addresses the class of problems (Sein et al. 2011). This last stage relates to generalized outcomes (Sein et al., 2011) and can be understood as an outcome of the ADR process. The tasks include 1) abstracting the learning into concepts for a class of field problems, 2) sharing outcomes with practitioners, 3) articulating the outcomes as design principles, 4) articulating learning in light of existing theories, and 5) formalizing the results for dissemination (Sein et al., 2011).

Both DSR and ADR explain the need to combine behavioral and design-oriented research (Sein et al., 2011; Hevner et al., 2004). This is especially needed in the evaluation stage to include techniques that fit the research project and determine that the developed artifact matches the needs of the users (Hevner et al., 2004). Such a combination of evaluation techniques has been discussed within mixed methods research (Creswell, 2004).

2.1.2 Mixed methods approach in ADR

The meaningful selection of evaluation methods within DSR and ADR is the key for rigorous research (Hevner et al., 2004; Sein et al., 2011). The emergent nature of DSR projects often leads to the need to apply many types of evaluations to study the feasibility and effectiveness of an IT artifact in an organizational context (Hevner et al., 2004; Sein et al., 2011). As explained by Creswell (2004), for such mixed methods research, the application of multiple methodological perspectives on the research problem can provide validity and a better understanding of the findings while careful consideration must be given to the applied methods. Research methods in a mixed methods approach are generally divided into qualitative and quantitative approaches (Creswell, 2004). *Qualitative research* usually addresses unstructured and semi-structured approaches for exploring and investigating new concepts and issues for further decision making (Creswell, 2004). *Quantitative research*, on the other hand, strives toward quantifiable, large amounts of data to represent the population under study, measure the views around the subject and generalize the results (Creswell, 2004). Qualitative research is especially helpful for understanding a new do-

main, while quantitative research generally strives toward generalizations and solid evidence (Patton 2002).

As discussed previously, DSR and ADR commonly address both design- and behavioral-oriented research (Sein et al., 2011; Hevner et al., 2004). The ADR approach presented in Figure 2 can aid in explaining why both of the perspectives are needed.

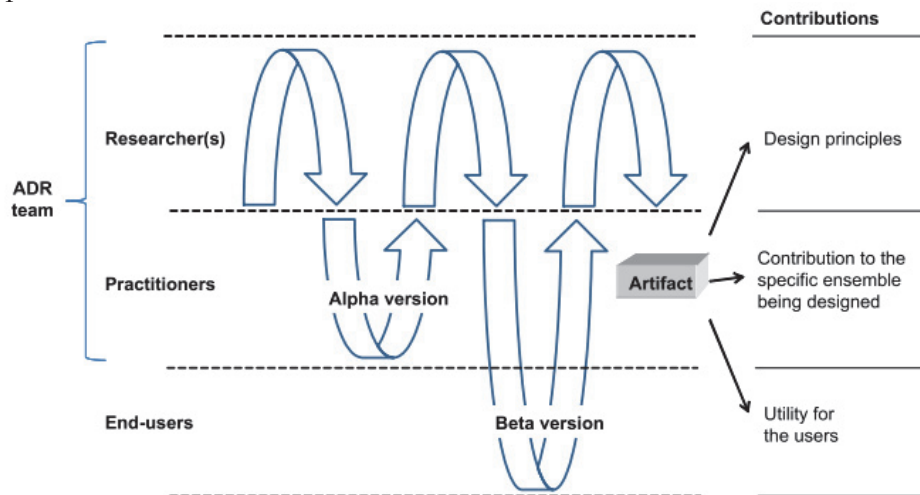


FIGURE 2 Generic Schema for IT-dominant BIE in ADR (Sein et al., 2011)

The design and development process for IT- and organization-dominant artifacts is highly iterative and interactive between the researcher(s), practitioners/developers and end-users/customers (Sein et al., 2011). The artifact (the object of the design process) needs to be addressed on different levels. From a user's point of view, it is important to evaluate the utility of the artifact for the users (Sein et al., 2011). This is the entry point for behavioral research that helps to explain the feasibility of the artifact for its intended purpose (Nunamaker et al., 1991). Thus, not only should the design level be evaluated, but multiple ways of evaluation also need to be conducted within ADR projects (Sein et al., 2011).

In DSR, evaluations might be conducted as 1) observational (studying the IS artifact in a business environment or project(s)), 2) analytical (evaluating static qualities, architecture etc.), 3) experimental (studying in a controlled environment), 4) testing (for the identification of failures and improvement needs), and 5) descriptive evaluations (through scenarios or informed arguments based on previous research) (Hevner et al., 2004).

The selection of the evaluation methods for addressing the research questions is often influenced by the *case studies* in which the research is accomplished (Hevner et al., 2004; Sein et al., 2011). Yin (2011) described three types of case studies that are suitable for the in-depth study of people, groups or events: *exploratory*, *explanatory* and *descriptive*. The descriptive approach requires a *descriptive theory* before the examination, which means that there needs to be a

theory that informs the ways things are but does not necessarily explain how things should be done or approached (Yin, 2011). The exploratory approach seeks to “explore” and understand situations and phenomena when the conceptual base leaves room for new information and theoretical foundations to emerge (Yin, 2011). Even so, exploration must have a degree of rationale and direction that sets the boundaries while the exact study propositions or theories might not direct or guide the inquiry (Yin, 2011). The explanatory approach deals with causality, and often theory verification, when certain conditions are believed to lead to other conditions (Yin, 2011).

Investigating previously validated theories and hypotheses in a new context can be very helpful for the research community and for generalizability. On the other hand, the exploratory approach could help to identify and explain issues that are not yet recognized within the particular context. As argued by Yin (2011), exploratory research can also set the foundation for explanatory studies that address the newly found issues.

2.2 Adapting ADR with mixed methods to multiple cases

Dealing with a rather new domain area of OER sets its own requirements for the research approach. As presented previously, studies on OER and the social environments around them have been rather superficial in understanding the factors that influence the behavior of teachers and their sharing practices. Accomplishing research objectives that look into the barriers and interventions within an organizational context sets the need for the researcher to be integrated into an organization or a project over a period of time. Therefore, the research effort was tightly connected to the researcher’s own work as a project researcher in systems design and implementation.

The PhD research was connected to projects OpenScout, Open Discovery Space (ODS) and Open Educational Ideas and Innovations (OEI2), which deal with social online environments for educators to share and collaborate with their peers. The researcher was tightly involved with the research as well as in the development of the artifacts and interventions coming from the efforts.

Open Discovery Space (ODS) project

Major parts of the empirical investigation were accomplished within the frame of the Open Discovery Space project¹ (2012-2015), which deals with OERs, the re-use of resources, and community building for teachers in European schools. While the project deals with improving the use of E-learning and information and communications technology (ICT) in schools, one of the major aims is to build a portal for teachers to adopt. This portal aims to offer OERs that are collected throughout school curriculum from different parts of the world. Around

¹ <http://opendiscovery.space.eu>

these OERs, social software tools are offered for networking and communicating with other teachers. The social tools and search functionalities of ODS are enriched with services for the production of lessons plans and learning scenarios. The role of the researcher in this project was as a work package leader, focusing on the needs and requirements of teachers.

OpenScout project

OpenScout² (2009-2012) is a similar European-funded project, which deals with OERs and community building around the social software supported infrastructure. The context of the project is business schools (higher education) and Small and medium enterprises (SMEs). The project deals with OER for management and business education, harvesting materials from distributed environments and making them available in one single single portal to deliver them to users. The researcher was the project coordinator.

Open Educational Ideas and Innovations (OEI2) project

The OEI2 project³ (2013-2015) is based on the previous OpenScout project and looks into knowledge sharing and educator collaboration in the context of open education, focusing mostly on higher education. In this project, collaborations that begin with idea sharing are explored and built upon. Similar to the ODS-project, the research effort deals with the needs and requirements of educators in order to build social software services for open education. The services will not be typical enterprise social software, but will focus on forming a workspace for individuals and communities of practice to support both formal and informal idea sharing. Similarly to OpenScout, the researcher is the project coordinator in this initiative.

An approach for the case studies needed to be set. As a descriptive approach requires a descriptive theory before the examination (Yin, 2011), it was ruled out of the research approach options. The decision was made to base the research on the *exploratory approach*, as the influencing factors and processes for knowledge sharing have not been addressed in the OER domain. The research perspective within these R&D projects can be seen as a problem-based approach that is similar to DSR and ADR. The objectives and the context of inquiry set for the thesis correspond well to the basic *principles of ADR* and a decision was made to follow *ADR as the research approach* for the thesis.

Given the objectives set for this PhD research, multiple methods were needed to explore the barriers and interventions as well as the interdependencies of these barriers. Therefore, the *PhD effort applies mixed methods to approach the research questions*.

² <http://learn.openscout.net>

³ <http://www.idea-space.eu>

2.3 Explaining the research process through ADR

It is common in DSR and ADR that the research process will differ depending on the project and because of the emergent nature of design research (Hevner et al., 2004; Peffers et al., 2007; Sein et al., 2011). The PhD research and its integration into the previously mentioned projects will be described through nine steps, using the ADR schema as an illustration method (Figure 3). The illustration shows the iterative nature of this PhD research, which combines design and behavioral research. The following section also describes the approach to the data collection and analysis.

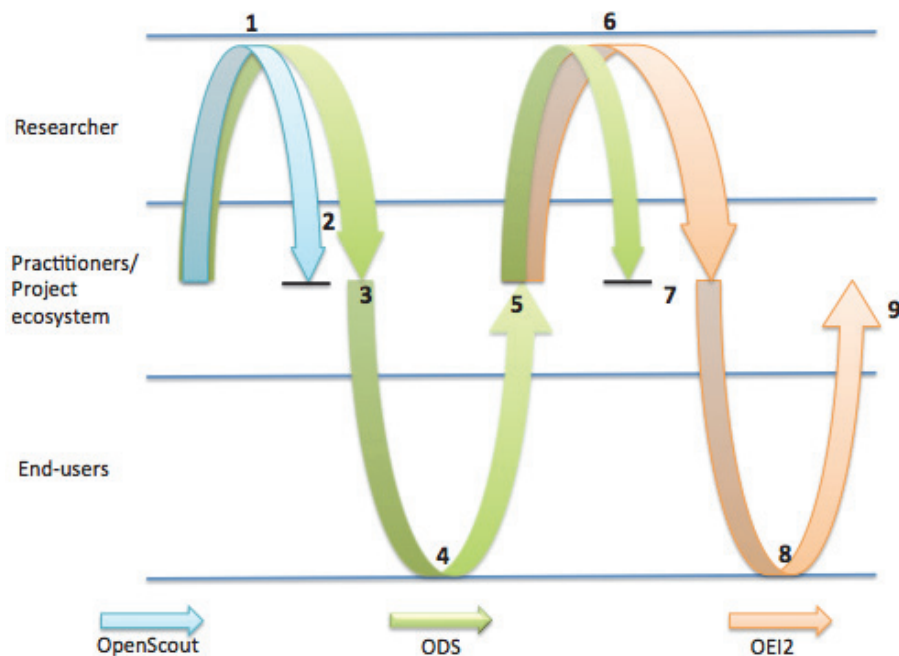


FIGURE 3 Dissertation explained through ADR

2.3.1 Step 1: Problem formulation

In the PhD research, the research opportunity was witnessed from the unsolved problems and interventions of social software supported knowledge management. The research gaps argued within the introduction and theoretical background of this dissertation pointed out the complexity of managing collaboration in distributed settings (Noll et al., 2010; Desouza and Evaristo, 2003). The class of problems was set as globally distributed, social software supported knowledge management, or global social knowledge management (GSKM). During the first step of the dissertation, research questions 1, 2 and 5 were identified first: identifying the barriers to GSKM, identifying how social software

can be applied to GKM activities and finding the key interventions to the barriers.

Literature review

The theoretical basis was set by the key components and the existing literature for: 1) social software and its roots and relations to social media, groupware, collaboration tools and Web 2.0; 2) knowledge management and the practices and theories related to it; and 3) globally distributed collaboration and virtual teamwork. The literature review (Articles I and II) was accomplished using Fink's (2005) systematic approach and the steps for rigorous analysis as defined by Kitchenham (2004). The rigorous approach should be systematic with a clear methodology, explicit in the procedures, comprehensive in the analysis and reproducible by others (Fink, 2005). As a response to RQ1 and as an outcome of Article I, a barrier framework was generated to classify and explain the key barriers to GSKM. Article II, addressing RQ2, set the basis for the empirical investigation with an explanation of the key activities and tools for GSKM. Article II also provided argumentation for how the contextualization of the research effort can be conducted. Major parts of the literature review that set the basis for collecting the empirical evidence were conducted in 2010.

Context definition and the commitment of organizations

The topic of knowledge sharing and the activities supported by social software was set in schools and higher education because of the relevance in current adoption efforts taking place on regional, national and international levels. The collection of empirical evidence took place between 2010 and 2014.

The commitment of the organizations was initially secured within the OpenScout and ODS projects. The PhD process that was started in 2010 soon progressed to the identification of the previously mentioned research gaps and focus points for GSKM. Because OpenScout was already running, the integration of the research could not be accomplished as an entire ADR cycle. However, the research effort was directly written into the project plan of the ODS project to secure the inquiry of both barriers and interventions within the project duration. The role of the researcher was clear as the tasks and responsibilities linked to the requirements analysis within the project were written directly in the project's application/contract.

2.3.2 Step 2: BIE - Contextualization

During the second step and the literature review (for RQ1 and 2), the need for contextualization was identified to observe the critical domain-related challenges that Article I could not explain. The literature review on the integration of social software into GKM activities pointed out a research gap. The previous studies bridging social software and KM had not elaborated on how to integrate these tools into KM strategies and organizational processes. For this, research

question RQ3 was articulated and operated in the context of the OpenScout project, where the researcher was a coordinator. In OpenScout, this step was crucial for the discovery of this organization-dominant BIE.

The integration of social software into organizational processes using the PKM approach (Maier and Remus, 2002) was discussed based on the existing literature, and a model for the integration of GSKM activities and processes into KM strategies and models was proposed. The GSKM specific model was further refined within the context of the OpenScout project and evaluated with the descriptive evaluation method (Hevner et al., 2004) by 1) informed arguments that explain the utility of the model by using the reference model evaluation framework by Frank (2007) and 2) scenarios that describe the utility of the model within the OpenScout project.

2.3.3 Step 3: BIE – Combining data collection with requirements gathering

The requirements gathering within the ODS project relied on a variety of data from both educational experts and the future users of the planned outcome of the project, the ODS portal. From the perspective of the researcher, the aim was the utilization of the findings of research questions 1 and 2 to find both IT-dominant and organization-dominant BIE through the data collection. As the research team within ODS had their own interests for the instantiation of the ODS portal, the role of the researcher was to discover IT-dominant issues to be used as a base for the requirements for the ODS portal and organization-dominant issues to find interventions to overcome the critical barriers. The selected approach required both quantitative and qualitative perspectives to be taken into account.

Data collection to explain critical barriers and find interventions

Within the described investigation, *qualitative research* would be helpful for understanding the new domain (Patton 2002) and the processes behind social software supported knowledge management. Building on the foundation of the existing literature on social software supported knowledge management, the qualitative investigation looked into the context of OER to identify the critical challenges as well as to map the activities and processes around OER.

The exploratory inquiry was first set to identify the barriers that are specific for social OER environments that are used in the context of schools. The goal was to discover the barriers that are most likely to occur when using the OER environments. This step would serve as the pre-phase and orientation for a larger survey that was to be prepared within the ODS project. The larger survey would then be a part of a large-scale behavioral study of the perceptions of teachers toward these selected barriers. As the barriers for such social OER environments are not addressed in the OER and social software and knowledge sharing literature, a *focus group* approach with OER experts was chosen to refine and enrich the potential barriers identified from the literature. Kitinger and Barbour (1999) described a *focus group* as a group interview that focuses on

group communication to explore the knowledge and experience of the participants. The successfulness of the approach depends highly on the organization of the session itself, the facilitator and the approach taken for documenting the sessions (Kitzinger and Barbour, 1999).

The group of experts was addressed in a focus group session co-located at the Open Discovery Space project meeting in Athens in the spring of 2012. The experts were from Open Discovery Space – consisting of project management and work package leads. All 26 participants had previous experience with OER, including development projects, working as consultants or educators. The discussion was especially focused on the social component of OER environments to consider potential challenges not covered in the existing OER literature.

Data analysis - Contextualization of GSKM to the OER domain

The discussion was recorded and analyzed for the selection of barriers for the large-scale study and for the discovery of potential new barriers. The analysis and identification of the new barriers followed the *qualitative content analysis* guidelines by Mayring (2000) because of their usefulness in exploratory research. Qualitative content analysis is an empirical, methodologically controlled analysis of recorded communication that follows a set of rules and step-by-step models (Mayring, 2000). While the qualitative content analysis approach supports exploration and often leads to new categorizations and quantitative steps (including frequencies) (Mayring, 2000), the analysis led to the identification of a few new barriers. Each barrier that was identified through the analysis was cross-referenced against the existing literature on OER, social software and knowledge sharing.

2.3.4 Step 4: BIE – Behavioral studies to identify key barriers

During the analysis of the literature on the contextual issues in the OER domain, and based on the initial data collection within the projects, focus points for a larger empirical study were identified. The findings of the focus groups and literature review on the critical OER-related barriers pointed out that motivational and cultural aspects were significant (Articles II, IV, V). This finding steered the operationalization of the survey to study which of the barriers are likely to predict lack of motivation (Article IV). From the potential barriers that teachers perceive, cultural and language related issues were included within the survey.

The focus points for the empirical study were formed as a more holistic research question (RQ4) to identify how the context-specific barriers to GSKM are perceived and affect the knowledge sharing activities of the teachers. The data collection strategy within the project made it possible to run physical workshops and collect data from teachers who would be the future users of the ODS portal.

Data collection within the workshops

In the ODS project, a bigger stream of activities was set in motion with a total of 92 workshops in 19 countries where approximately 2300 stakeholders participated. Mainly teachers from schools participated as the workshops focused on the ICT skills of teachers and the use of social OER environments.

The exploratory approach in Articles IV and V incorporated quantifiable data through a *survey*. As elaborated on previously, the survey was operationalized based on the results of the focus group approach as well as on the existing literature. Information was also collected about the level of maturity and experience of the respondents and their organizations in terms of ICT usage in general. The final part of this survey included open-ended questions to study the IT-dominant as well as the organization-dominant interventions (Article V). This part of the survey applied open questions purposed to understand what could solve or lower the particular barriers reported by the respondents. A total of 1175 individuals from 19 European countries returned the questionnaire. The respondents were mainly teachers in primary and secondary schools.

Data analysis: Explaining the influence of the barriers to teachers' motivation in social OER environments

The influence of the barriers to lack of motivation toward sharing and collaboration was studied in detail (Article IV). One of the aims was to cluster and study the barriers further. For this purpose, *factor analysis* and *linear regression* are powerful ways to explain which aspects can predict the significance of a certain barrier. Factor analysis can help in explaining the variability and dependencies of variables, aiming to identify joint variations between these to form factors (Loehlin, 1998). Regression is a statistical technique to estimate the relationships between the identified factors (Neter et al., 2006). The main variables used in the analysis were the five items on the scale of organizational ICT maturity, two items on the lack of motivation, and 13 barriers on organizational, cultural and technical aspects. Missing values were imputed for these data.

In order to construct clusters or groups of barriers (latent variables) for sharing and collaborating in social OER environments, an exploratory factor analysis (principal axis factoring) was performed. The correlation of the extracted factors was permitted by using the promax rotation. The Kaiser-Meyer-Olkin measure of sampling adequacy greater than .600 and a statistically significant Bartlett's test of sphericity were expected to suggest that the factoring of the barriers would be possible. Different extraction and rotation methods were tested to confirm the robustness of the resulting factor structure. The latent barrier variables revealed by the exploratory factor analysis were calculated as the means of the variables, which were chosen for their factor loadings and contextual similarities. Cronbach's alphas were calculated to confirm the internal consistency of the scales. In addition to alphas, the factor score covariances were reported (true reliability).

To predict the lack of motivation toward sharing and collaboration, two linear regression models were constructed to determine the influence of the witnessed barriers on the motivation of the teachers. The first model included the control variables, which were the age and gender of the respondents, and the ICT maturity of the organizations. At this point, the model included 730 responses due to missing values, which could not be imputed. The second model included the sum variables representing the latent factors of the barriers to engaging in social OER environments.

Data analysis: Explaining the cultural distance that teachers and learners face in social OER environments

Studying the cultural barriers in detail was another crucial analysis effort within the thesis and in the ODS project. The significance of these barriers was first emphasized in the literature, and later within the empirical investigation. As the findings of the previous motivational study had pointed out the perceptions toward distant cultures as a strong predictor, this part of the analysis was to study these issues in detail, identifying ways to overcome the barriers. The key concept for the study was the cultural distance that defines how strong the difference is between the home culture and host culture in the recipient's perception (Ward et al. 2001). To explore the cultural distance barrier that the teachers and students from the 18 countries perceived (N=855), a generalized linear model (GLM) predicting the cultural distance barrier was constructed.

The questionnaire items regarding cultural distance were used to construct a summated scale to represent the barrier. The reliability of the items was confirmed using principal axis factoring. Factor loadings over .50 were expected, as well as loadings relatively comparable in size. The reliability coefficient of the cultural distance scale was calculated using both a factor score covariance and Cronbach's alpha. After the reliability check, a summated scale was constructed by calculating the average of the four cultural distance barrier items. The average of all variables was used instead of factor loadings, because the study was exploratory and it was important to retain the original scale (from one to five), avoiding unnecessary distortion of the data. Any missing values for the cultural barrier items were imputed to replace missing data. The missing values for the selected four items were between 6.1% and 7.2%. The analysis of the missing value patterns revealed no significant differences between gender and the roles of the respondents. Next, a GLM predicting the cultural distance barrier was constructed. The fixed factors of the model were the country, gender and professional status (teacher or learner) of the respondent. The respondent's age was used as a covariate. An intercept was included in the model, which was full factorial, i.e., the interaction effects between the fixed factors were also tested.

Data analysis: Complementing the quantitative findings

A qualitative approach was used in the study to clarify the quantitative findings and provide a deeper investigation to understand the phenomenon, as suggested by Patton (2002). The second part of the questionnaire (Article V) aimed to look for potential interventions against the cultural distance barrier. With the use of the guidelines for qualitative content analysis by Mayring (2000), key interventions against the cultural distance barrier were found through clustering and an analysis of the open-ended questions. The clustering effort had a focus on the IT-dominant (technical) as well as the organization-dominant (non-technical) interventions as discussed in action design research (Sein et al. 2011).

2.3.5 Step 5: Reflection and learning / Communication

The fifth step included reflecting on the design, evaluation and analysis of the interventions within the ODS project. First, the results of the literature review, contextual barriers, and ways to integrate GSKM into KM models and strategies were submitted to conferences and journals that would provide maximum visibility for practitioners and researchers. Articles II and III were both accepted first to conference proceedings and then extended into journal papers. Article I went through the submission process of two high-quality journals on IS until it was published in 2014.

The key findings of the behavioral studies on social OER environment adoption (Articles IV, V) were first communicated within the project through deliverables (restricted to the European Commission only) that described the requirements for design (technical interventions) and the engagement actions (non-technical interventions). Articles IV and V included the key findings to increase the theoretical and practical knowledge on the interrelations of the barriers and the perceptions of teachers toward those barriers in the context of open education.

2.3.6 Step 6: Initiating an objective centered solution through the findings

The findings from the previous steps and the limitations of addressing the key interventions in the ODS project led to initiating a new project, OEI2. The project specifically addressed new ways of knowledge sharing in the OER domain to increase the motivation and engagement of the collaborators. The RQ5 was still relevant to identify interventions for overcoming the critical barriers. However, the class of problems was refined toward idea sharing, expanding on the collaborative practices of OER towards collaboration on early ideas that lead to joint developments of OERs.

The investigation in OEI2 (Article VI) influenced the ADR research design and demonstrated the emergent nature of ADR and DSR research and the importance of iterating when needed.

The theoretical basis and prior technological advances were discussed within Article VI on collaborative idea sharing. Organizational commitment

within OEI2-project was rather simple to accomplish as the researcher is the coordinator of the project and roles and responsibilities are described within the project contract.

2.3.7 Step 7: BIE – ODS and OEI2 development based on the findings

The research effort in ODS was accomplished to provide the requirements analysis for the project. The ODS portal has been in development status since spring 2014. As the identified interventions included long-term goals for ODS to accomplish (Article V), the analysis of the interventions' feasibility against the stated goals (the third step of reflection and learning) will be a part of the upcoming studies. These upcoming, longitudinal studies could inform whether users perceive that the barriers are on some level removed or reduced. The user engagement will be finalized in 2015 when the research results are expected to be ready for analysis.

The objective for OEI2 within this BIE-phase was to initiate a similar requirements gathering to serve as a basis for the development of services and tools for the project. The identification of IT- and organization-dominant interventions is the focus while the development of an instantiation in the form of a social software tool for idea sharing is the long-term goal until the end of year 2015.

2.3.8 Step 8: BIE – Identifying the key barriers to and interventions for idea sharing

This ADR step was part of the BIE process in the OEI2 project in conducting an empirical investigation on idea sharing practices in the OER domain. The investigation is similar to ODS in looking at both behavioral and technical issues in relation to social OER environments.

Data collection: New ways of knowledge sharing

The results of the empirical work reported in Articles II-V led to studying alternative ways of sharing knowledge in the context of higher education (Article VI). The data collection was operated in the form of focus groups in a total of six workshops that were organized in March 2014. Four of these took place face-to-face and two were managed as online events through the Adobe Connect conferencing system. The face-to-face workshops were held in the ECSP Europe Business School (Berlin, Germany), Duale Hochschule Baden-Württemberg (Heilbronn, Germany), Northern Lithuania College (Šiauliai, Lithuania) and NCSR Demokritos (Athens, Greece). The online events were facilitated by the University of Jyväskylä (Finland) and the European Foundation for Quality in e-Learning (EFQUEL; Brussels, Belgium) with international participants from around Europe. All of the workshops were planned and organized with a unified methodology and approach. Altogether, 64 participants participated in the workshops. The participants of the sessions were professors, heads of depart-

ments, lecturers, professionals, teacher trainers, researchers, project researchers and PhD students. Each workshop was recorded and transcribed for further analysis.

Data analysis: New ways to GSKM in higher education

The recorded and transcribed focus group sessions were analyzed in the same way that was done with the data reported in Article V, analyzed based on the *qualitative content analysis* guidelines by Mayring (2000). The analysis was accomplished by deductive category development because the objectives and aims of the study were derived from the existing literature on knowledge sharing and OER.

2.3.9 Step 9: Reflection and learning / Communication / Formalization of learning

The final step of the PhD process was to publish Article VI and formalize the learning within this dissertation. It is important to elaborate on the ADR process so far and discuss what is left for the upcoming research. The research contribution section elaborates on this further. The key outcomes of the research have been discussed with and disseminated to project consortiums and practitioners in the domain of open education and ICT in learning. Additionally, the six articles included in this dissertation have been shared with the research community.

To summarize, the nine steps and investigations in three projects showed the relevance of studying the barriers and interventions within each setting. The literature can inform on many of the crucial issues, but much remains unsolved when it comes to successful ways of managing GSKM. The complexity of the issues that disrupt knowledge sharing were demonstrated by the barriers and interventions. This complexity is one of the reasons why more research is needed to see whether the identified interventions contribute to efficiency, effectiveness and improved ways of working.

3 OVERVIEW OF THE INCLUDED ARTICLES

This section describes the key objectives and findings of the six articles included in this dissertation. The relationships of each paper to the overall research questions are elaborated as well.

3.1 Article I: Global Social Knowledge Management – Understanding Barriers For Global Workers Utilizing Social Software

Pirkkalainen, H., & Pawlowski, J. (2014). Global Social Knowledge Management – Understanding Barriers For Global Workers Utilizing Social Software, *Computers in Human Behavior*, 30, 637-647.

Research objectives and methods

The first article studied the variety of barriers globally distributed knowledge workers might face when the collaboration takes place through social software. Even though many challenges have been identified for globally distributed collaboration (Noll et al., 2010), as well as for knowledge sharing in organizations (Riege, 2005), a comprehensive study that could inform on which barriers can occur when social software is used for globally distributed knowledge management was lacking. Based on 218 articles, the study aimed to identify those potential barriers. The study focused on knowledge exchange activities that take place in collaborative environments and workspaces, as well as KM intra/inter-organizational processes in globally distributed teamwork. In addition to the identification of the barriers, this article studied the context dependency and interrelations of the challenges.

Results

The analysis revealed how the previous studies on social software in knowledge management could not touch all of the relevant issues and potential barriers for globally distributed, social software supported knowledge management. While technology poses some barriers when used for collaboration, the analysis of the cross-disciplinary studies showed how the major barriers are related to interpersonal, organizational and cultural aspects. The relevance of the cultural barriers was not elaborated on in the social software literature, yet it is clearly one of the most significant issues in globally distributed collaboration, as identified by Noll et al. (2010). The relevance of such issues that strongly depend on the beliefs, customs and social structures of groups that share a common identification or context should not be overlooked when studying the adoption of social software. The literature review revealed 301 detailed barriers that were further analyzed and condensed into 63 barriers. These barriers were explained in their organizational and contextual, social, technical and cultural dimensions in a *GSKM barrier framework*. This framework explains the key issues to tackle when adopting social software in KM and can be applied to both the identification and analysis of the barriers. The interdisciplinary study revealed how the identified barriers are highly context dependent and interrelated.

Response to the research questions and relationship to the whole

The study addressed the following research question (RQ1): What are the barriers to global knowledge management when collaborating and interacting through social software?

As elaborated above, a cross-disciplinary literature review was required to understand the variety of barriers to GSKM. The 63 barriers presented within the GSKM framework help explain the key issues that organizations need to take into account when adopting social software in GKM.

The study emphasizes the need to target upcoming research efforts to certain types of social software in a specified context. This is especially important for researchers and practitioners to avoid generalizing about types of software that serve very different purposes.

3.2 Article II: Global Social Knowledge Management: From Barriers To The Selection Of Social Tools

Pirkkalainen, H., & Pawlowski, J. (2013). Global Social Knowledge Management: From Barriers To The Selection Of Social Tools, *Electronic Journal of Knowledge Management*, 11 (1), 3-17.

Research objectives and methods

This paper strives for merging the topics of global knowledge management and social software. While research papers bridging the gap of knowledge management and social software have been published recently (Avram 2006; Zheng and Zheng 2010; Levy 2009), so far there is only anecdotal evidence for how these applications work in globally distributed organizational settings. The aim of this paper was to study the types of KM activities and processes into which social software has been integrated. Second, the barriers arising from the selected software are elaborated upon. This article discusses the importance of the contextual understanding of GSKM, highlighting the educational domain as an example. Based on a literature review, the paper summarizes some of the context-dependent barriers to open education and explains the initial steps of a case study to explore the significance of those barriers.

Results

The analysis of the existing papers targeting social software in knowledge management revealed the types of activities specific tools can support. The study resulted in a *social software framework* that explains the types of social software that are used in KM, pointing out the typical barriers when a particular tool has been adopted within the KM activities. The findings reveal how not all tools support the entire value chain of knowledge management. This *social software in a KM life-cycle model* illustrates the matching of the KM life-cycle and social software tools. The intermediate steps of the case study in the educational domain illustrate how a context-specific barrier analysis is necessary for the identification of the organizational and technological interventions. The results of a focus group effort were analyzed for the identification of strategic (organizational) and functional (technological) interventions to overcome some of the crucial barriers. The article concludes with a guideline that explains how the contextualization approach can be reproduced by adapting the guidelines and methodology of design science research.

Response to the research questions and relationship to the whole

This article addressed RQ2: To which types of GKM activities does social software apply?

The literature review helped to explain the variety of globally distributed KM activities for which social software has been used. However, the article not only responded to RQ2, but extended Article I by elaborating on the context-specific barriers within the educational domain. The article also set a base for validating these barriers. Additionally, both Articles IV and V extended the analysis of the focus groups and survey that were discussed within this article first.

3.3 Article III: The Knowledge Intervention Integration Process: A Process-Oriented View to Enable Global Social Knowledge Management

Pirkkalainen, H., & Pawlowski, J. (2012). The Knowledge Intervention Integration Process: A Process-Oriented View to Enable Global Social Knowledge Management, *International Journal of Knowledge Society Research*, 3 (3), 45-57.

Research objectives and methods

This article ties social software supported, distributed knowledge sharing activities to KM strategies and processes within organizations. The paper focuses on PKM, which ties business processes and KM activities closely together. The objective of the article was to align social software supported activities with knowledge flows and core organizational business processes. The integration of social software and the adaptation of the current practices and processes of an organization require managerial and coordination related actions that are discussed within this article. These activities and mappings between tools and processes are explained through a case study. The case was accomplished in a European software development project by illustrating and mapping the knowledge-intensive business processes, knowledge activities and coordination processes for the KM effort.

Results

This research article explains how social software based interventions (organizational and technological) can be incorporated and integrated into the business processes and existing collaboration practices of an organization. Such integration is highly context-specific, i.e., based on the domain, the key focus of the organization, and the organizational structures and technological base. Respecting these considerations, the *knowledge intervention integration process* (KIIP) model presents a reference and an integrated process model for GSKM. This model visualizes, describes and offers an analysis tool for GSKM. As a reference model, it provides descriptions of an application domain and is intended for reusability in different contexts (Frank, 2007). A key aspect of the KIIP model is the intervention of the KM coordination processes within an organization. The study extends and adapts existing KM coordination processes (e.g., Maier and Remus, 2003; Kucza, 2001), separating the activities of Analyze, Define, Plan and Effect that enable the setting of the strategy and goals for GSKM. The model emphasizes the social software activities that are balanced between public and closed collaboration. The level of openness depends on the networks the stakeholders are engaged through. Organizations that enable (parts) of their distributed collaboration through social software need to consider the implications of inter-organizational as well as public social media

activities to their knowledge sharing behaviors as well as to the selection of technologies. These aspects have not been addressed in the PKM literature before.

A detailed integration process of the KIIP model into an actual organizational context was presented through a case study. Embedding the activities into a globally distributed software development project showed how the information generated between tightly collaborating partners is not easily communicated with other relevant audiences. It is crucial that the barriers affecting the collaboration are analyzed and reacted to in an early phase.

The article includes an initial evaluation of the reference model, accomplished by using a descriptive evaluation method (Hevner et al., 2004) and applying the reference model evaluation guidelines by Frank (2007). The evaluation results emphasize the suitability and transferability of the model to other GSKM cases if the organization is in a position to update their practices when needed. Adopting the KIIP model might lead to considerable strategic adaptation and to major investments in an organization, e.g., when knowledge gaps are identified, new technologies are needed to replace old systems and training is needed.

Response to the research questions and relationship to the whole

This article provided a response to RQ3: How can GSKM be integrated into KM strategies and process models?

With the support of Articles I and II and the analysis on PKM approaches and coordination processes within the KM research, this article showed the key entry points of GSKM to process-oriented thinking. The management perspective of GSKM efforts is important for showing how organizations can set, adapt or build their strategies around social software supported activities.

3.4 Article IV: Understanding Social OER Environments - a Quantitative Study on Factors Influencing the Motivation to Share and Collaborate

Pirkkalainen, H., Jokinen, J.J., & Pawlowski, J. (2014). Understanding Social OER Environments - a Quantitative Study on Factors Influencing the Motivation to Share and Collaborate, IEEE Transactions on Learning Technologies, pre-print available.

Research objectives and methods

This research effort focused on explaining how the variety of barriers that teachers perceive can affect their motivation to share and collaborate in social OER environments. In the educational domain, lack of motivation has been one

of the key reasons why teachers do not share OER online (Agarwal, 2007). Willingness to share knowledge has been studied rather extensively outside the OER domain (Vuori & Okkonen, 2012; Wang & Noe, 2010). However, previous studies have not addressed how the perceived barriers influence teachers' motivation in social OER environments, which are becoming more frequent. It is also crucial to point out how the contexts differ between intra-organizational knowledge management, traditional user-generated content (e.g., Wikipedia) and OER. When teachers share in OER environments, they do not necessarily share the same goal orientation and constraints as employees who share knowledge in enterprise social software environments. As shown by Vuori and Okkonen (2012), contributing to an organization's success, incentives, reputation gain and reciprocity are some of the most important motives that enhance knowledge sharing in organizational teamwork. Another major difference is the artifacts being shared. Teachers sharing their own teaching materials, lesson plans and ideas in OER environments differs dramatically from other types of participation in social media and thus, sets various challenges that need to be understood.

The objective of the article was to investigate the possible barriers to engaging in social OER environments and to explain their interrelationships. The existing literature was analyzed to gain an understanding of the probable challenges that teachers could face in such environments. Through focus group sessions, the set of barriers was enriched with aspects that have not been considered in the literature. A survey was applied to 92 workshops in 19 countries, with around 2300 participants. The investigation looked into the perceptions of teachers on the barriers they face and identified the groups of barriers that are strongly linked to a lack of motivation to share and collaborate.

Results

The key results of the study were accomplished first through the exploratory factor analysis that showed how the 15 identified barriers can be explained through three constructs. These were: lack of organizational support, a language and culture barrier and a barrier for being uncertain of the quality of OER and services. Second, through these constructs, a regression was applied to identify which of these can predict a lack of motivation to share and collaborate. The regression showed how teachers' motivation to share and collaborate in these environments decreases when they perceive higher language and cultural barriers. A lack of organizational support and quality concerns regarding OERs and related services also have an impact on teachers' motivation. However, a lack of motivation occurs when teachers perceive that the materials they find are too distant from their own context and when they have to switch from their native tongue to a foreign language in the online environments. This finding is in line with globally distributed collaboration, where culture has been argued to be one of the strongest challenges (Noll et al., 2010). Being one of the first and biggest (N=754) quantitative studies in the domain of OER, the article not only

explains how various barriers that teachers have reported influence their motivation, but also, determine barrier interrelations as OER-specific constructs: aspects that revolve around openness and reflect on teachers' sharing practices that cannot be explained by existing studies in other research disciplines.

Response to the research questions and relationship to the whole

This article addressed RQ4: How do the context-specific barriers to GSKM affect knowledge sharing activities?

Previous studies on both knowledge sharing and social software related barriers have emphasized the need to understand the interrelationships of barriers, but such evidence has been missing (Riege, 2005). This study helps us understand how a variety of challenges actually load together and change in relation to each other. The influence of these barriers on the motivation for sharing one's own experiences and educational resources provides a key contribution to RQ4.

This paper extended the case study from Article II and set the basis for Article V, which looked into the cultural barrier in detail.

3.5 Article V: Overcoming Cultural Distance in Social OER Environments

Pirkkalainen, H., Jokinen, J., Pawlowski, J., & Richter, T. (2014). Overcoming Cultural Distance in Social OER Environments. In S. Zvacek, M. Restivo, J. Uhomoibhi, & M. Helfert (Eds.), *CSEDU 2014: Proceedings of the 6th International Conference on Computer Supported Education: Vol. 1 (15-24)*. Portugal: SCITEPRESS - Science and Technology Publications.

Research objectives and methods

This article extended the research of the previous articles within this dissertation and addressed the crucial topic of culture in the OER domain. The objective of the paper was based on various language and cultural barriers reported in the OER literature. Lai and Chen (2011) and Zhang (2010) elaborated on how the adoption of specific social software services might differ highly between countries because of differences in culture and context. As argued by Agarwal (2007), there are various challenges to knowledge sharing, while so-called cultural distance becomes highly important in a context where people deal within online social environments. The key concept for the study was the cultural distance that defines how strong the difference is between the home culture and the host culture in the recipient's perception (Ward et al. 2001). As pointed out by Kroeber and Kluckhohn (1952), and later by Church and Katigbak (1988), addressing cultural comparisons is extremely risky, often

biased and can miss crucial culture-specific aspects. This article studied the perceptions of the teachers and learners themselves regarding such cultural distance as they perform activities and identify learning resources in social OER environments. The objective was first, to identify how teachers and learners in schools perceive cultural distance as a barrier (quantitative part), and second, to study how to overcome such a barrier (qualitative part). Both the quantitative and qualitative data was collected with a survey (N=855).

Results

The results of the study show how the barrier of cultural distance depends on the age and nationality of the respondents. Meaning that older respondents were more likely to experience cultural distance as a barrier when they were engaged in online collaboration and used OERs from a distant culture. The role (teacher/student) did not seem to explain such perceptions. The analysis of the 18 investigated countries illustrated how the significance of the perceived barrier varied between them. More research is needed to determine the reason for such deviations.

The analysis of the open-ended questions focusing on ways to overcome such cultural distance barriers resulted in both technical and non-technical (community-oriented) interventions. The technical aspects present some of the key requirements for the development of social OER environments. One of the most crucial requirements relates to multilinguality; resources as well as the system itself should be available in the user's own native language. Another crucial aspect is the inclusion of rich metadata that can clearly explain and highlight the context where the OERs were created and used. For non-technical community-oriented interventions, the key aspects rising from the data were the localization efforts of OER to fit the context it is intended for as well as ways to stimulate a knowledge sharing culture in schools.

This article emphasizes that cultural barriers do not necessarily become issues that disrupt or stop someone from engaging in knowledge sharing. An active community around the person as well as context-aware technology that facilitates collaboration can aid the adoption process. However, there are differences in the perceptions and attitudes even within a group that shares a common identification, such as teachers in the same school.

Response to the research questions and relationship to the whole

This article addressed both RQ4 (How do the context-specific barriers to GSKM affect knowledge sharing activities?) and RQ5 (What types of interventions are needed to overcome the critical barriers to GSKM?)

The deeper investigation into cultural distance barriers showed that within a similar context and educational system, the perceptions of individuals do differ. These perceptions will influence, as shown in Article IV, whether a person is likely to be engaged in knowledge sharing in such workspaces for communities

of practice. The interventions identified through the qualitative analysis can inform what the key issues to overcome are, such as critical barriers related to language and culture.

This article extended the studies of Article II and IV. The focus of this paper goes beyond the one explained in Article III by focusing on the cultural barrier.

3.6 Article VI: Collaborating on Ideas: Tackling Barriers to Open Education

Pirkkalainen, H., & Pawlowski, J. (2014). Collaborating on ideas: Tackling Barriers to Open Education. In *World Conference on Educational Multimedia, Hypermedia and Telecommunications: 1/2014 (1844-1850)*. Chesapeake: Association for the Advancement of Computing in Education.

Research objectives and methods

The final article of the PhD was based on the previous papers and the findings within. The objective was to study new ways of knowledge sharing to overcome the crucial barriers that result in low motivation to contribute and take part in collaborations around OER. The investigation focused on engaging educators within higher education to early knowledge sharing around educational ideas that eventually lead to educational resources. The paper addressed some of the key motives for sharing in organizational teamwork and studied their feasibility in the OER domain. Within this study, a key concept was the ownership of knowledge, which has been seen as a key motivator for knowledge sharing, and has been studied in firms (Jones and Jordan, 1998) as well as in family businesses (Björnberg & Nicholson, 2012). Group interviews were organized and analyzed to find out what the key barriers and enablers are for creating collaborations on OER when educational ideas are being developed.

Results

The findings of the study show patterns for idea sharing in distributed educational settings that can be transferred to the OER domain. A set of activities and initial processes were extracted from the results along with the barriers and conditions for successful knowledge sharing processes. These processes aim toward partnerships and reciprocal, goal-oriented collaborations that are not truly supported by the existing social OER environments. Collaborations on OER should be set up and structured to allow stakeholders to be active developers of OERs and to pursue long-term benefits instead of waiting for other educators to adopt OERs that one has pushed to existing repositories. The facilitators of the process and the collaboration have to respect

the existing networks and tools stakeholders use for their informal and formal educational practices. The practices and project-like settings from the open source community are likely to be adoptable for the OER collaborations within the context of higher education. These considerations and findings were presented within the article as *recommendations for the idea sharing process* that can be seen as a best practice for the knowledge sharing process in the educational domain. The analysis of the focus groups was also presented as the *open educational ideas life-cycle* that extends the OER thinking toward knowledge sharing on the idea level.

Response to the research questions and relationship to the whole

Similarly to Article V, this study addressed both RQ4 (How do the context-specific barriers to GSKM affect knowledge sharing activities?) and RQ5 (What types of interventions are needed to overcome the critical barriers to GSKM?)

This article and its objectives were based on the findings of Articles II, III and IV. Reciprocity and working toward the same goals within knowledge sharing in formal organizational practices are in a key position to enable successful collaboration (Vuori and Okkonen, 2012; Hendriks, 1999). As collaborations on OER have been minimal, this study looked into ways to enhance collaborations around OER and to adjust how such collaboration is facilitated. This study helped to point out the barriers that relate to idea sharing practices and thus, provided further evidence for RQ4. The study contributed to RQ5 by explaining knowledge sharing practices in the OER domain that can be facilitated in new ways. These new ways of sharing can be seen as interventions to tackle motivational barriers to OER.

4 CONTRIBUTIONS

The key contributions of this dissertation will be discussed from both theoretical and practical perspectives within this section. The following figure 4 highlights the key contributions emerging from the PhD research process.

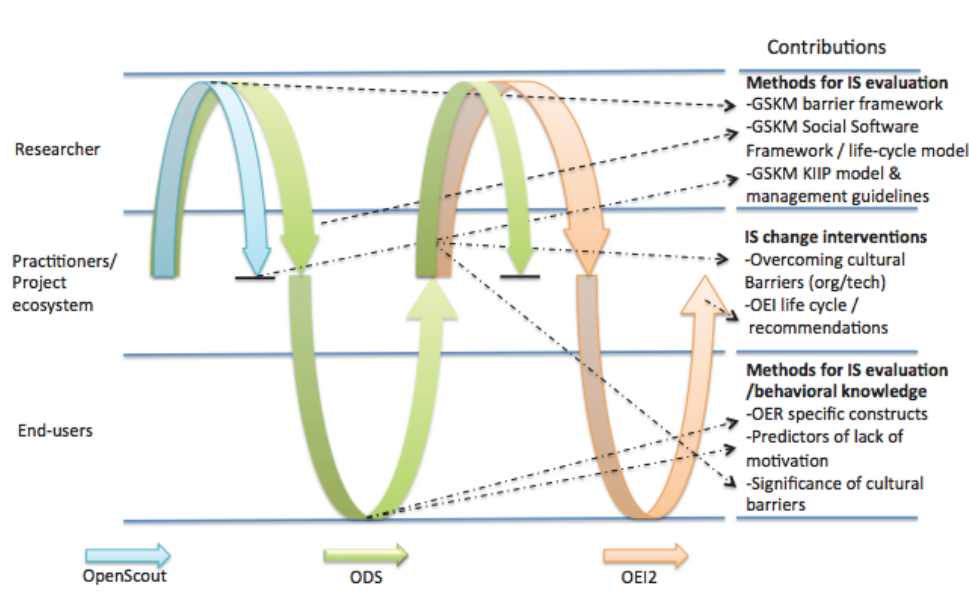


FIGURE 4 Key contributions of the dissertation

The key results of this dissertation do serve the practice by direct integration into design and development activities. Simultaneously, many of the findings extend the current theoretical knowledge on knowledge sharing and social software. While each contribution can be seen to advance both theoretical knowledge and practical KM efforts, the categories which they are described in will be taken from mainstream DSR research (Gregor and Hevner, 2013) to al-

low discussion and comparison with existing DSR/ADR work. The contributions are divided into: 1) methods for IS evaluation/analysis mechanisms, 2) IS change interventions, and 3) behavioral knowledge of the utility for users.

The previously discussed GSKM barrier framework, social software framework and life-cycle model, as well as the KIIP model, can all be seen as IS evaluation methods that support the analysis of the social software integration into globally distributed knowledge management. The term *IS*, in this case, refers to an information system as a tool or software and not the IS domain. This differentiation is important because the analysis support could be deployed in a totally different context. All of these contribute both to theory and practice. Similarly, the IS change interventions that were generated within the dissertation for overcoming some of the key challenges and providing recommendations for idea sharing provide these two types of contributions. The behavioral studies conducted within the thesis in Articles III and IV were especially important to build up the theoretical base for OER-specific influencing factors for knowledge sharing. However, these studies enabled the identification of the interventions that can be used to overcome the challenges and to derive requirements for both organizational activities and technical development. The behavioral studies provided justification and evidence when combined with IS evaluations. Each of these contributions will be discussed in detail below.

A variety of practices and methods to evaluate the feasibility and importance of the artifacts have been proposed to develop design science research further. One of such instruments was provided by Gregor and Hevner (2013) in the form of a DSR knowledge contribution framework (KCF) (Figure 5).

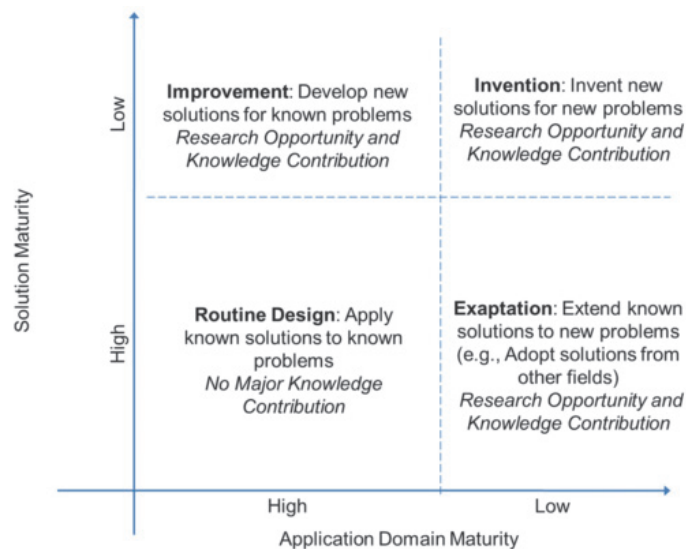


FIGURE 5 DSR knowledge contribution framework (Gregor and Hevner, 2013)

The framework can help to explain how the contributions emerging from DSR research enrich and extend the current body of knowledge. The KFC can be ex-

plained by four types of solutions in relation to the maturity of the application domain (Gregor and Hevner, 2013):

- **Invention** includes new solutions for new problems. This declares radical changes in thinking and doing.
- **Improvement** includes new solutions for known problems. This happens when more efficient and innovative solutions are required in a known application context. As emphasized by Gregor and Hevner (2013), many of the DSR contributions can be classified as improvements.
- **Exaptation** includes known solutions that are extended to new problems. This happens when solutions that have worked in another context are transferred to and adopted by a new field. Exaptation is also a typical IS contribution as argued by Gregor and Hevner (2013).
- **Routine Design** encompasses the smallest contributions, as those address known solutions for known problems. It can be argued that routine design does not provide an adequate research contribution (Gregor and Hevner, 2013).

As the ADR approach is heavily based on DSR, the fitness of this evaluation instrument is relevant for this dissertation. As the theoretical and practical contributions are discussed, they will also be classified and evaluated against these criteria set by the KCF by Gregor and Hevner (2013).

4.1 Theoretical contributions

This thesis demonstrates how social software supported knowledge management efforts deal with unique influencing factors and barriers. The conducted research first describes the research gaps that currently remain unexplained by the existing literature on social software supported knowledge management. Second, the research addresses these gaps by both contextualizing the empirical investigation and explaining those gaps within the context of open education.

4.1.1 Identifying and contextualizing barriers

As a start to this research work, a large, systematic literature review was conducted to explore the barriers in relation to GSKM (Article I). Within this activity, a step forward was taken to explain the relevant barriers to knowledge management in a distributed, social software mediated context. The main contribution to research is the artefact, the *GSKM barrier framework*, which illustrates a comprehensive barrier analysis on the wide topic of GSKM. The framework, which includes organizational, social, cultural and technical barriers, sets the basis for researchers to study the cross-domain barriers, and their dependencies and persistence. The framework helped to explain how the previous social

software literature has not emphasized the *cultural barriers that are most prominent and persistent challenges* enough within globally distributed collaboration. The contribution of this framework targeted the IS domain in specific.

The categorization was further applied to a review of the crucial barriers in the context of OER in Article II. The analysis was finalized within Articles III and IV, setting the basis for explaining the research gaps in the educational domain.

The contribution of the GSKM barrier framework can be argued to be an improvement-type of contribution in KCF (Gregor and Hevner, 2013). The previous literature has identified many types of barriers that are drawn together within this cross-disciplinary work, emphasizing that more holistic methods for analysis are needed to tackle the critical barriers. However, the role of cultural barriers to social software use can also be argued to be *exaptation*-type of contribution in KCF, as this comes from related studies on knowledge sharing and globally distributed collaboration, and has direct implications on the design of interventions for social software adoption.

4.1.2 Identifying dependencies and crucial barriers in OER

As depicted by Riege (2005), while barriers are discussed separately in the literature, it is highly likely that barriers interrelate in real life contexts. However, such interrelations were not available for social OER environments or knowledge sharing in general. The literature on knowledge sharing and collaboration related barriers has not explained these relations, except for the clustering of the challenges into various social and technological categories (see Riege 2005, Ågerfalk et al., 2005, Sclater et al., 2001). Articles II and III explain barriers that are specific to the OER domain and address a large quantitative study that provides the first evidence on the relations of these barriers in the OER domain. The relations and grouping of the *OER-specific barrier constructs* were explained and named as the lack of organizational support, language and cultural barriers and the difficulty of assessing the quality of educational resources and associated services. Similarly to the barrier framework, the OER-specific constructs provide a basis for confirmatory studies for OER and knowledge sharing in general and thus can be explained as *improvement* according to the KCF.

The existing research on OER does not provide evidence on the factors that influence motivation in the context of social OER environments. As argued in Article IV, studies that address motivational factors or willingness to share in other contexts, such as in organizational knowledge management or in open approaches such as OSS communities or Wikipedia, are not applicable to OER as such. The differences were expressed by the artifacts being shared and the teacher-centric user group that differentiated the usage. The scenarios also differ with OSS communities that sometimes are paid to contribute (Roberts et al., 2006) and use different modes of collaboration. The insights gained from the research showed how *language and cultural barriers strongly predict teachers' lack of motivation* to share and collaborate in social OER environments. This contribution to OER and knowledge sharing tackles existing problems and provides re-

searchers with clear focus points for addressing the upcoming research on the motivational factors of OER. Therefore, this contribution can be seen as an *improvement* in KCF.

The study on perceptions toward cultural distance in the OER domain helped to explain the contextual and socio-cultural differences toward the use of social OER environments. The findings pointed out differences between countries and how the age of the user of such an environment does make a difference. The ways to *overcome the cultural distance barrier* provided evidence on both technical and organizational levels on what is needed to improve the situation. The contribution of the interventions can be seen as an *improvement* in KCF as it pointed out key focus points for improving the situation in an educational context.

4.1.3 Aligning global KM processes and social software

The general interest in applying social software to knowledge management has launched various studies that have addressed specific tools in various KM activities, ranging from general investigations of social media and knowledge management (Avram, 2006, Levy, 2009, Zhang, 2010, Zheng and Zheng, 2010) to specific investigations of micro-blogging in informal communication at work (Zhao and Rosson, 2009) and more. Article II takes a step further and maps the studies that focus on GSKM, explaining the types of activities and processes that are supported and influenced by social software. The mapping was accomplished in a *GSKM social software framework*. This contribution, which can be argued to be an *improvement* in KCF, aligns key social software tools based on the functionalities and KM activities they support with the key barriers that have been identified in related studies. Such an effort to align the activities, tools and crucial barriers has not been done before. The aligning effort was extended to *social software in a KM life-cycle model*, elaborating on how types of social software only support some of the knowledge exchange activities. This alignment work is also an *improvement* in KCF in the light of the previous scattered knowledge on social software integration with KM. These contributions are generalizable to the IS domain, even though a vast amount of literature was identified from related disciplines.

Identifying relevant social software that supports a variety of knowledge management tasks in organizations is highly important (Avram, 2006), but in reality, implementing KM in an organization deals with human- and technology-oriented aspects, such as technological infrastructure, organizational culture and processes (Wong, 2004). However, the implications of the globally distributed, social software supported knowledge management (GSKM) for the design and practice of organizational and KM processes have not been emphasized enough. Article V analyzes the literature on process-oriented KM and social software to discover indications and evidence about how interventions should be designed and integrated into the KM coordination actions of an organization, focusing on the crucial factors that too often disrupt KM projects. The *KIIP model* highlights the integration of the previously overlooked combination of inter-

nal and external social software activities into the KM processes and provides a detailed management approach for KM projects to analyze and implement those in organizational settings. As many other contributions to the IS domain, this contribution can be argued to be an *improvement* by extending the strategic and managerial guidelines toward IS adoption and KM.

Article VI discusses the implications of collaboration in the open education domain for the GSKM activities. As an outcome of the analysis of the focus groups, several conditions, barriers, enablers and activities were identified for successful collaboration in OER development that starts from educational ideas. The outcomes and the iterative work of collaboration around educational ideas can be explained in a form of the *OEI life-cycle model* (Article VI). The model extends the previously discussed KM life-cycles toward methods set in the open source community, highlighting the role of knowledge sharing in the OER domain. The model and the attached *guideline for collaborative idea generation* highlight the key elements of the collaborative idea generation process leading to OERs. While the data collection took place in the educational domain, the contribution is generalizable as an open idea sharing process to the IS domain. As the model and the guidelines for collaborative idea generation extend innovative practices from the open source community to the OER domain, this contribution can be argued to be *exaptation* in KCF.

While the contributions of Articles III and VI build toward process theories in knowledge sharing, more work is needed to transform them toward explanation and prediction (Gregor, 2006) with testable propositions and causal explanations. Studying and evaluating these models in the scope of the theory types of Gregor (2006), the KIIP model of Article III aims toward theory type V with a focus on design and action. The OEI life-cycle model that was explained for the educational domain should be extended toward a knowledge sharing theory in IS.

4.2 Practical contributions

The practical contributions were an objective of their own because the research was tied to an action design research approach in research and development projects. As explained, most of the conducted research has directly affected the requirements analysis and the implementation of the services within the projects. The domain-specific knowledge collected and evidenced within the efforts has been shared not only with the research community, but also with practitioners.

The GSKM barrier framework (Article I) and the approach to researching the challenges in the context of OER (Article II) have been guiding the requirements analysis within the ODS project and have been applied by partners beyond the scope of this research. The contribution of the barrier framework and the contextualization approach comes from applying the framework to knowledge management activities in a global context as a managerial analysis

support to 1) study which barriers are most likely to occur in a given context, and 2) identify barriers in order to realize the solutions or interventions on both technical and organizational levels. The integration of the barrier framework is crucial in the implementation of KM projects in organizations. Article III explains in detail how to embed the analysis into KM coordination activities when the approach and boundaries for knowledge management are set.

The empirical investigation on the influence of the barriers to user motivation in social OER environments set a foundation for creating both IT- and organization-dominant interventions. The investigation of the predictors of teachers' lack of motivation to share and collaborate in social OER environments (Article IV) can inform both practitioners in schools and in the development of OER services regarding priorities and requirements that correspond to the users' motivation to engage in the system. The interventions described in Article IV first discuss the requirements for the development of the OER environments with a clear focus on multilinguality and the types of metadata required within the system. The non-technical (or organization-dominant) interventions describe the organizational perspectives of facilitating a knowledge sharing culture in schools and within the OER context.

Articles III and VI approach the processes and activities in OER from different viewpoints. Article III discusses management implications for GSKM projects and highlights key issues for facilitating social software activities within both informal and formal work processes. As the process view has not been addressed within the OER domain, these initial GSKM management tasks and processes can give new projects a framework that supports them in managing the variety of tasks within collaborative practices. On the other hand, Article VI explains how the practices around the collaborative development of OER can be structured around existing networks and tools that stakeholders already have in use.

4.2.1 Reflections on a good design

As emphasized in DSR and ADR, a good research attempt should lead to reflections on what makes a good design (Hevner et al., 2004; Sein et al., 2011). As major parts of this thesis focused on behavioral research, the reflections on good design were only partly addressed by the thesis in Articles II, III, V and VI. The requirements gathering process that was accomplished within the ODS project was an integral part of the data collection, even though it was not fully elaborated on within the thesis. However, the survey and the qualitative study (elaborated on in Articles II, IV and V) related to it resulted in key requirements for social OER environments. Therefore, toward a good design.

The tables (Table 1 and Table 2) below illustrate the key issues that respondents saw in response to the barriers presented in Article IV. Similarly to Articles V and VI, the analysis was accomplished with the qualitative content analysis guidelines of Mayring (2000). The open-ended questions of the survey (explained in Article V) were analyzed to identify interventions on a technical

level. These elaborations were further analyzed for the project's purpose of pointing out high-level requirements (Table 1).

TABLE 1 High-level requirements for social OER environments

Requirement statement
The user shall be anywhere in the portal in a max of three clicks
The portal shall be translated into all major languages (based on engagement with ODS)
The portal shall offer learning resources with a balanced language distribution
The portal shall be accessible by mobile devices and tablets
The portal shall be constantly moderated to avoid runtime errors, service breakdowns or unreachable resources
The portal shall offer "certified" or "trusted" resources
The portal shall offer resources mapped to curriculum
The portal shall allow clear separation of national (local) and international views
The portal shall indicate which resources have limited access for mobile devices and tablets
The portal shall offer support for accessibility standards
The resources shall support accessibility and access for people with disabilities
The portal shall not include irrelevant and offensive content
The portal shall visibly highlight updates of new resources
The portal shall offer resources using a Creative Commons (CC) license
The portal shall display CC conditions with icons (linking to the respective CC page)
The portal shall offer a wide variety of in-depth metadata on the resources
The portal shall link physical training events and online training materials
The portal shall offer tutorials on using the portal
The portal shall offer tutorials on applying the resources in real life
The portal shall offer tutorials on adapting the resources
The portal shall offer social networking functions
The portal shall offer written best practices
The portal shall offer simple tips for applying OER
The portal shall offer a helpdesk function
The key services of the portal shall be usable directly through the browser
The portal shall indicate the rights and conditions of users once they upload material

Additionally, the responses were analyzed further to identify the key functionalities for social OER environments. These were expressed as user actions in Table 2.

TABLE 2 Functional requirements for social OER environments

Requirement statement
The user shall be able to search materials with a simple text-based search (Google-like)
The user shall be able to search with an advanced search
The user shall be able to view the most popular/viewed resources
The user shall be able to view the most recently added resources
The user shall be able to create a closed collaboration space
The user shall be able to share particular resources with selected users
The user shall be able to rate resources
The user shall be able to comment on resources
The user shall be able to upload resources
The uploader shall be able to indicate how the resource was applied in the classroom
The user shall be able to discuss in a forum
The user shall be able to sign up for notifications in the portal
The user shall be able to filter resources that are "trusted," "certified" or from "followed" users
The uploader shall be able to link the resource with best practices around its use
The user shall be able to maintain a personal profile
The user (teacher) shall be able to communicate with parents and students
The users shall be able to send private messages to others
The user shall be able to discuss synchronously on chat
The user shall be able to discuss synchronously using a conferencing facility
The user shall be able to follow other users in the portal
The user shall be able to see the activities of the people "followed"

These requirements, which came from the research effort, were used as implementation guidelines for the ODS project and can be seen as key issues of good design. However, this dissertation has shown that overcoming the critical barriers to GSKM cannot be addressed on a technical level only.

4.3 Limitations and future topics

As the thesis addresses various types of barriers for social software supported knowledge management, limitations can be recognized that should be addressed by upcoming research. One limitation relates to the generalizability of these findings.

The thesis focuses the empirical investigation on the educational domain and misses a cross-domain analysis. Such an investigation would be highly important if positioned well with the existing studies around organizational knowledge sharing. As the usage of social software in the context of OER is community driven and lacks organizational reciprocity and goal orientation (this is elaborated on further in Article III), the influencing factors toward people's behavior and attitudes are likely to differ from those in intra-organizational knowledge sharing. The findings of the articles do point out that teachers and students do not necessarily see the investigated issues as barriers that would stop them from their knowledge sharing activities in social OER environments. This finding is comforting as well as troubling at the same time. It shows how the expected and perceived benefits do outweigh issues that one does not consider to be critical. However, the adoption of these environments still seems to be extremely modest and low. More research is needed to study those expected and perceived benefits of sharing in workspaces for communities of practice.

One of the future topics that should be investigated in the adoption of social OER environments relates to social norms. The focus is derived from social sciences, but is also applied to the IS domain for confirmatory studies (Taylor and Todd, 1995). While other explanations about the lack of adoption can be found about perceived benefits and usefulness, the role of group or community beliefs and pressure in school education would be interesting to address.

While working on a large playground of social software supported knowledge management, the focus of the studies must be carefully designed based on what has already been studied. Technology is one part of this. As social software comprises a variety of tools that are either designed for or applicable to organizational knowledge sharing, it is clear that not all of them can be studied within one research stream. In relation to social software, it becomes clear that when serving such different purposes from generic to specific and personal versus collective (Wamelen and Kool, 2008), the usage experience differs alongside the potential barriers the users face.

One limitation and the basis for the upcoming research is the longitudinal perspective and patterns set in motion by applying the action design research approach. The stages dedicated for validating the newly found constructs (Article IV) in additional confirmatory studies as well as qualitative research to explain related interventions would be crucial. This would be important from a validation perspective (the reliability of the results) as well as for informing on how to design more sustainable OER environments in the future. As elaborated

on before, many of the identified interventions are difficult to put in practice and show how seriously the critical barriers should be addressed. The upcoming efforts of the researcher will be to ensure that those interventions are integrated into current and upcoming projects on social OER environments and to validate whether their implementation helps in reducing the barriers. However, many of the findings within this thesis already provide strong evidence for how to intervene with GSKM in organizations and what aspects are likely to reduce people's willingness to collaborate and share knowledge.

All in all, there is a need to align the studies on social software with knowledge management. As a part of the research effort, the author participated in a collaborative research action (Pawlowski et al., 2014) to define some of the crucial topics and methodological considerations for future topics on social knowledge environments.

YHTEENVETO (FINNISH SUMMARY)

Sosiaalisten ohjelmistojen käyttöönotto osana organisaatioiden tiedonhallintaa on havaittu tehostavan työntekijöiden sekä sidosryhmien välistä kommunikointia. Pääosin yhteistyöteknologioista sekä verkkoviestintätyökaluista koostuvat sosiaaliset ohjelmistot yhdistetään niin viralliseen, kuin epäviralliseenkin organisaatioissa tapahtuvaan viestintään. Näiden teknologioiden käyttöönotto hajautetuissa ympäristöissä usein epäonnistuu julkisella ja yksityisellä sektorilla. Yhtenä esimerkkinä toimii koulutussektori, jossa kouluttajien sekä opiskelijoiden tiedonjakamista tukevien sosiaalisten ohjelmistojen käyttö on ollut hyvin vähäistä, vaikka tarve on tiedostettu hyvinkin suureksi.

Sosiaalisiin ohjelmistoihin liittyvissä tutkimuksissa on havaittu käyttöönottoa haittaavia tekijöitä, joita usein kutsutaan esteiksi. Nämä esteet ovat henkilökohtaisia ja kumpuavat henkilön asenteista, kokemuksista ja mielipiteistä. Organisaatioiden sisäisessä, kuin myös organisaatioiden välisessäkin tiedonhallinnassa nämä henkilökohtaiset esteet saattavat estää kriittisen tiedon välittämistä ja pahimmillaan pysäyttää koko tiedonvälitysketjun. Nämä esteet usein liitetäänkin ihmisten väliseen kanssakäymiseen sekä organisatorisiin ongelmiin. Olemassa oleva tieto näiden esteiden ylittämiseksi organisaatioiden hajautetuissa toimintakentissä on hyvin vähäistä. Aiemmat tutkimukset ovat jättäneet vähälle huomiolle näiden esteiden keskinäisriippuvuudet ja erityisesti kulttuuritekijöiden merkityksen käytettäessä sosiaalisia ohjelmistoja hajautettuun tiedonjakamiseen. Tässä väitöskirjassa tutkitaan etenkin hajautetun tiedonjakamisen ja ylipäättänsäkin tiedonhallinnan haasteiden välillisiä riippuvaisuuksia sekä niiden kontekstisidonnaisuutta. Näiden tekijöiden tunnistaminen on välttämätöntä kestävien sekä onnistuneiden interventtioiden eli organisatoristen ja teknisien muutosten läpivientiin ja esteiden poistamiseen. Aihealuetta tarkastellaan väitöskirjan empiirisessä osassa avoimen opetuksen toimialalla laadullisin ja määrällisin keinoin. Kyseinen toimiala on hyvin mielenkiintoinen ja relevantti erityisesti verkkovälitteisen viestinnän näkökulmasta. Avoimen opetuksen käytänteissä opettajat ja tutkijat suunnittelevat ja toteuttavat koulutuksen palveluita ja sisältöjä yhteistyössä paikallisten ja kansainvälisten toimijoiden kanssa.

Väitöskirjan havainnot auttavat organisaatioita tietämyksenhallinnan strategioiden luomisessa sosiaalisten ohjelmistojen ympärille. Tulokset selventävät kuinka globaalisti hajautetun tiedonjakamisen esteet voidaan selittää organisatorisilla, sosiaalisilla, kulttuurisilla sekä teknisillä tekijöillä. Tulokset osoittavat kuinka nämä esteet ovat keskinäisriippuvaisia, kontekstisidonnaisia, ja jopa ikäriippuvaisia. Työssä tunnistetuista esteistä kulttuurisilla sekä kieleen liittyvillä ongelmatekijöillä on suurin negatiivinen vaikutus sosiaalisten ohjelmistojen käyttömotivaatioon. Toisin sanoen, sosiaalisen ohjelmiston käyttäjän haluttomuus osallistua kyseisessä ympäristössä tapahtuvaan tiedonjakamiseen vahvistuu erityisesti, jos hän kokee informaation ja keskustelujen sisällön heijastelevan itselle vieraita toimintatapoja, käytänteitä ja arvoja. Kyseisten negatiivisten tunteiden vaikutus tiedonjakamiseen on suurempi, kuin mahdolliset koke-

mukset ohjelmiston heikosta laadusta tai käyttöönoton tukitoimien puutteesta. Väitöskirjassa osoitetaan kuinka koetut esteet vaihtelevat merkittävästi tutkimukseen osallistuneiden maiden välillä.

Tutkimuksen avulla luotu viitekehys tukee organisaatioiden tietämyksenhallinnan strategioiden koordinoimista ohjelmistojen käyttöönoton yhteydessä. Kyseinen viitekehys on tiedonhallinnan asiantuntijoiden sekä johtotason opas, joka auttaa poistamaan esteitä sosiaalisissa ohjelmistoissa tapahtuvaan tiedonjakamiseen. Väitöskirjassa osoitetaan keskeiset tiedonhallinnan aktiviteetteihin soveltuvat ohjelmistotyytit ja niihin liittyvät rajoitteet. Harkinnalla organisaation tarpeita palvelemaan valitut ja kehitetyt sosiaaliset ohjelmistot ovat avainasemassa esteiden poistamiseen. Keskeisten tiedonjakamisen ongelmien ratkaiseminen vaatii kokonaisvaltaisia, organisaation toimintaan pureutuvia muutoksia, jotka eivät keskity pelkästään teknisiin ratkaisuihin.

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ORIGINAL PAPERS

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GLOBAL SOCIAL KNOWLEDGE MANAGEMENT - UNDER- STANDING BARRIERS FOR GLOBAL WORKERS UTILIZING SOCIAL SOFTWARE

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GLOBAL SOCIAL KNOWLEDGE MANAGEMENT – UNDERSTANDING BARRIERS FOR GLOBAL WORKERS UTILIZING SOCIAL SOFTWARE

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Abstract

Utilizing social software as a part of a global knowledge management strategy has raised increasing interest in enterprises as well as in the educational domain. Rather than being proactive, organizations tend to face barriers related to knowledge management after the problems occur. When dealing with social technologies in a distributed setting, organizations and individuals face a variety of barriers currently unrecognized in knowledge management literature. Within the study, we analyse knowledge management literature extending the body of knowledge with barrier analysis regarding global challenges as well as social software. Our focus is especially on knowledge exchange and globally distributed collaboration activities in organizations. We argue for contextualized understanding of the barriers, recognizing the challenges studied in similar activities. The paper concludes with a synthesis of these interrelated components, proposing a Global Social Knowledge Management-barrier framework that demonstrates the wide spectrum of possible challenges in globally distributed, social software supported knowledge management activities.

Keywords: Barriers; Knowledge Management; knowledge sharing; Social Software; global collaboration

1 Introduction

Managing knowledge in a global context is a complex process in virtual teams as in distributed collaboration in general. Especially in virtual teams that may not have opportunities for face-to-face collaboration, problems may rise from differing and unusual modes of interaction (Sivunen and Valo, 2006), language and cultural differences (Noll, Beecham, and Richardson, 2010), because of the geographical distance (Pallot, Martínez-Carreras, and Prinz, 2010b) and so forth. From the technical point of view, collaborators have to deal with systems they might not be accustomed with or feel unease to apply. Social software is seen as a potential solution for supporting knowledge management across global settings, which seems to be established as a new research focus, or even a trend. The possibilities rise from the opportunities to utilize social software for various business operations and collaborative tasks (Kaerkkäinen and Jussila, 2010; Zhang, 2010) and to knowledge management activities ranging from knowledge retrieval to sharing (Zheng, Li and Zheng, 2010). Social software can be seen as a set of technologies to support user communication, group building, cohesion, networking and so on (Wever, Mechant, Veevaete, and Hautekeete, 2007). It even has been seen as a prominent solution and a cure for many challenges caused by the lack of physical collocation given that the organization is committed to the adoption and allocates support accordingly (Noll et al. 2010; Kaerkkäinen and Jussila, 2010). As discussed by von Krogh (2012), social software might enable faster local decisions and improve efficiency when applied to organizational social practice. Still, researchers across disciplines have indicated lack of organizational adoption of social software for collaboration, because of barriers.

Previous literature has indicated barriers relating to usage and adoption of specific technologies such as social software in an organizational context. Such could be “lack of understanding for the possibilities of the tool” when the potential of social software is not fully harnessed, i.e. collaboration mechanisms provided by the tool are not taken up in practice or the stakeholders that could be reached through the tool are not involved (Kaerkkäinen and Jussila, 2010). Widely discussed threat is related to privacy of social software. Different types of social software services store a variety of information about the users in the user profiles but also on the actions the users take in the systems (Campisi, Maiorana, and Neri, 2009). The user actions and discussions held in the system may

encompass confidential data that can easily leak to unwanted hands of web attackers (Yang et al. 2012). As social software such as social networking sites might differ drastically from services like blogs, differing perceptions of users and unequal adoption of the technologies is likely to occur when the software is adopted by organizations (Onyechi and Abeysinghe, 2009). However, the existing literature does not elaborate on the variety of challenges that also relate to those circumstances and the implications such barriers might have. A variety of those versatile challenges are related to managing knowledge in enterprises. The inclusion of social software tightly connects to (distributed) collaboration practices that can be asynchronous or synchronous and take place closed for the organizational units or crossing the intra-organizational boundaries towards external stakeholders and communities. Barriers related to distributed collaboration are versatile in nature focusing on aspects such as geographical distance, lack of trust, differing languages and cultures and so on (Noll et al. 2010). It is crucial to study the interdisciplinary research to understand the challenges in global, social software supported knowledge management initiatives.

Our study gives a holistic state of the art literature review of barriers for global Knowledge Management, focusing on information exchange activities and processes that are accomplished or aided by using social software in an international context. We focus on barrier-related literature for distributed teams and heterogeneous organization types, emphasizing the research disciplines of global knowledge management (including global collaboration/ team work practices) and social software. The leading research question for the study is: “What type of barriers global knowledge workers face when collaborating and interacting through social software?” As a result, a better understanding of the barriers, their context-dependency and their relation to one another is achieved.

The paper is structured as following: In the second section, we describe the key components of our study and present the methodology to capture the barriers. The third section describes how barriers have been addressed in different research disciplines and finalizes the analysis by the construction of a barrier framework (Global Social Knowledge Management) for global workers utilizing social software. The paper concludes with a summary of results, clarifying the contributions to theory and practice.

2 Theoretical foundation and methodology

Within this section, we lay the theoretical foundation for the study. Following the Global Social Knowledge Management research (GSKM) approach (Pirkkalainen & Pawlowski, 2013), we merge the research fields of *Global Knowledge Management (GKM)*, and *Social Software* to understand the barriers of utilizing social software in globally distributed knowledge management efforts. As to be discussed within this paper, *barriers* have been addressed from many perspectives in the literature related to globally distributed collaboration. For the purpose of this paper we will focus on GSKM challenges according to the barrier-definition of Pirkkalainen and Pawlowski (2013): “A barrier is any challenge, risk, difficulty, obstacle, restriction or hindrance that might prevent a single person, a group or an organization to reach an objective and success in a specific context when the challenge is related to acting or working in a collaborative cross border setting”.

Through the *GKM* component we observe the organizational as well as individual challenges arising in collaborative distributed settings. These include situations where knowledge is being created, shared and adopted by groups of people. We observe literature and barriers that have been studied especially in knowledge management. We extend the focus to virtual teams and (geographically and temporally) distributed collaboration to lay a foundation for recognizing the barriers for GKM.

Social software can be applied to manage knowledge and collaboration from multiple perspectives. Within the study, we analyse social software from the knowledge exchange perspective but also as a tool for engaging with external audiences. As evidenced by Richter (2013), social software use in organizations often passes the organizational boundaries to reach stakeholders and networks of experts for innovation potential, increased visibility and future viability of the organization. Even as the term social software is frequently used, there is still no commonly agreed definition. One way of defining social software is that it enables interactive collaboration, managing content and networking with others. It supports the desire of users to be pulled into groups in order to achieve their personal goals (Wever et al. 2007). We acknowledge the obvious overlaps to other terminology such as Web 2.0, Social Media and Collaboration tools that are in many cases used to explain the same phenomenon and technologies. Within this analysis, we have focused on the following types of software: social networking services, wikis and collaborative writing, blogging and micro-blogging, social

bookmarking and media sharing. As a key component for our study, we strive to understand its influence on knowledge management in global settings.

2.1 Method

Our analysis focuses on the following objective: To perform a systematic literature review on the barriers for global knowledge workers. The goal of the analysis was to answer the following research questions:

1. What type of barriers global knowledge workers face when collaborating and interacting through Social Software?
2. How are the GSKM barriers reflected in different research disciplines?

The literature review for the barriers was accomplished using the systematic approach by Fink (2005) as method to describe available knowledge for professional practice. The rigorous approach should be *systematic* with clear methodology, *explicit* in the procedures, *comprehensive* in the analysis and *reproducible* by others (Fink, 2005). The literature review followed the steps defined by Kitchenham (2004) for conducting a rigorous analysis. The steps include: (1) Identify need and define the method, (2) create research question(s), (3) conduct the search for relevant literature, (4) assess the quality and appropriateness of the studies, (5) extract data from the studies, (6) conduct data synthesis and finally (7) interpret the results and write a report.

During the literature analysis process we expanded social software related searches to social media, web 2.0, collaboration tools and specific tool categories mentioned previously. This allowed us to have a better overall scope of the barriers as the terms are often used to express the same phenomenon. For all of the key literature, the main entry points were IEEE Xplore bibliographic database, ACM Digital Library as well as SciVerse Scencedirect. Additionally, top journals based on Association of Information Systems (AIS) rankings were included depending on the discipline and focus. As our analysis is a cross-disciplinary effort, it was crucial that in the quality/appropriateness assessment phase (Kitchenham, 2004) every included publication was analysed in terms of the study aims and the domain of interest in search for the barriers. This is seen necessary as past research has pointed out the essence of contextual influence for describing the importance and relevance of barriers (Kaerkkainen and Jussila, 2010; Gao, Dai, Fan, and Kang, 2010). For global knowledge management and

related literature on globally distributed collaboration, 135 papers were included in the final analysis for the barriers. For social software related literature, 83 articles were included.

The synthesis part of the literature review takes a constructive approach (Crnkovic, 2010). Constructive research is suitable for construction of a solution (artefact or a theory) that is based on existing knowledge (Crnkovic, 2010). In our case the approach is to build on existing knowledge on barriers and to construct an artefact in form of a framework in order to study the barriers for global knowledge workers. The framework was constructed and extended in a tradition described by Pandit (1996) for completing a grounded theory analysis based on literature analysis and validating the framework through empirical cases. Therefore, the conceptual framework is aimed towards theory building for IS research (Nunamaker, Chen, and Purdin, 1990) by contributing to the body of knowledge with a variety of challenges that require validation in global organizations.

The constructive part is combined with the approach of Kitchenham (2004) by analysing, synthesizing and interpreting the literature in order to finalize the data analysis and construct the barrier framework. The framework is foreseen to be applied in qualitative studies that address GSKM in globally operating organizations. It can also be utilized in quantitative approaches, such as incorporating it for studying KM success eg. using the Jennex and Olfman KM success model (Jennex, Smolnik, and Croasdell, 2008).

3 Barriers of GSKM – a critical analysis of current literature

This section describes how barriers have been studied in different disciplines that focus on globally distributed collaborative activities in organizations. The second part of the section presents the synthesis of our study and introduces the barrier framework for GSKM.

3.1 Barriers for global knowledge workers

Studying globally acting and networking organizations has been addressed from many points of views within the last years. The research discipline of *Global Knowledge Management (GKM)* is from the barrier point of view focused on the aspect of *knowledge sharing or transfer* within organizations (Disterer, 2001; Bureš, 2003; Riege, 2005). The research for KM and knowledge sharing in specific has pointed out the complexity and wide range of challenges that need to be dealt with and taken in to account by organizations. Riege (2005) divided knowledge sharing barriers to individual, organizational and technology barriers.

Disterer (2001) focused on individual and social barriers. Bureš (2003) also focused on individual and social barriers while having the focus on corporate culture and incoherent paradigms between individual and the company. Many barriers in knowledge sharing are interpersonal, addressing the willingness or unwillingness of individuals to share or receive information. At the same time there are still concerns about social networking causing unwanted distraction when used in internal collaboration (Archambault and Grudin, 2012). However, GKM research still is lacking the holistic view on the importance and ranking of barriers for a certain context. Still, attempts have been made for prioritizing barriers, for example Ruggles (1998) showed empirical evidence on importance of culture as the biggest impediment for knowledge transfer.

The barriers for *distributed collaboration* in many ways overlap with the GKM research, as collaboration is an essential part of the knowledge sharing process. Especially in the related research field of *Global Software Development (GSD)* (Agerfalk, Fitzgerald, and Holmstroem, 2005; Huang and Trauth, 2006), the factor of distance (Pallot et al. 2010b) has been addressed by researchers from various angles. As elaborated by Agerfalk, Fitzgerald, and Holmstroem (2005), distance does not necessarily solely refer to geography and separation in terms of physical distance. It can also refer to temporal distance where collaborators are located in differing time-zones or socio-cultural distance where collaborators do not share same values and norms. Researching a specific aspect of distance has been well established not only in GSD but related to distributed collaboration in general. One of the highly researched barriers related to distance is “time-zone difference” (Carmel, 1999; Huang and Trauth, 2008). This barrier can cause multiple types of challenges for distributed collaboration such as lack of coordination, communication and collaboration (Carmel, 1999).

As mentioned, not all research related to distributed collaboration is covered by GSD. Widely researched aspects for globally acting organizations and teams include *management and coordination* (Herbsleb, Mockus, and Finholt, 2000; Battin, Crocker, Kreidler, and Subramanian, 2001; Piri, Niihimaeki, and Lassenius, 2009), operating in *virtual teams* (Sivunen and Valo, 2006; Huang and Trauth, 2007), *collaboration /communication* (Sclater, Grierson, Ion, and MacGregor, 2001; Herbsleb et al. 2000), *organizational/national cultural influences* (Sclater et al. 2001; Bureš, 2003; Hofstede and Hofstede, 2005) as well as the *support of technology* for organizational activities (Taylor and Todd 1995; Onyechi and Abeysinghe, 2009; Zigurs and Khazanchi, 2008). Thanks to the widely conducted empirical

work, research for the identification of barriers in distributed collaboration and GSD has been profound. The variety of the challenges illustrates the complexity of global collaboration in general. However, the interrelations of the barriers can be seen as context-dependent. Both Pallot et al. (2010b) and Riege (2005) have stressed the interdependence of barriers and the challenge to understand the effects of those. Noll et al. (2010) also pointed out how geographical, temporal and cultural distances have a significant impact on trust in global teams. Additionally, the importance of a barrier can be questioned. While geographical and temporal distance have been one of the most researched collaboration factors in GSD, the study of Pallot et al. (2010b) has argued it to be less significant compared to many other distance creating factors on collaboration. Therefore, we emphasize clarifying the importance of a barrier in a specific context before generalizing its overall impact.

For the component of *social software*, the last years have been very active in terms of research and integration to business solutions. Katzy, Bondar and Mason (2012) addressed 18 top managers in Swiss firms to understand the potentials of social tools for knowledge workers. They make the notion that the knowledge from outside the firm is often equally as important than the one inside the firm. The challenge is that managers still tend to be sceptic about tools that are open for wider public. Zhang (2010) elaborated on the potentials of social software for collaborative work. Kietzmann et al. (2011) discussed a group of technologies belonging to social media and illustrated how the seven building blocks (identity, conversations, sharing, presence, relationships, reputation, and groups) can support organizations to engage actively with these technologies. Additionally, studies that try to bridge the gap between the research disciplines have started to emerge, such as social software and knowledge management (Pirkkalainen and Pawlowski, 2013; Zheng, Li and Zheng, 2010; Agarwal, Tan, and Poo, 2007). In such cases the potentials of the tools are discussed through support for knowledge management strategies and activities such as knowledge sharing and knowledge acquisition (Zheng, Li and Zheng, 2010). What makes it challenging to identify the barriers on social software is the fact that a wide range of software falls under this category (IM, blogs, wikis, SNS etc.). Additionally, researchers do not share the same vocabulary and definitions for the technologies. This makes it hard to identify the relevant barriers. Even though there has been a variety of social software research in education (Cloete, Villiers, and Roodt, 2009; Cowan, Vigentini, and Jack, 2009) and in enterprises (Kaerkkainen and Jussila, 2010; Kaplan and Haenlein, 2010), there have not been many studies to identify and distinguish barriers that

could be common for social software compared to specific barriers for a piece of software (e.g. wiki, social networking). However, first attempts towards this type of generalization are emerging. Kuikka and Aekkinen (2011) as well as Kaplan and Haenlein (2010) approached the barriers that are typical for social media usage. Gao et al. (2010) focused on sociability of social software that defines the social interaction and engagement of users in a specific environment. The analysis took an effort to understand the sociability influences for multiple software types and explains factors that we address as barriers, e.g. privacy aspects and richness of information within the system. While these barriers (here influence factors) focus mainly on social or interpersonal aspects and the technological system, recent literature has focused on other aspects such as management and coordination issues (Cummings, Massey, and Ramesh, 2009), ensuring proper policies for the usage of social media (Kaplan and Haenlein, 2010) as well as technology fitness for tasks such as awareness and network building in corporate environments (Richter, 2013).

During the analysis, we identified that the influence of culture on the usage is rarely reported in the social software literature while in previous research disciplines it is constantly raised. The influence of culture on the behaviour (e.g. style of communication and collaboration) was highlighted and seen crucial in the literature of knowledge sharing as well as GSD (Noll et al. 2010; Ruggles, 1998). Similar to KM, only a few studies have focused on comparison and ranking of the barriers. Although in the case of social software it proves to be more challenging as the term compasses a wider variety of technologies. We must point out that the barriers for adoption and usage of social software are not as well known as for GKM and global collaboration related literature. As the research focus of social software is much more recent, this does not come as a surprise. Of the few studies focusing on ranking, Kaerkkainen and Jussila (2010) assessed social software barriers in a Business-to-Business context. In their study, “lack of understanding of the possibilities of the tool” was found to be the most significant barrier. This finding is in line with the results of Pallot et al. (2010a) that sharing a conceptual consensus is one of the most significant barriers in global collaboration. However, we argue that cross-referencing barriers identified in other research disciplines helps us to better understand GSKM.

3.2 Data synthesis

To better explain the variety of barriers and the contexts those are captured in, we synthesized the data in order to classify the identified barriers in the GSKM barrier framework. This framework will serve as a holistic approach for understanding the variety of challenges when social software is used in globally distributed knowledge management tasks.

During the data extraction phase (Kitchenham, 2004), we found out that barriers in many cases are not stand-alone but intertwined and represent a subset or an instantiation of a bigger problem. As an example we can raise a large concept of “cultural distance” that was highlighted under collaboration barrier literature (compiled by Noll et al. 2010) while Cloete et al. (2009) raised cultural aspect of “differing values, perceptions and viewpoints” in social networking studies in Higher Education which represent distinct factors of culture. For the sake of discussing the variety of barriers we will harmonize the barriers to categories and according subcategories based on existing literature. The barriers that repeatedly occurred in the literature with minimal difference in their focus will be presented as a single challenge. This allows us to better explain the barriers without elaborating on all variations of the same problem. Our literature review revealed 301 detailed challenges that were further analysed and presented as 63 key barriers.

We will adapt the main categorization approaches identified in the literature to present the cross-disciplinary barriers. The main dimensions and according subcategories that we will adapt for our categorization include the classifications of Pallot et al. (2010b) for distributed collaboration (Structural, social, technical, legal and ethical barrier dimensions), Sclater et al. (2001) for distributed communication (technical, environmental and social barriers), Agerfalk et al. (2005) for GSD (temporal, geographical and socio-cultural distance factors) and Riege (2005) for knowledge sharing (individual, organizational and technological barriers).

The following tables present the main dimensions of the framework. The selected dimensions include:

- Organizational and contextual dimension – includes challenges that are tied to a certain context, organization or tasks
- Social dimension – includes challenges that relate to individual and group behaviour

- Technical dimension – includes challenges that relate to technologies and the qualities of those
- Cultural dimension – includes challenges that relate to cultural distance of workforce

The following Tables describe the key dimensions and subcategories of barriers, the actual barriers, the amount of the variations of the same barrier, the context those were identified in as well the key references.

<u>GSKM barriers - Organizational / contextual dimension</u>	
Barrier (number of identified barriers)	Context identified in - References
Geographical /temporal distance (6 barriers)	Global teamwork - (Carmel 1999); (Agerfalk et al. 2005); (Noll et al. 2010); (Huang & Trauth 2008) ; (Espinosa and Carmel 2003) ; (Pallot et al. 2010b); (Komi-Sirvioe and Tihinen 2005)
Lack of company resources for staff (2 barriers)	Social media usage in B2B operations - (Kaerkkainen & Jussila 2010) Social Media in public relations - (Briones, Kuch, Liu, and Jin, 2011) Organizational knowledge sharing - (Riege, 2005)
Lack of time (3 barriers)	Collaborative environments - (Lantz 2001) Organizational knowledge sharing – (Vuori and Okkonen, 2012; Riege, 2005) Sharing knowledge in schools - (Agarwal et al. 2007)
Coordination breakdown , challenges or lack of direction (7 barriers)	Global teamwork - (Carmel 1999); (Agerfalk et al. 2005); (Battin et al. 2001); (Pallot et al. 2010b) Organizational knowledge sharing - (Riege, 2005) Online Social Networks for collective intelligence - (Cachia, Compano, and Dacosta, 2007)
Management sceptic about adopting the technology (4 barriers)	Collaboration tools in enterprise - (Onyechi and Abeysinghe 2009) Social networking in Large organizations - (Baltatzis, Ormrod, and Grainger, 2008) Social Media in public relations - (Briones et al. 2011) Social media usage in B2B operations - (Kaerkkainen & Jussila 2010)
Lack of rewards (3 barriers)	Sociability influences for Social Software - (Gao et al. 2010) Organizational knowledge sharing - (Riege, 2005) Social Software for collaboration - (Zhang 2010)
Bad experiences in the past (2 barriers)	Micro-blogs in enterprises - (Zhang, Qu, and Cody, 2010) Social media usage in B2B operations - (Kaerkkainen & Jussila 2010)
Organization not ready to adopt (3 barriers)	Social networking in non-profit organizations - (Waters 2009) Organizational knowledge sharing - (Riege, 2005)
Power and expertise in decision making processes (2 barriers)	Global teamwork - (Pallot et al. 2010b)
Organizational hierarchies affect work negatively (4 barriers)	Organizational knowledge sharing - (Riege, 2005) Global teamwork - (Krishna, Sahay, and Walsham, 2004)
Competition in the work place affects work practices negatively (2 barriers)	Organizational knowledge sharing - (Riege, 2005) Knowledge transfer barriers - (Disterer 2001)
Organization structure does not support knowledge sharing (5 barriers)	Organizational knowledge sharing - (Riege, 2005) Cultural barriers in knowledge sharing – (Bureš 2003); (McDermott & O’Dell 2001) Barriers in project communication - (Sclater et al. 2001)
Environmental factors affect adoption	Social Software for collaboration - (Zhang, 2010)
Legal	
Unclear IPR and Copyrights	Global teamwork - (Pallot et al. 2010a)

	Social media usage in B2B operations - (Kaerkkainen & Jussila 2010) Organizational knowledge sharing - (Riege, 2005) Web 2.0 applications for E-Government - (Wamelen & Kool, 2008)
Support from the organization	
Management does not give or allocate sufficient amount of support (4 barriers)	Privacy in Social Media - (Clark, 2010) WEB 2.0/Social Media in organizations - (Cummings et al. 2009); (Zhang 2010); (Kuikka & Aekkinen, 2011) Social media for organization's communities of practice – (Katzy, Bondar and Mason, 2012) Organizational knowledge sharing - (Riege, 2005)
Lack of training (2 barriers)	Social Media in public relations - (Briones et al. 2011) Organizational knowledge sharing - (Riege, 2005)
Lack of policy or regulations (2 barriers)	Social Media in organizations - (Husin & Hanisch, 2011) Global teamwork - (Pallot et al. 2010a)
Fitness to task	
Not sharing the same conceptual understanding with collaborators (2 barriers)	Global teamwork - (Pallot et al. 2010a) WEB 2.0 in Higher Education - (Grosbeck, 2009)
Conceptual understandings for the tools vary (3 barriers)	Micro-blogs in enterprises - (Zhang et al. 2010) Social media in internal communications of the organizations – (Huang et al. 2013) Social Software in Enterprises - (Zhao & Rosson, 2009) WEB 2.0 in Higher Education - (Ajjan & Hartshorne, 2008)
Lack of compatibility between diverse IT systems and processes (10 barriers)	Organizational knowledge sharing - (Riege, 2005); (Richter, 2013) Global teamwork - (Agerfalk et al. 2005) Academics usage of Facebook - (Cloete et al. 2009) Collaborative technologies - (Zigurs & Khazanchi, 2008) Sociability influences for Social Software - (Gao et al. 2010) Social Media in business - (Kaplan and Haenlein, 2010) IT / research and Social Software - (Duque et al. 2005) Social networking in enterprises - (Thom-Santelli, 2010)
Not knowing all capabilities of the tool (3 barriers)	Social Software for collaboration - (Zhang, 2010) Social media for organization's communities of practice – (Katzy, Bondar and Mason, 2012) Social media usage in B2B operations - (Kaerkkainen & Jussila, 2010) Social media in internal business use – (Archambault and Gruding, 2012) Micro-blogs in enterprises - (Zhang et al. 2010)
Alternative technologies harder the adoption choice (3 barriers)	Organizational knowledge sharing - (Riege, 2005) Social Media in public relations - (Briones et al. 2011) Social networking in organizations - (Dimicco et al. 2008)
Using the tool in a new context (3 barriers)	Social media usage in B2B operations - (Kaerkkainen & Jussila, 2010) Academics usage of Facebook - (Cloete et al. 2009) Global teamwork - (Pallot et al. 2010a)
Online setting to cause negative effects on work (4 barriers)	Academics usage of Facebook - (Cloete et al. 2009) Social networking in organizations - (Dimicco et al. 2008) Social media in internal business use – (Archambault and Gruding, 2012) Learning in Discussion Forums - (Thomas, 2002) Collaborative environments - (Lantz, 2001)

Table 1 Organizational / contextual barriers

While all of the presented barriers in Table 1 have been reported as barriers for working in globally distributed manner, some have received more attention from the researchers. Those were especially barriers that relate to organizational decision-making and received support

from the management. These challenges have long research traditions in globally distributed teamwork but have also been constantly mentioned in social software related literature when these technologies are applied for organizational work practices. In many reported cases, the organizational challenges are caused by prejudice and lack of awareness of the possibilities the adoption of these technologies could bring (Zhang, 2010; Archambault and Gruding, 2012). As mentioned, many social software supported KM pilots and efforts have been failing. It is important to understand that using an easy to adopt or lightweight social software to foster collaborative or pure communication efforts does not take away the distance barrier and all its implications. Organizations do need to take actions to increase collaboration incentive of the employees, no matter how easy the tools seem to be to adopt.

Technology fitness to organizational processes and tasks has been in the focus since 2005 as social software has been receiving more attention. One of the reasons for compatibility issues to arise is the unawareness how to efficiently and meaningfully integrate the tools to organizational tasks (Kaplan and Haenlein, 2010; Richter, 2013). While many of the online social software services evolve and change rather rapidly based on changing user needs and practices, making strategic and long-term decisions on their application to organizational activities can be extremely demanding. What makes it even harder is the variety of competing tools that might already be applied by certain key stakeholders.

The organizational /contextual dimension describes barriers we have identified from various domains in an interdisciplinary research. The articles we identified and clustered for this dimension are published between 1999 and 2013. Of those papers, 22 were focusing on social software or social media in specific. The focus of the conducted research has been on global teamwork (9 papers), organizational knowledge sharing (9 papers) and collaborative environments in business use (16 papers). The research methods applied to identify the barriers in the within these papers were mostly qualitative empirical methods where observation and ethnographic approaches as well as action research were applied. In many cases, the researchers were engaged in the daily activities, capturing the barriers at the workplace.

<u>GSKM barriers – Social dimension</u>	
Barrier (number of identified barriers)	Context identified in - References
Interpersonal	
Lack of interpersonal awareness (13 barriers)	Global Teamwork - (Agerfalk et al. 2005); (Pallot et al. 2010a);

	(Griffith, Sawyer, and Neale, 2003) Organizational knowledge sharing - (Riege, 2005) Online Social Networks for collective intelligence - (Cachia et al. 2007) Communication barriers in collaborative design projects- (Sclater et al. 2001) Cultural barriers in knowledge sharing - (Bureš, 2003) Academics usage of Facebook - (Cloete et al. 2009)
Lack of trust (3 barriers)	Organizational knowledge sharing - (Riege, 2005) Global Teamwork - (Pallot et al. 2010a); (Noll et al. 2010); (Pyysiaainen, 2003); (Battin et al. 2001) Micro-blogging in informal communication - (Zhao & Rosson, 2009) Web 2.0 for E-Government - (Wamelen & Kool 2008)
Lack of collaboration incentive (12 barriers)	Global Teamwork - (Pallot et al. 2010a); (Agerfalk et al. 2005); (Boland and Fitzgerald, 2004) Social Software in knowledge management – (Bechina and Ribiere, 2012) Social Software in work collaboration (Public sector) - (Zhang, 2010) Web 2.0 in organizations - (Cummings et al. 2009) Knowledge sharing hostility in organizations - (Husted and Michailova, 2002); (Disterer, 2001) Cultural barriers in knowledge sharing – (Bureš, 2003)
Existing relationships preferred (5 barriers)	Web 2.0 in organizations - (Cummings et al. 2009) Academics usage of Facebook - (Cloete et al. 2009) Sociability influences for Social Software - (Gao et al. 2010) Technology usage and adoption - (Taylor & Todd, 1995) Cultural barriers in Knowledge sharing - (McDermott & O'Dell, 2001)
Amount and activeness of users affects adoption decision (3 barriers)	Sociability influences for Social Software - (Gao et al. 2010) Organizational knowledge sharing - (Riege, 2005)
Attitude towards others in the system (6 barriers)	Sociability influences for Social Software - (Gao et al. 2010) Evaluating other users in Social Media – (Anderson et al., 2012) Online work / teaching - (Chester & Gwynne, 1998) Global Teamwork - (Pallot et al. 2010a) WIKI in Higher education - (Cowan et al. 2009)
Difficulties to receive or transfer knowledge from and to others (6 barriers)	Organizational knowledge sharing - (Riege, 2005) Social Software in work collaboration (Public sector) – (Zhang, 2010) Knowledge sharing hostility in organizations - (Husted and Michailova, 2002);
Not learning from the past	Organizational knowledge sharing - (Riege, 2005)
Lack of opportunities for communication /collaboration (3 barriers)	Global teamwork - (Agerfalk et al. 2005); (Griffith et al. 2003); (Herbsleb et al. 2000)
Loss of communication richness (4 barriers)	Global teamwork - (Carmel 1999); (Boland and Fitzgerald 2004) Communication barriers in collaborative design projects - (Sclater et al. 2001)
Language distance and differences (3 barriers)	Global teamwork - (Noll et al. 2010); (Pallot et al. 2010a) SNS in enterprise - (Thom-Santelli 2010)
Skills	
Skills and capabilities to partake in virtual teams (5 barriers)	Academics usage of Facebook - (Cloete et al. 2009) Global teamwork - (Pallot et al. 2010a) Organizational knowledge sharing - (Riege, 2005)
Cognitive / personal	
Diversity setting (different backgrounds) – creates cognitive distance (7 barriers)	Global teamwork - (Pallot et al. 2010a); (Herbsleb et al. 2000) Communication barriers in collaborative design projects - (Sclater et al. 2001) Technology usage and adoption - (Taylor & Todd, 1995) Cultural barriers in knowledge sharing - (Bureš, 2003) Social Software in work collaboration (Public sector) - (Zhang,

	2010)
Different preferences in working / learning (3 barriers)	Global teamwork - (Ebert and De Neve, 2001) Online Social Networks for collective intelligence - (Cachia et al. 2007)
Self image in group working (2 barriers)	Organizational knowledge sharing - (Riege, 2005); (Husted and Michailova, 2002); (Agarwal et al. 2007)
Some benefit more than others of the system (2 barriers)	SNS in enterprise - (Thom-Santelli, 2010) Web 2.0 in organizations - (Cummings et al. 2009)
Worker expectations on technology	Organizational knowledge sharing - (Riege, 2005)
Behavioral intention / how much would I benefit from using the system (6 barriers)	Social media usage in B2B operations - (Kaerkkainen & Jussila, 2010) Technology acceptance - (Davis, 1989) Technology usage and adoption - (Taylor & Todd, 1995) Social networking in organizations - (Dimicco et al. 2008)
People respond to technology in a different manner (15 barriers)	Social networking in organizations - (Dimicco et al. 2008) Micro-blogs in enterprises - (Zhang et al. 2010) Meta-introspective synthesis of Facebook - (Patterson, 2011) WIKI in Higher education - (Cowan et al. 2009) Collaboration tools in enterprise - (Onyechi and Abeysinghe, 2009) WEB 2.0 in Higher Education - (Ajjan & Hartshorne, 2008) Sociability influences for Social Software - (Gao et al. 2010) Global teamwork - (Pallot et al. 2010a) Academics usage of Facebook - (Cloete et al. 2009) Micro-blogging in informal communication – (Zhao & Rosson, 2009)
Differences in experience levels (2 barriers)	Organizational knowledge sharing - (Riege, 2005)
Technology not adopted equally (8 barriers)	Organizational knowledge sharing - (Riege, 2005) Social media usage of elderly people – (Chakraborty et al. 2013) Collaboration tools in enterprise - (Onyechi and Abeysinghe, 2009) Social Media in public relations - (Briones et al. 2011) Web 2.0 for E-Government - (Wamelen & Kool, 2008) Social Software in work collaboration (Public sector) - (Zhang, 2010)

Table 2 Social barriers

Social barriers (Table 2) seem to be highly cross-disciplinary, occurring in activities that range from global teamwork to social software usage in organization. This does not strike as a surprise as differences and preferences between individuals lead to both positive and negative confrontations in collaborative activities. The confronted barriers do not usually have to do with the skills of the workers, especially when social software is discussed. Personal preferences on working and group and interpersonal dynamics play far greater role. Of the personal and interpersonal challenges, especially lack of interpersonal awareness, lack of collaborative incentive as well as people responding to technology in a different manner seem to occur very often in social software supported global knowledge management activities. Most of the personal and interpersonal challenges seem to be persistent as they occur very often in related literature within the past 20 years. This also implies the fact that social and interpersonal barriers are present when dealing with social software and should have a strong emphasis when addressing solutions and interventions for any problem related to these tools.

One important consideration is to identify those workers who are not comfortable in using these tools, especially if the usage for work purposes requires maintenance of public profile that is visible for external communities. Such cases easily lead to knowledge gaps and require alignment in the KM strategy.

Over half of the social barriers are also recognized in social software literature. 34% of the papers addressing the social barriers were studied related to collaborative environments. 22% of the publications were focused on global teamwork and 20 % on organizational knowledge sharing. The research methods that were applied for identifying the barriers were rather similar to contextual barriers with the qualitative research focus. However, some of these barriers are addressed as influencing factors in quantitative research efforts. Ajjan and Hartshorne (2008) studied faculty decisions to adopt Web 2.0 technologies with structural model that addressed behavioural control and attitudes towards adoption. Similarly, Gao et al. (2010) addressed factors related to sociability of social software and studied the influence of those to intention to use the system. Both the qualitative and quantitative research efforts addressing the barriers are commonly cited and noted by the research community.

<u>GSKM barriers – Technical dimension</u>	
Barrier (number of identified barriers)	Context identified in - References
The systems is lacking in functionality (15 barriers)	Wiki in education - (Kear et al. 2010) Collaboration tools in enterprise - (Onyechi and Abeysinghe, 2009) Sociability influences for Social Software - (Gao et al. 2010)
Availability	
Shortage of appropriate infrastructure supporting sharing practices (2 barriers)	Organizational knowledge sharing - (Riege, 2005)
Varying restrictions throughout countries	Web 2.0 for E-Government - (Wamelen & Kool, 2008)
Lack of internet access / poor bandwidth	Web 2.0 in Higher Education - (Grosseck, 2009)
Interoperability	
Lack of interoperability of tools and systems (2 barriers)	Global teamwork - (Pallot et al. 2010a) Web 2.0 for E-Government - (Wamelen & Kool, 2008) Collaboration tools in enterprise - (Onyechi and Abeysinghe, 2009) Sociability influences for Social Software - (Gao et al. 2010)
Privacy / security	
Reliability and security of information exchange (6 barriers)	Social networking in Large enterprises - (Baltatzis et al. 2008) Collaboration tools in enterprise - (Onyechi and Abeysinghe, 2009) Social media usage in B2B operations - (Kaerkkainen & Jussila, 2010) Web 2.0 for E-Government - (Wamelen & Kool, 2008) Privacy in Social Media – (Clark, 2010) Global teamwork - (Pallot et al. 2010a)

Concerns about security	Micro-blogs in enterprises - (Zhang et al. 2010)
Privacy (4 barriers)	Privacy in Social Media - (Campisi et al. 2009; Yang et al., 2012) Web 2.0 for E-Government - (Wamelen & Kool, 2008) Sociability influences for Social Software - (Gao et al. 2010)
Concerns about privacy (4 barriers)	Web 2.0 for E-Government - (Wamelen & Kool, 2008) Academics usage of Facebook - (Cloete et al. 2009) Micro-blogging in informal communication – (Zhao & Rosson, 2009)
No administrators set to monitor usage	Social media in business - (Kaplan and Haenlein, 2010)
Misuse	
Unacceptable behavior by user (8 barriers)	Academics usage of Facebook - (Cloete et al. 2009) Social media in business - (Kaplan and Haenlein, 2010) Online Social Networks for collective intelligence - (Cachia et al. 2007) Assessing the transformative potential of Social networks – (Donath, 2008) Meta-introspective synthesis of Facebook – (Patterson, 2011)
Creates opportunities for deception	Social networks in learning - (Sandars, 2005)
System Quality and Usability	Sociability influences for Social Software - (Gao et al. 2010) Wiki in education - (Kear et al. 2010) Wiki in Higher Education – (Cowan et al. 2009)

Table 3 Technical barriers

The technical dimension (Table 3) is much less researched compared to social and contextual/organizational dimensions. However, the frequency of technical studies is rising because of high interest towards social software in organizations. The hype around popular social networking and micro-blogging services can be witnessed in the focus of the social software papers within last four years. While most barriers for GSKM are indeed not technological challenges, those still can appear when technology is used as a medium to facilitate collaboration. This is why technical barriers should not be overlooked. The variety of technical barriers relate to availability and interoperability of technology, privacy and security as well as the functional capabilities of the tools. Some of the most researched barriers relate to systems that lack in functionality in comparison to the activities at hand. In addition to those, reliability and security of information exchange are often occurring in the literature.

One crucial observation is that 86% of the identified technical barriers were from social software literature where the observed technology was in focus instead of group dynamics, collaboration etc. This finding strongly suggests that the major barriers in globally distributed work are often caused by something else than the technology, even when specific social software is used as the mechanism to foster collaboration. For the identification of technical barriers, researchers have applied mainly qualitative research methods.

<u>GSKM barriers – Cultural dimension</u>	
Barrier (number of identified barriers)	Context identified in - References
Cultural distance in differing values, perceptions, viewpoints and practices (15 barriers)	Globally distributed knowledge workers – (Huang and Trauth, 2006) Cultural barriers in knowledge sharing - (Bureš, 2003) Global teamwork - (Noll et al. 2010); (Carmel, 1999) Academics usage of Facebook - (Cloete et al. 2009) Social Software in work collaboration (Public sector) - (Zhang, 2010) Technology and culture – (Heaton & Nkuzimana, 2006) Cultural influencing factors - (Hofstede and Hofstede, 2005)
Lack of common usage and norms (4 barriers)	Cultural influencing factors - (Hofstede and Hofstede, 2005) Cultural barriers in knowledge sharing - (Bureš, 2003); (McDermott & O’Dell, 2001) Global teamwork - (Pallot et al. 2010a)
Orientation of the organization (15 barriers)	Organizational culture - (Hofstede, 1998); (Cooke and Lafferty, 1987); (Wallach, 1983); (Wilkins and Ouchi, 1983)
Not knowing what is accepted to be said and what not (2 barriers)	Cultural barriers in knowledge sharing - (Bureš, 2003) Web 2.0 in Higher Education - (Ajjan & Hartshorne, 2008)
Cultural time perceptions (5 barriers)	Organizational culture - (Hofstede and Hofstede, 2004) GSD - (Huang and Trauth, 2008)

Table 4 Cultural barriers

The cultural dimension (Table 4) could be seen to be included in the previously presented dimensions as the cultural barriers relate to individual, interpersonal, organizational and contextual differences that were previously discussed. We have chosen to include it as a separate dimension because of its strong emphasis in the related literature. Of those challenges especially cultural distance in differing viewpoints and values on a interpersonal level and orientation of the organization (hierarchical structure, procedures, practices) on the organizational level seem to be highly emphasized. While culture and distance have been highly discussed factors in the organizational and global teamwork related literature in the past 20 years, those are not often reported in the social software related literature. As previously discussed within this paper, culture has a tremendous influence on globally distributed work. As social software usage is based on asynchronous or synchronous distributed collaboration, these cultural challenges should be recognized in the according working and collaborative practices. This is in particular important when people from heterogeneous backgrounds collaborate.

4 Discussion

The categorization provided by the GSKM barrier framework allows us to observe how different research disciplines complement each other. We showed how the disciplines share similar types of barriers while each has their unique focus points. As an example, the role of

culture was emphasized largely in knowledge management as well as in previous global information systems development and collaboration related literature while it was not clearly expressed in studies about social software. None of the disciplines could alone touch all relevant issues and potential barriers for GSKM. Through this categorization we can identify the focus points of the disciplines and gain an overall and a focused understanding of the variety of challenges.

GSKM related working methods are becoming more common as organizations and educational institutions are moving towards social technologies or social software in their internal collaboration as well as for networking and reputation building activities. This was emphasized in the organizational / contextual dimension of the GSKM framework. Especially since 2005, the focus of social software research has elaborated on technology fitness to globally distributed organizational activities. Ensuring efficient and meaningful integration of the technology is still today a vital managerial task (Richter, 2013). While a big part of the social software literature in the last 8 years has focused on the popular social networking and micro-blogging tools such as Facebook or Twitter, a variety of studies have focused especially on wikis and blogs. Usability issues and quality concerns of social software are often limited to wikis that may require stronger content management skills from the users (Kear et al. 2010). More common worriers are evidenced by privacy and security concerns, especially when the tool is not only meant for intra-organizational collaboration (Katzy et al. 2012). The barriers in the social dimension seem to be extremely persistent and reoccurring in distributed collaboration, KM and social software research. Individuals have their own preferred working styles when it comes to technology usage or group dynamics. While social software provides simple mechanisms for knowledge sharing, it will not be adopted equally (Dimicco et al. 2008). Upcoming KM strategies and interventions should not overlook this aspect.

Our focus has been the identification of barriers in GSKM. We do not argue that all of the previously mentioned barriers occur in an organization that decides to adopt social software. On the contrary, barriers are highly depending on the type of organization, the activities as well as the workers. The early identification of potential challenges is necessary for organizational KM to plan according interventions and solutions for overcoming the challenges at hand. We argue that many of these challenges cannot be addressed separately without taking into consideration the intertwined barriers that occur in those circumstances.

While the study provides a thorough analysis of existing barriers, we must express the limitations to the study. As knowledge management processes can be very complex within an organization, the barriers related to knowledge sharing, management and collaborative aspects might not highlight all existing barriers. Additionally, the focus on social software connects to barriers that have been discussed under several interlinked concepts and tool categories that might not have been taken in to account within this study. An example is social software itself that has roots in Groupware and might be partially explained also under collaborative tools and other similar research topics.

Previous literature includes comprehensive analyses by several researchers on specific domains, e.g. Pallot et al. (2010b) for distance factors, Noll et al. (2010) for collaboration barriers and Riege (2005) for knowledge sharing. Each of these analyses provides a good overview of problems at hand while the context remains unclear. We have taken a step forward for both research and practise to better explain how the barriers are interlinked and especially to explain the relevant barriers for KM in a distributed, social software mediated context. The contribution for practise comes from applying the framework in knowledge management activities in a global context as an analysis support. We foresee the following options for usage: 1) Analysing which barriers are most likely to occur in a given context 2) analyse if utilization of social software can reduce the barriers compared to other types of technology that might be applied 3) Analysing barriers in global KM general (related to KM activities and processes, interventions etc.) 4) analyse whether to it is feasible to design and develop new social software for KM or apply existing technologies based on their characteristics and existing user base. Our main contribution for research is the artefact, GSKM framework that illustrates one of the most comprehensive barrier analyses accomplished.

5 Summary

In this contribution, we constructed a Global Social Knowledge Management (GSKM) barrier framework for analysing barriers for global knowledge workers utilizing social software. Within the first part of the study, we analysed the barrier literature for global knowledge management and social software. Our analysis highlighted the state of the art and compiled a comprehensive overview of the most researched barriers. For the purpose of the study, we constructed a context-aware, cross-disciplinary (GSKM) framework by identifying the

existing the barriers and extending on previous categorizations and frameworks. The framework demonstrates how none of the inspected domains can separately explain the variety of challenges the global workers deal with when they apply social tools as a part of their working practices. Social software applications have implications on the activities operated in heterogeneous organizational working settings, because of the interactive, non-formal and transparent nature of the applications.

Focusing on barrier interrelations and mapping possible solutions will be major parts of our upcoming research. We do acknowledge the complexity of such validation efforts. Identifying and addressing all relevant barriers in any globally acting organization does require consultation and in-depth discussions with corresponding stakeholder groups of the company. Only then the significance of the challenges can be addressed. While previous literature on knowledge sharing and GSD has revealed some of the most crucial challenges such as time-zone difference causing negative effects on coordination, communication and collaboration (Carmel, 1999) or the language and cultural challenges being the barriers in distributed collaboration (Noll et al. 2010), focus in GSKM would welcome such research. Both exploratory and confirmatory studies could inform on the relevance, context-dependency and relevance of the challenges identified in this paper. Exploratory studies could give us context-specific information on the actual challenges the workers (and management) face and potentially, even contribute with new theories for the phenomenon. The role of confirmatory or theory verification studies are equally as important as a part of future research. Similarly to many of the research papers we have discussed within this paper (e.g. Gao et al. 2010; Ajjan & Hartshorne, 2008), addressing combinations of barriers as factors can inform us on the causality and relationships of the barriers. Such studies provide the necessary steps for generalisation of the knowledge around the barriers that in turn is vital for organisations to react to the critical challenges.

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II

GLOBAL SOCIAL KNOWLEDGE MANAGEMENT: FROM BARRIERS TO THE SELECTION OF SOCIAL TOOLS

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Global Social Knowledge Management: From Barriers to the Selection of Social Tools

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Abstract: Web 2.0 and Social Software revolutionize the knowledge exchange within and between organizations. This is one of the claims consultants and software vendors in the field have made. But have the promises been kept and has evidence been achieved so far, in particular for knowledge management in globally distributed settings? As a starting point, our paper introduces the field of Global Social Knowledge Management (GSKM). We see this area as one of the main research areas for future research in the Knowledge Management domain. A variety of social software applications have already been seen promising and incorporated into the context of knowledge management (Avram 2006; Zheng and Zheng 2010; Levy 2009). One main assumption is that social software could bridge the traditional gap between human- and technology orientation (Avram 2006:1; Fiedler & Welpel 2011). However, there is so far only anecdotal evidence how these applications work in globally distributed organizational settings. Within this paper, we present the key issues for GSKM and elaborate on transferability of these aspects to differing contexts. The main research domains related to GSKM are Social Software and Global Knowledge Management. We present a brief review of state of the art research for these domains and focus in detail on Social Software supported knowledge activities. As one of the first efforts, we perform a mapping of Social Software to KM activities and major barriers. Additionally, we will illustrate through a case study how to contextualize the GSKM approach for educational application area. The paper is a starting point for discourse on this promising field, outlining the research field of globally distributed Social Software-supported Knowledge Management and discussing current research efforts on the main components. By this paper we intend to contribute towards a research agenda for Global Social Knowledge Management.

Keywords: global social knowledge management, social software, barriers, distributed teamwork, contextualization, cultural influence

1. Global social knowledge management: State of the art

Managing knowledge in a global environment can be problematic. The potentials and challenges Social Software poses are not fully understood in leveraging knowledge between individuals and organizations. Here we lay our conceptual foundation for the study and describe the key components of Global Knowledge Management and Social Software (Figure 1).

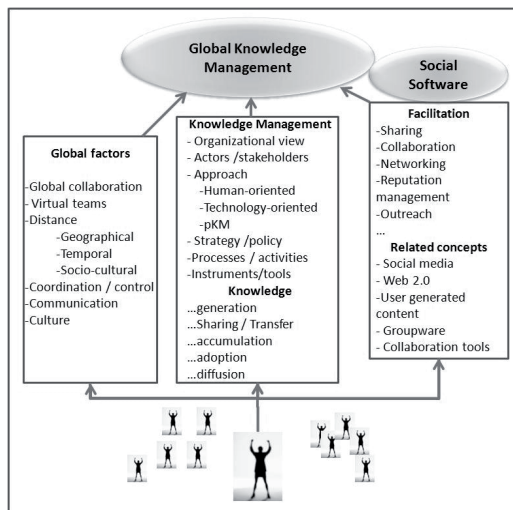


Figure 1: Focus points for GSKM

As a starting point, we define Global Social Knowledge Management as the research discipline on strategies, management and processes utilizing social software systems and tools to enhance knowledge management in globally distributed settings. The main idea is to bridge the gap of human- and technology orientation as well as facilitating inter- and intra-organizational knowledge processes.

1.1 Global knowledge management

Global Knowledge Management (GKM) contains processes, systems, and stakeholders for Knowledge Management in globally distributed settings. Thus, GKM is the main concept for cross cultural knowledge exchange and collaboration amongst people and organizations. Working within global contexts raises challenges that need to be understood and addressed (Nunamaker et al, 2009: 113). Conquering the challenges of virtual teams and global collaboration remain to be crucial research topics (Huang and Trauth 2007: 114; Sivunen and Valo 2006: 57). These challenges include time zone differences, cultural differences, different working styles as well as loss of communication richness (Nunamaker et al, 2009: 114). Studying collaboration and global team aspects within the research domain can help us to achieve a good comprehension of underlying challenges caused by distributed work settings and bring us closer to overcome the challenges.

Knowledge Management in an organization could be defined to comprise of the phases of knowledge generation, transfer, accumulation, adoption, and diffusion (Disterer 2001: 1). Several approaches for managing knowledge in organizations have been proposed in the recent years. Some of the approaches present a more human-driven approach, some focus more on technological support (Choi & Lee 2002: 173). Knowledge sharing has been raised as a crucial, but not yet fully understood factor in Global Software Development (GSD) projects and teamwork (Storck 2000). There are also many similar KM life cycle models as presented by Nissen et al (2000: 30). A significant part of the KM literature is about knowledge sharing/transfer which has been continuously raised as the cornerstone of KM strategy of (globally acting) organizations (Disterer 2001; Bureš 2003; Riege 2005).

Through the Knowledge Management component we can achieve more specific view on the organizational as well as individual challenges arising in collaborative distributed settings. These include situations where knowledge is being created, shared and adopted by groups of people.

1.2 Social software

Social Software has recently been applied in various organizations as a tool for managing knowledge and collaboration but the barriers for adoption have been evident (Kärkkäinen et al, 2010; Zheng et al, 2010). As indicated by Kärkkäinen et al (2010: 229), studies on the adoption of these technologies in organizations and specific business functions is currently limited while the changes towards utilizing Social Software are very rapid in organizations. Thus, not all challenges are understood neither the solutions. Challenges for Social Software have been identified for different settings: managing knowledge in business to business sector (Kärkkäinen et al, 2010: 229), supporting knowledge evolution, use and sharing (Zheng et al, 2010), managing reputation in academia (Matešić et al, 2010) or sharing knowledge in schools by teachers and students (Agarwal et al, 2007).

Although the term Social Software is frequently used, there is still no commonly agreed definition. One way of describing Social Software is that it enables interactive collaboration, managing content and networking with others. It supports the desire of users to be pulled into groups in order to achieve their personal goals (Wever et al, 2007: 512). From this description, we can say that Social Software denotes *applications that involve various collaborators in social interaction where new meanings, contents or discussions are created.*

As a conclusion, we see Global Social Knowledge Management as a promising field for current and future research. However, various unexplored areas remain. It is not clear which Social Software tools (and corresponding processes and activities) can support globally distributed knowledge management. As pointed out by Fiedler and Welpel (2011: 31), it is crucial to look further and study how Social Software could be taken up successfully in specific KM processes and activities of global organizations.

2. Global social knowledge management: finding social software for KM barriers and activities

As elaborated above, it is crucial to clearly understand which tools and applications can support KM in global settings. We follow a simple approach of KM architectures for this purpose looking at the key components of global KM settings: we start with challenges and problems which might keep actors away from engaging actively in KM activities. Secondly, we identify core KM activities. As the main outcome, we map Social Software tools: identifying tools supporting versatile KM activities and mapping these to major challenges. This is a crucial task towards overcoming barriers, especially in globally distributed, culturally diverse settings. From this, we derive the following research questions:

- Which are the main Social Software categories in the current literature and which are the key functionalities for these tools?
- To which type of knowledge activities these tools apply and which are the main GSKM barriers to be overcome?
- How to contextualize the GSKM focus for a specific application area?

Based on these key questions, we have chosen the methodology: we base our approach on the Global Knowledge Management Framework (GKMF, Pawlowski & Bick 2012) which identifies the key components of global KM settings and their interrelations. Based on this initial framework, we have performed a literature analysis with a systematic approach (Fink 2005) aiming at identifying relations between barriers, activities and tools (interventions). Secondly, we perform a design-oriented, constructive approach (Dodig-Crnkovic 2010) to build a framework in order to provide guidance for Social Software interventions aiming at 1) identifying and overcoming major barriers, and 2) identifying and supporting knowledge activities with a global and culture-aware focus. The third question will be applied through a case study approach. The methodology for the contextualization process will be described later in this paper.

As a starting point for the topic, it is essential to recognize and understand barriers to GSKM.

2.1 2.1 Barriers in GSKM

In many publications, barriers are discussed from the viewpoint of an individual or group of people, like university students (Sclater et al, 2001) or company employees working in virtual teams (Noll et al, 2010). Barriers can relate to social interaction and as an example to factors that hinder or challenge knowledge exchange (Disterer 2001). They also might relate to challenges and risks when adopting or using a specific technology (Baltatzis et al, 2008). Existing studies also diagnosed challenges set by diverse workers, hierarchies and cultural influences within an organization (De Long and Fahey 2000). Barriers are also in many cases tied to a specific context. This can relate to a specific technical platform (Sclater et al, 2001) or more loosely defined context, like collaboration of employees in global software development projects (Noll et al, 2010).

Based on the previous characteristics of barriers in IS literature, we define a *barrier as any challenge, risk, difficulty, obstacle, restriction or hindrance that might prevent a single person, a group or an organization to reach an objective and success in a specific context when the challenge is related to acting or working in a collaborative cross border setting.*

A comprehensive literature review was conducted for GSKM barriers to identify the major barrier categories and show the interdependencies between the research domains (global KM and Social Software) (see Pirkkalainen & Pawlowski 2012). The key categories are presented in Table 1 with a sample barrier per category. For each category, many barriers exist and have been identified.

Table 1: Barrier examples categorized (Pirkkalainen & Pawlowski 2012)

Barrier	Context - References
Organizational / contextual dimension	
Geographical /temporal barrier	Global teamwork - (Noll et al. 2010) ...
Lack of company resources for staff	Organizational knowledge sharing - (Riege, 2005)
Support from the organization	
Lack of policy or regulations for Social Media	Social Media in organizations - (Husin & hanisch 2011)
Fitness to task	
Lack of compatibility between diverse IT systems and processes	Organizational knowledge sharing - (Riege, 2005) Sociability influences for Social Software

Barrier	Context - References
	- (Gao et al., 2010)
Social Dimension	
Lack of interpersonal awareness	Organizational knowledge sharing - (Riege, 2005)
Skills	
Skills and capabilities to partake in virtual teams	Global teamwork - (Pallot et al., 2010)
Cognitive / personal	
Diversity setting (different backgrounds) – creates cognitive distance	Global teamwork - (Pallot et al., 2010)
Technical Dimension	
Availability	
Shortage of appropriate infrastructure supporting sharing practices	Organizational knowledge sharing - (Riege, 2005)
Interoperability	
Lack of interoperability of tools and systems	Global teamwork - (Pallot et al., 2010)
Privacy / security	
Reliability and security of information exchange	Social networking in Large enterprises - (Baltatzis et al. 2008)
Misuse	
Unacceptable behaviour by user	Facebook for lecturers - (Cloete et al. 2009)
Quality	
Usability	Sociability influences for Social Software - (Gao et al., 2010)
The extent to which the information obtained in the system can fulfil the user's needs	Sociability influences for Social Software - (Gao et al., 2010)
Legal Dimension	
Ownership	
Unclear IPR and copyrights	Global teamwork - (Pallot et al., 2010)
Cultural Dimension	
Cultural distance between collaborators	Global teamwork - (Huang & Trauth 2006)

A key challenge for GSKM settings is to manage / understand cultural influences in interpersonal knowledge sharing efforts. As barriers in Knowledge Management clearly focus on interpersonal and technological barriers, the roles of cultural and language distance as well as temporal and geographical issues have been overlooked. The role of culture has been highlighted as the most crucial for KM and Global IS barriers (Pirkkalainen & Pawlowski 2012). As shown within their analysis, these challenges are persistent in nature and require careful and sustainable attention. We recognize this crucial matter and emphasize it further in the next chapter where we show a mapping between Social Software, KM activities and barriers.

2.2 Mapping barriers to knowledge processes and Social Software

One of the key issues of Social Software for KM is to understand in which context these tools are useful. In the following, we present a framework for Social Software which aims to support 1) overcoming certain barriers and 2) to identify corresponding KM processes. By this systematic mapping, we provide a first step and a basis for a clear and well justified tool selection process for organizations.

We recognize the fact that Social Software in general has potentials for supporting various tasks such as knowledge identification and sharing as well as collaboration in globally acting organizations (Zheng & Zheng 2010; Fiedler & Welpel 2011). However, it is crucial to be more specific how these versatile tools actually fit the differing KM activities and which are the barriers emerging in these

settings. Table 2 presents how some of these crucial interrelations between Social Software, KM processes and barriers could occur.

The Social Software tool categories and purpose were derived from the 4C classification of Cook (2008: 39), taking into consideration collaboration technologies from the extended Groupware classification by Borghoff & Schlichter (2000) which are referenced under Social Software literature and finally enriching the merged categories by "Social Software in KM" literature. The key end user functionalities were extracted from three most popular services per category, which we identified by using eBizMBA and Alexa Global Traffic Ranking of services and websites. The barriers and activities are derived from the main KM and Social Software literature and present some of the main findings for both.

Table 2: Social Software framework; mapping the tools to KM activities and major barriers

Tool category	Purpose	Key End user Functionality	KM Activities & processes	Main Barriers
Blogging tools	Communication	<ul style="list-style-type: none"> -Post writings -Comment on writings -Share writing (external/internal) -Evaluate writings -Extend with plugins / integrate to other systems -RSS (alerts) 	<ul style="list-style-type: none"> -Active & passive exchange of professional information (Fiedler & Welpel 2011). -Acquire / capture / create, Apply/share/transfer. Incentive for (Reuse/innovate/evolve/transform), alerting (Avram 2006) -Knowledge Evolution (Zheng & Zheng 2010) -Idea-generation and problem-solving (Zhang 2010) -Externalization, combination (Chatti et al, 2007) -Creation, codification, sharing, collaboration, organization (Razmerita 2009) 	<p><i>Organizational, Cultural, Social</i></p> <p>Organizational (Zhang 2010), Fitness to task (Thom-Santelli 2010) Cognitive (Kim 2008)</p>
Micro-blogging tools	Connection / awareness.	<ul style="list-style-type: none"> -Post micro writings -Comment / share / evaluate micro writings -Share material / Information via micro writings -Manage profile (notifications (RSS), privacy) -Follow other users -Send direct messages 	<ul style="list-style-type: none"> -Retrieve knowledge for use (Zheng & Zheng 2010), -Enhancing information sharing (easy to identify information updates), building common ground, sustaining connectedness among colleagues, supporting informal communication (Zhao & Rosson 2009) -Alerting, informing users of changes (Levy 2009; Avram 2006) -Socialization, combination (Chatti et al, 2007) 	<p><i>Organizational, Social</i></p> <p>Fitness to task (Thom-Santelli 2010), Social (trust) (Zhao & Rosson 2009)</p>
Social networking tools	Awareness, communication, sharing, (collaboration), (identification)	<ul style="list-style-type: none"> -Add / delete friends / groups / events -Post short writings to f/g/e -Share material / information with f/g/e -Manage profile (notifications (RSS), privacy) -Send direct messages -Instant messaging (p2p/group) -Extend with plugins / integrate to other systems 	<ul style="list-style-type: none"> -Building personal networks leading to creation of organizational memory (Fiedler & Welpel 2011) -Scan/Map, Acquire/capture/create, store, Apply/share/transfer, alert (Avram 2006) -Social presence in Knowledge sharing, expert finding (Zheng & Zheng 2010) -Socialization, combination (Chatti et al, 2007) 	<p><i>Organizational, Social, Cultural</i></p> <p>Fitness to task (Thom-Santelli 2010), Social (Cloete et al, 2009), (Dimicco et al, 2008) Communication (Thom-Santelli 2010) Cultural (Cloete et al, 2009)</p>

Tool category	Purpose	Key End user Functionality	KM Activities & processes	Main Barriers
Social bookmarking tools	Identification, collaboration, sharing	<ul style="list-style-type: none"> -Save links / bookmarks for personal/ community use / sharing (social tagging) -Comment on pages / bookmarks / links -Include saving options for browser or to mobile device -Follow users activities -Include feeds (RSS) / notifications 	<ul style="list-style-type: none"> -Scan/Map, Acquire/capture/create (Avram 2006), -Collaborative building of a knowledge structure (Cayzer 2004) -Alerting, informing users of changes (Levy 2009; Avram 2006) -Combination (Chatti et al, 2007) -Sharing, collaboration, organization (Razmerita 2009) 	<p><i>Organizational, Social</i></p> <p>Conceptual / fitness to task / knowledge sharing (why to use, what are the benefits) (Millen et al, 2006)</p>
Wiki	Collaboration, sharing, identification, communication.	<ul style="list-style-type: none"> -Collaborative page writing / editing -Cross-linking pages/ concepts/ information -Managing page versioning -Commenting on pages -Notifications (RSS) -Wide extension and integration possibilities 	<ul style="list-style-type: none"> -Active & passive exchange of professional information (Fiedler & Welpel 2011) -Scan/Map, Package / codification / representation, Apply / share / transfer, Reuse / innovate / evolve / transform, alert (Avram 2006) -Idea-generation and problem-solving (Zhang 2010) -Externalization, combination (Chatti et al, 2007) -Creation, codification, sharing, collaboration, organization (Razmerita 2009) 	<p><i>Technical, Social</i></p> <p>Social (Cowan et al, 2009), Cognitive (Cowan et al, 2009), Skills, Usability (Cowan et al, 2009)</p>
Synchronous / Collaborative writing	Collaboration	<ul style="list-style-type: none"> -Collaborative document / presentation writing / editing -Managing page versioning -Instant messaging between authors 	<ul style="list-style-type: none"> -Acquire / capture / create, store (Avram 2006) 	<p><i>Technical</i></p> <p>Skills, usability (Brodahl et al, 2011)</p>
Instant messaging and chat tools	Communication	<ul style="list-style-type: none"> - Add / delete contacts -Send private / group messages -Add awareness information (short status updates, availability) -Video calls 	<ul style="list-style-type: none"> -Building personal networks leading to creation of organizational memory (Fiedler & Welpel 2011) -Knowledge sharing for quick questions and clarifications (Quan-Haase et al, 2005) -Externalization (Chatti et al, 2007) -Creation, sharing (Razmerita 2009) 	<p><i>Organizational, Social, Cultural</i></p> <p>Creates distance (used for difficult decisions or sensitive topics) (Quan-Haase et al, 2005)</p>
Time management	Collaboration, awareness	<ul style="list-style-type: none"> -Create and share calendars -Organize meetings/events -Make to-do lists -Polling, voting, survey 	<ul style="list-style-type: none"> -Scan/Map (Avram 2006) -Awareness activities (Munkvold 2003) -Codification, organization (Razmerita 2009) 	<p><i>Organizational, Social</i></p> <p>Support for organization or individual? (Munkvold 2003)</p>

Tool category	Purpose	Key End user Functionality	KM Activities & processes	Main Barriers
Shared information spaces /media sharing (video, audio, images, presentations)	Identification, collaboration, communication sharing	-Share information (P2P, group, community) -Comment on information -Follow users -Notifications (RSS)	-Scan/Map, Acquire/capture/create (Avram 2006) -Knowledge sharing (Bafoutsou & Mentzas 2002) -Storage/retrieval (Alavi & Leidner 2001) -Combination (Chatti et al, 2007) -Codification, sharing, organization (Razmerita 2009)	<i>Organizational, Social, Cultural, Technical</i> Privacy, security, misuse, administration effort, Unwillingness to share (judged by others) (Kietzmann et al, 2011)
Conferencing	Communication	-Organize small to big group calls -Webinar / webcast / conference -Whiteboarding -Screensharing -Document sharing -Record / share session	-Human presence- and overview of activities in distributed tasks (Bafoutsou & Mentzas 2002) -Early stages of teambuilding (Munkvold 2003) -Externalization (Chatti et al, 2007)	<i>Social</i> Knowledge sharing (Munkvold 2003)
Brainstorming tools (separate or in a GDSS)	Collaboration	-Idea structuring -Whiteboarding -Mind mapping -Voting / ranking	-Activities that are similar to take normally place in business meetings, decision support (Bafoutsou & Mentzas 2002) -Combination (Chatti et al, 2007)	<i>Social, organizational, cultural</i> Evaluation apprehension, free riding, cognitive inertia (Shih et al, 2009)
Discussion Board / Forum	Communication	-Create threads / discussions With peers / groups / communities -Create / browse profiles -Comment on threads / discussions -Assign notifications	-Forming knowledge networks (those who seek information and those who can provide it), knowledge identification/ creation/ sharing (Alavi & Leidner 2001; Razmerita 2009) -Combination (Chatti et al, 2007)	<i>Organizational, Social</i> Fitness to task (Bafoutsou & Mentzas 2002)

The table above presents some of the researched aspects around barriers on different tools and the application of these technologies in knowledge activities and processes. The highlighted barriers indicate some of the strongest challenges when applying the tools in the KM activities. Overcoming these challenges is crucial for a successful usage. The key area of challenge for GSKM is the social dimension which in many cases leads to unwillingness to share or only some people of the key stakeholders contributing. As indicated by several authors, the cultural influence to personal or organizational behaviour is crucial. This has been raised as the top challenge for globally distributed work as for KM (Pirkkalainen & Pawlowski 2012). However, as depicted by Dafoulas & Macaulay (2001: 11), modelling and building variables from cultural factors (especially national), is extremely difficult and risky. We share the view that it is more essential to understand the effects of culture on working settings. We realize the fact that several authors imply, Social Software provides mechanisms for KM and social collaboration and strives for the lowest effort in adoption and use, but, as indicated by Riege (2005: 28), knowledge sharing embracing organizational cultures requires mechanisms around the technology itself for succeeding. Later in this paper we will demonstrate how to apply this framework in a case study.

It is not a surprise that most Social Software have been stated to support knowledge exchange in particular. As shown in table 2, Social Software is being widely used for purposes beyond this. In fact all the basic phases of knowledge life cycle are covered by Social Software while the focus points for specific tools can be identified from the framework. In Figure 2, we highlight to which knowledge activities Social Software has been mapped in existing literature. We have adapted the life cycle

model of Nissen et al (2000: 30), including a further step of "identifying" knowledge which has been raised as a crucial step in Social Software literature.

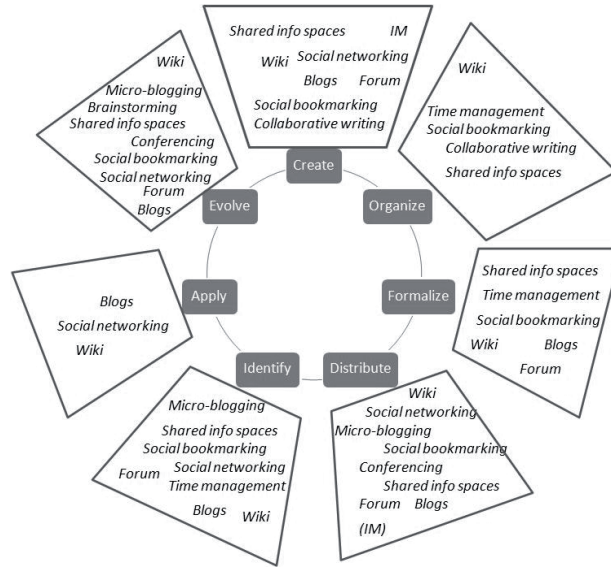


Figure 2: Social Software in a knowledge management life cycle

Our approach provides a first step towards mapping the key components of Global Social Knowledge Management (GSKM) to barriers (also representing global and cultural challenges and issues), activities and Social Software tools. Our initial mapping is not – and does not intend to be – complete. However, it is a first step to develop a clear understanding and guidance of how Social Software tools can be utilized in a promising, successful way. Figure 2 should be taken only as a visual representation and a mental image to understand the connection while the actual knowledge steps are much more intertwined and unordered.

3. Contextualization of the GSKM analysis

During our inquiry both from literature and practice, we have noted the complexity of addressing the challenges of GSKM for finding a balanced combination of human- and technological interventions in a particular context. Within this section, we describe how the GSKM approach can be contextualized and present a case study where the approach is undertaken. Previously, we discussed aspects the global organizations have in general. However, different domains and areas of expertise have their own unique qualities and naturally challenges. In order to select or create solutions for an application area, one must understand these qualities and domain specific challenges. We discuss contextualization as a process to apply the barrier analysis and Social Software framework in a specific application area, taking in to account the implications to move from a general focus to a specified one.

3.1 Methodology for the contextualization approach

The contextualization process will be described through four major steps.



Figure 3: Main steps of the GSKM contextualization process

Each of the steps of the process requires methodological decisions which impact the sequential steps but also the outcome of the inquiry. In the following sections, we describe how we addressed those steps but also elaborate on transferability and limitations of the approach. As a part of our previously described methodology, we will extend on the constructive approach and apply the contextualization approach in a case study. Thomas (2011: 512) defines case studies as *analysis of persons, events, decisions, policies, institutions and so on. The case is the subject of the inquiry and can be seen as an instance of a class of phenomena, setting the frame (boundaries) for the study*. We have applied the approach in a European project Open Discovery Space. The project deals with open educational resources (OER), re-use of resources and community building for teachers in European schools. UNESCO (2002) described OER as *“technology enabled, open provision of educational resources for consultation, use and adaptation by a community of users for non-commercial purposes”*. The project develops a Social Software -portal that serves as a knowledge sharing and social networking platform for teachers across Europe. The portal will offer customization support for setting up networks for local schools, making it possible to bring parents and students to collaborate on planning lectures and studies. The development will start only after the needs and requirements are captured. The major concern that the project wants to avoid is developing a Social Software platform that does not respond to actual or real needs of the users. This would very likely lead to low usage or sustainability. This is why the approach has been taken to apply the GSKM components as the basis to understand the major challenges for adopting the practices around applying, using and sharing OER.

Once we started exploring the OER movement in educational domain, it became obvious that it held various challenges that a more generic framework could not comprehend. This is why we extended on the literature review process to study the challenges specific for this application area.

3.2 Contextualization to domain

As explained, we used the GSKM barrier framework of Pirkkalainen & Pawlowski (2012) as the basis for the categorization. Table 3 presents the result from our literature review for the main barriers of the OER domain. When addressing these challenges together with the GSKM barriers we have better possibilities to reach a holistic impression of the real problems in the domain.

Table 3: Barriers for OER

OER barriers - Organizational / contextual dimension	
Barrier	context identified in / focus - References
Lack of resources for sustaining services, content and infrastructures	OER - (Atkins et al. 2007)
Lack of time for production and localization of OER	OER factors of re-use – (Hatakka 2009) OER in developing countries – (Humbert et al. 2008)
For sharing OER, Need for Rewards and Acknowledgement.	Knowledge sharing and OER - (Agarwal et al. 2007)
Lack of business model for open content initiatives	OER in developing countries – (Humbert et al. 2008)
Too many resources to choose from	OER factors of re-use – (Hatakka 2009)
Hard to find suitable material – where to look from	OER factors of re-use – (Hatakka 2009)
Lack of knowledge and awareness of open content	OER factors of re-use – (Hatakka 2009)
Lack of knowledge and awareness of learning object repositories	OER factors of re-use – (Hatakka 2009)
Lack of contextual information for the resources – how can be used or modified	Cultural factors on OER - (Davis et al 2010)
Difficulty level of content – found materials not suitable for specific students	OER factors of re-use – (Hatakka 2009)
Open content do not fit the scope of the course	OER factors of re-use – (Hatakka 2009) OER - (Chen 2010)
Granularity of the materials	OER factors of re-use – (Hatakka 2009)
Matching the resources to own curricula is problematic	OER quality - (Clements & Pawlowski 2011)
The effective use of OER is quite complicated and unclear	OER - (Chen 2010)
Lack of training how to apply and re-use resources	OER factors of re-use – (Hatakka 2009)
Lacks policy support from the institutional level	OER - (Chen 2010)

OER barriers - Organizational / contextual dimension	
Regulations on national or institutional level might hinder the adoption	OER factors of re-use – (Hatakka 2009)
Text book dependency	OER factors of re-use – (Hatakka 2009)
Social dimension	
Lack of trust towards unknown authors or systems where resources retrieved from	OER factors of re-use – (Hatakka 2009)
Lack of motivation to share resources or information around those resources	Knowledge sharing and OER - (Agarwal et al. 2007) Knowledge sharing in schools - (Disterer 2001)
Absorbing knowledge and sharing nothing in return ("knowledge parasites")	Knowledge sharing and OER - (Agarwal et al. 2007)
Wish to avoid external parties from assessing the quality of their knowledge	Knowledge sharing and OER - (Agarwal et al. 2007)
"Not invented here" notion. Hesitation to receiving knowledge someone else has created	OER factors of re-use – (Hatakka 2009)
Language of the resources	Cultural factors on OER - (Davis et al 2010) OER factors of re-use – (Hatakka 2009)
Lack of ICT skills to use and produce OER	OER factors of re-use – (Hatakka 2009) OER in developing countries – (Humbert et al. 2008)
Technical dimension	
Lack of hardware (broadband, infrastructure, software)	OER in developing countries – (Humbert et al. 2008) OER - (Chen 2010) OER factors of re-use – (Hatakka 2009)
Lack of support from top management and IT practice for using and producing OER	OER in developing countries – (Humbert et al. 2008)
Reliability of the systems	OER factors of re-use – (Hatakka 2009)
Quality dimension	
Lack of awareness of quality content	OER - (Yuan et al. 2008)
Hard to assess the quality and relevance	OER factors of re-use – (Hatakka 2009) OER- (Hylén 2006); (Atkins et al. 2007)
Legal dimension	
Unclear Intellectual property rights (IPR) and copyrights (lack of awareness)	OER quality - (Clements & Pawlowski 2011) OER- (Hylén 2006); (Atkins et al. 2007) Cultural factors on OER - (Davis et al 2010) Knowledge sharing and OER - (Agarwal et al. 2007)

3.3 Stakeholder engagement

Identifying the specific challenges of a domain served as one part of the contextualization process. However, in order to study the challenges and finding correct interventions that address the needs and requirements of the teachers, ways of inquiry must be specified.

As each participating country from the consortium will run workshops with the teachers in their own area, a decision was made to apply a focus group method to discuss the topic with the teachers. Kitzinger (1995) described focus groups as a *group interview that focuses on group communication for exploring the knowledge and experience of the participants*. While focus group approach provided a way to engage with the teachers, survey attached to the sessions was selected as the method for capturing the opinions of the participants. The survey would consider a barrier selection that would aim to comprehend the significant challenges for the respondents. The survey would also consider potential interventions to overcome these challenges. The following would serve as the method of inquiry not just for the potential solutions but to find connections to activities and processes.

As the initial step for the inquiry, the experts from the project were presented with the extended classification of barriers in the OER domain. The classification above was merged in to the overall GSKM list of challenges. A dedicated workshop was held where the entire classification was discussed with the partners ranging from pedagogical experts to technical developers. The three-hour session concluded with the selection of barriers (Table 4) which are most probably the most significant challenges for the teachers to apply and use the Social Software platform for the educational knowledge resources.

Table 4: Selected barriers for the inquiry

Lack of time to search or use resources from a repository
Lack of time to learn and use tools/services in the repository
Lack of training how to use the repository for my work
Lack of reward for the efforts made (e.g. not getting paid extra to use resources from the repository)
Lack of support from management level on how to use or apply open content
Lack of technical support within my organization how to use or apply tools and services for open content
Lack of Policy and guidelines (within your organization) for using resources in your work
Lack of Policy and guidelines (within your organization) for social tools (open services and tools such as social networking, wikis, collaborative features for editing materials etc.)
No training on how to use resources from a repository for my work
No training on how to use tools and services around the resources for my purposes
Incompatibility of resources with existing work styles (e.g. the pedagogical approaches used in the repository are not what I want to use in my classroom)
Incompatibility of repository tools and services with existing work practices (e.g. don't support the learning environment in our school (Moodle etc.))
Lack of Learning object repositories good practices in my own country
The IT infrastructure in my school is not sufficient (not enough computers for students, the network is not fast enough etc.)
Resources in the repository are not available in own language
Language problems when collaborating online (misunderstandings when not sharing same mother tongue etc.) (collaboration can mean for example producing educational resources together)
Differences in national culture or ethnic background (values and beliefs etc.) affects negatively online collaboration with globally distributed peers
Impact of cultural and geographical distance on trust between collaborators working together over distance
Resources I found are too dependent on a specific culture (viewpoints, perceptions, terminology etc.) for my own use
Lack of educational resource sharing culture within my organization
Resources I found do not give enough information on the context where it is / was created and used
It is too problematic to be dependent (or to build) on resources developed by others (in general)
Lack of motivation to share information (in form of sharing own contents or contributing to discussions around open contents)
I am not sure what I can use or modify the resource to my own needs, I am not sure about the licensing details. I don't want to share resources that someone else own rights to etc. (IPR issues in general (intellectual property rights))
Finding resources that would match the curriculum of my country is demanding or impossible matching open content to own curriculum is demanding or impossible
Contents in repository X are not fitting to the learning styles of my students
I am worried about my professional reputation: if I use someone else's resources instead of making my own from scratch. Teachers are not used to discuss the quality of curriculum and course contents with their peers
Relevance of content (hard to find contents fitting to own needs)
Hard to judge the quality of material
Hard to judge the quality of tools
The current teaching practice doesn't support the use of educational resources

As most probable barriers why teachers would not adopt the system we identified 31 challenges. This collection and outcome of the expert workshop was applied to a survey with one statement corresponding to one barrier. A likert scale was applied to study the significance of a barrier for the respondent personally.

3.4 Mapping and implementation

The phases of literature analysis on the educational domain, expert workshop for finding the key focus as well as the teacher workshops for studying the significance of barriers and identification of key interventions comprehend the key steps for the contextualization process. The aim of the process in this particular case is to find out which interventions can support teachers overcoming the most

critical challenges they have related to using the ODS - Social Software portal. The implementation and validation process for the interventions will be further discussed in this section.

The teacher workshop results for inspection of the barrier significance will not be discussed in this article in detail as the process is underway and workshops are still running. However, the intermediate results highlighted the following interventions:

Table 5: Intermediate interventions mapped to knowledge activities and barriers

Intervention	Focus - Activities	Addressing barriers of
Training needed	Strategic – human oriented activities for concrete training events. Online support and tutorials	Lack of time Lack of training Incompatibility of resources
Support from the top management	Strategic – human oriented activities, concrete support in the form of resources, training, practices etc.	Lack of policy Lack of support
Facilities to upload and share learning materials	Functional – technology oriented. Support for whole knowledge life cycle on OER	Lack of support Lack of awareness Not enough quality content
Tools to facilitate teacher collaborations	Functional- technology oriented. Facilitating creation, evolving and sharing knowledge	Lack of awareness Lack of training
Localized versions of the portal	Functional – technology oriented. Supporting regional, national and international activities	Lack of awareness Lack of support Language barrier
Various filtering options for materials (age, learning goals, level etc.)	Functional – technology oriented. Search, acquisition, identification of knowledge	Incompatibility of resources Language barrier Lack of awareness

The table presents not only the suggested interventions but also the focus of the interventions towards human- or technology orientation, the main activities supported as well as barriers addressed. The intermediate results on intervention identification reveal that overcoming the barriers does not imply only technological innovations. The interventions in many cases require human-driven changes in the context where the stakeholders operate. These changes require larger movement and sustainable support towards the stakeholders. However, the results give clear signals towards the technical side as well. The initial findings for mapping the interventions to knowledge activities and barriers do point out that the system must address the whole knowledge life-cycle in terms of OER usage and sharing. The key findings feed in to the requirements analysis of the project and the findings for functional, look & feel and access will be implemented in the portal. For each intervention, in-depth discussions were accomplished in the workshops where the teachers themselves described their understanding for the intervention. The development team of the project critically reviewed all interventions and the feasibility to implement those.

The validation of the interventions will be accomplished in a later stage of the project with similar workshop approach, covering at least the same amount of teachers as the on-going workshop process.

3.5 Transferability of the contextualization approach – a guideline

Within this case study, we have described the entire procedure for contextualizing the GSKM approach. While the process is still on-going for the implementation and validation, elaboration for the validity and transferability of the approach can be reflected on.

The selected process for contextualization has roots in constructive research and especially in design science research methodology (Peffer et al. 2006). The method selection for each step of the process was heavily influenced by the ODS project and the pre-planned activities for teacher engagement. The approach was adapted to reach stakeholders across Europe and to derive the needs and requirements for the portal development based on the GSKM framework. We suggest considering the following during the contextualization process:

- Stages for GSKM contextualization – While the stages could differ in another context, we encourage to build on the constructive approach and to understand the domain challenges before

initiating the inquiry. Focus not only on technological aspects but also on environmental, organizational, social, types of knowledge created and shared in the application area etc.

- Methods for GSKM contextualization – The selection of the methods were in this case applied based on the project planning. We encourage involving the users in the inquiry, not just assuming their needs. An expert workshop or a focus group session is a good way narrowing down the focus from the GSKM framework that is extended with domain knowledge. Consider targeting the users with a very condensed selection of potential challenges, aiming for a deeper understanding on the challenges and extensions to potential other factors. Presenting the participants with concrete examples and versatile cases of Social Software usage can foster capturing valuable information around the interventions that could overcome the main challenges.
- Deriving implementation and validation plan for interventions – Base trust on the user feedback. However, deriving a clear requirement from an identified barrier is not trivial. Use additional means, as explained in the previous example, to understand what works and could reduce such barriers. Accomplish the mapping of interventions to knowledge activities and processes based on the key activities of the domain and the case at hand. Finally, apply more stages to the contextualization process if the setting demands so.

4. Conclusion and outlook

Within this paper, we have provided a focus for Global Social Knowledge Management research. We provided a survey of successful approaches and for the first time in globally focused KM research, we have mapped Social Software to knowledge activities and major barriers based on the existing literature. This exemplary mapping effort provides a first glance to recognize the crucial influence the global or multicultural component brings to managing globally distributed knowledge activities through Social Software support. Our inquiry indicated the need to adapt the framework based on the context where it is addressed. We argued for a contextualization process for the GSKM approach and demonstrated this through a case study in the open education context. The framework constructed for this paper can be seen as starting points for organizations to recognize how Social Software interventions can be managed in versatile KM processes. This becomes highly important taking in to consideration that most KM initiatives are struggling to succeed. It is crucial to study the GSKM in differing contexts to meet the complex needs of a particular setting.

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III

THE KNOWLEDGE INTERVENTION INTEGRATION PROCESS: A PROCESS-ORIENTED VIEW TO ENABLE GLOBAL SOCIAL KNOWLEDGE MANAGEMENT

by

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The Knowledge Intervention Integration Process: a Process-oriented View to Enable Global Social Knowledge Management

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Abstract. Process oriented Knowledge Management (pKM) has been a widely discussed approach for KM initiatives. The approach ties business strategy closely to KM by connecting knowledge activities to key business processes. Social Software has been taken up in many domains as an organizational tool for managing knowledge. Up till now, the impact of being globally distributed (organizations and teams) has not been emphasized within the pKM view, nor has been the Social Software approach. The globally distributed, Social Software – supported approach has clear impacts for designing and implementing KM processes in the pKM view. Within this paper we clarify these implications with an integrated model for introducing Social Software tools for Knowledge Management and aligning those with KM as well as business processes. Our approach emphasizes on aligning the Social Software activities with KM coordination processes, knowledge-intensive business processes and knowledge activities. Our work also stresses the need to recognize and deal with KM barriers within the coordination processes in order to define and implement appropriate interventions and activities.

Keywords: Process-Oriented Knowledge Management, Globally distributed organizations, Barriers, Interventions

1 Introduction

The goal of this paper is to investigate and focus on integration of globally distributed and Social Software-supported organizational activities to versatile Knowledge Management (KM) processes. KM initiatives in globally acting organizations are nothing new. The role of knowledge as a crucial strategic resource of a company is highly valued while the challenges to manage knowledge in globally distributed organizational units and teams seem to remain. The benefits of well-found KM are evident while a large portion of KM initiatives in organizations are failing [1]. Social Software has been seen a promising tool to support Knowledge Management activities [2][3]. Setting up KM is a complex effort which must deal with human and technology-oriented aspects such as technological infrastructure, organizational culture and processes [1]. Development and implementation of KM strategies for globally acting companies have been present to some extent in literature [4][5].

However, the implications of the globally distributed, Social Software- supported Knowledge Management (GSKM) to design and practice of organizational and KM processes has not been emphasized on. There still is a need to analyze how these GSKM aspects affect those processes. In this paper, we analyze the literature on process-oriented KM and extend the analysis for the Social Software supported global KM to find out indications and evidence how interventions should be designed and integrated to KM processes, focusing on the crucial factors that too often disrupt the KM projects.

Our two research questions for the paper are: “What type of implications Social Software-supported and globally distributed workforces have on the design of KM processes?” and “how to design interventions and approach for a global Social pKM approach?” To examine these issues, a literature review was conducted for the KM and Social Software research. An integrated approach for managing GSKM processes was constructed to serve as a reference model. The integration of this approach to a case study is presented within this paper with an initial model validation. The paper concludes on recommendations for further usage of this knowledge intervention integration process.

2 Theoretical Background

Process-oriented KM (pKM) has been seen an approach to bridge the gap between the technology and human-driven KM approaches [6]. PKM can be seen a management function and a strategic tool for maintaining, implementing and selecting strategies for organizational knowledge management [6]. As indicated by Crowston [7], processes enable organizations to accomplish desired goals. In pKM approach, several types of processes are discussed. Within this paper we address the integration of various KM processes to Social Software-supported KM efforts, focusing especially on *interventions* which can be defined as organized actions that can be both technical and organizational to put KM in use [8]. We analyze especially the following process types:

- *Knowledge processes*: often described in form of a knowledge life cycle (KLC) ranging from creating, acquiring, identifying, adapting, organizing, distributing and applying knowledge [9]. These Knowledge processes support knowledge flows between business processes and actors [10].
- *Knowledge-intensive business processes*: core processes along the value chain of an organization [6].

As pKM approach tightly is related to organizational processes, the importance of creation of a process theory should be raised. In process theories, the outcomes of interest in organizations are described by performance and sequence of events [11][7]. Process theories can describe and help to understand complex causal relationships by showing how individual and organizational inputs and outputs are related [12]. Within

this paper, we base on process theories by extend the pKM approach towards understanding globally distributed, Social Software-supported KM.

Fiedler and Welpé [13] have argued that it is crucial to study how Social Software could be taken up successfully in KM processes. Social Software enables interactive collaboration, managing content and networking with others. It supports the desire of users to be pulled into groups in order to achieve their personal goals [14]. The role of culture in KM has been emphasized as highly crucial in the research of Ruggles [15]. Cultural factors on working activities have been shown one of the biggest challenges for organizations. Especially for globally distributed and heterogeneous workforces, the influence of culture is highly crucial. Working in a globally distributed manner has other implications as well in addition to cultural factors which often relate to how people act, work and perceive things in general. These can be language issues [16] when not sharing the same mother tongue, as well as geographical and temporal issues, which often lead to lack of trust and transparency [17]. Previous research of Pawlowski and Pirkkalainen [18] emphasized different types of barriers related to globally distributed, Social Software-supported KM (GSKM). These barriers are crucial for the success of GSKM and relate to organizational context, social and interpersonal dimensions, cultural and policy issues, as well as to technology and quality aspects [18]. When analyzing these barriers, it becomes clear that globally acting teams deal with different barriers than closely collaborating teams, even when sharing similar Social Software tools.

However, what is yet unclear is what type of implications the use of Social Software has on KM processes. As depicted by Avram [2], knowledge evolves and meanings are created through collaboration and conversations when applying Social Software in KM. This has obvious impacts how knowledge flows within groups of people in an organization. As explained in pKM approach for handling KM, knowledge is managed, stored and refined through an integrated approach together with business processes [6]. Pawlowski and Pirkkalainen [18] presented a classification of knowledge activities and Social Software, depicting a clear connection of the versatile technologies to the knowledge life cycle models. However, more research is needed to define, if the pKM approaches are feasible when Social Software is used as a key component to align business- and knowledge processes. We will address these issues in the next chapter by the means of our model.

3 Knowledge Intervention Integration Process: an Integrated Process for GSKM

In the following, we show how Social Software interventions are incorporated into organizations' business processes and in the knowledge management lifecycle (KLC) in general. We present our Knowledge Intervention Integration Process (KIIP) which shows how to incorporate Social Software tools for KM purposes in global settings. Our model can be understood as a reference model, providing descriptions of an application domain and intending for reusability in different contexts [19].

As presented previously, the role of barriers and interventions becomes crucial to avoid pitfalls and breakdowns of KM activities which are handled through Social Software. We argue that proper analysis must be conducted for barriers before the Social Software applications are introduced to the KM efforts of an organization. Not just for the purpose of analyzing aspects around the globally distributed collaboration but to understand the various barriers which we raised within previous chapter. This follows the “knowledge about processes” in the tradition of Eppler et al [20]. These barriers from a global perspective have obvious impacts on the knowledge flows and collaboration between the stakeholders and therefore, they must be linked to the processes. This relates clearly to coordination and knowledge management process around KM projects [21][22][6]. These KM projects can vary tremendously in their focus. De long et al. [23] presented alternative approaches for capturing and reusing structured knowledge to identification of sources and networks of expertise, synthesizing knowledge from external sources, embedding knowledge in products and process etc. However, the coordination process must be precise in terms of how it addresses the barriers and technology support. As presented by Kucza [21], the continuous coordination process of KM project consists of phases of *Analyze* (analysis on scope), *Define* (Measurement planning, goal setting), *Plan* (Define and determine process, infrastructure, roles, rules etc.) and *Effect* (KM piloting, measuring, updating). The barrier analysis must be a crucial part within these steps. As argued by Maier and Remus [6], the integration of the three levels 1) previous *coordination processes* (or in this case KM processes) to 2) *knowledge processes* and 3) *Knowledge-intensive business processes* are crucial for the success of KM. As previous literature has stressed that knowledge is used within business processes and created /gathered and formalized as a result of a process [24], the strategy how Social Software is embedded to this knowledge creation process must be emphasized. If addressing the relation of the GSKM focus for Business Process Management lifecycle [24], relating to creation, modeling, pre analysis, enactment, post analysis and evaluation of a business process, the implications to the creation-phase are inevitable. Within this phase the requirements and opinions of various stakeholders are analyzed and it is important to take in to consideration the barriers on the dimensions of context, social, technical, quality, legal and culture as presented by Pawlowski & Pirkkalainen [18].

As the business processes clearly relate to the KM lifecycle (KLC) [24], the approach for applying Social Software within this lifecycle (and in the business process) has a tremendous influence how the KM activities are designed and addressed. Since KM projects can vary in their focus, the way Social Software can be applied can take many forms. Very often KM lifecycle revolves around knowledge repositories or KMSs [24]. The approach of the KM project sets the focus whether the Social Software has to have interfaces to external stakeholders or within group / team collaboration. This is crucial for the sake of integration to potentially existing KMSs and whether to adopt public Social Software services (reaching external stakeholders and wider public) or closed environments to manage internal organizational knowledge. This focus will determine how the KM lifecycle will be applied and integrated as a part of the business process. When analyzing the existing approaches

(such as process types in pKM model [6]) for visualizing integrated KM processes, it is important to clarify that the barriers for organizations working in a globally distributed manner, have the biggest implications for the coordination processes and analysis-phases, with less changes to the high level abstraction KM processes.

We propose an integrated model for Knowledge Intervention Integration Process (KIIP), which includes the building blocks for managing the integration between the process types as well as the mechanisms to facilitate the overall process. A central issue is to have a clearly defined process for aligning and integrating business and knowledge processes. See Figure 1 for the visualization of the overall model.

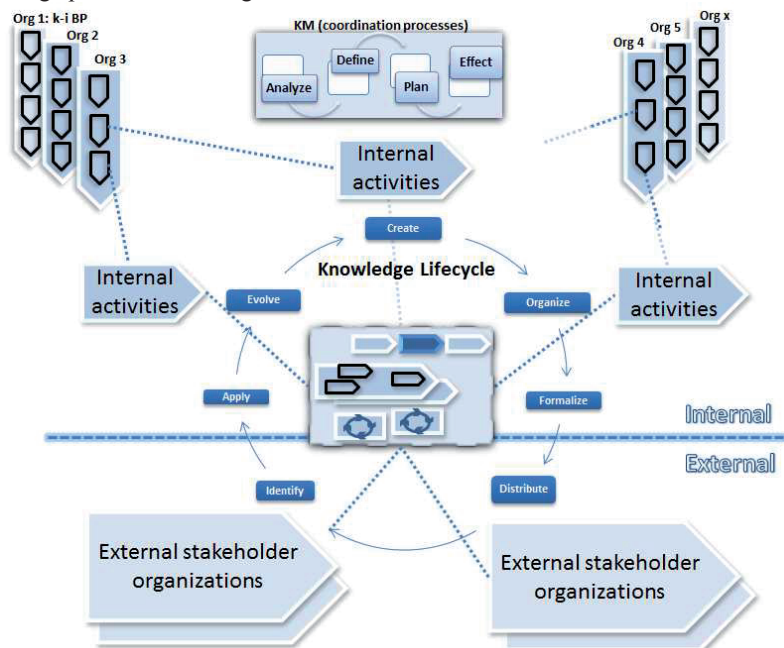


Fig. 1. Knowledge Intervention Integration Process (KIIP)

Through this model we base our work on the previous research on pKM and extend on the implications for GSKM. The KIIP model shows how the organizations engage to collaborative, Social Software-supported knowledge activities and internal KM activities within their knowledge-intensive business processes. The interfaces of Social Software between the external stakeholders and internal project groups depend on the choice of technologies. Aligned with existing pKM management/coordination processes [6][21][22][23][24][18][5], we propose the following building blocks within the KM coordination processes of our model:

Analyze: Defining scope for the KM approach [21][22] and addressing the cultural and barrier aspects for different organizational levels and tasks [18][5]. This is a key activity which has to be conducted and monitored throughout the KM project runtime.

Define: Planning for the intervention [6][18] and goals [22] which addresses the mechanism and approach to resolve the critical barriers. Focus and approach can differ in terms of how the interventions are identified and from where the sparks for these are derived from.

Plan: Clear determination of Social Software alternatives and integration with existing systems (KMSs, KR etc.). Should include the approach for integrating the intervention and technologies between organizational processes [6][21][18][23]. The step also includes setting the activity landscape [6], assigning instruments [6] as well as setting rules, rights and responsibilities for the key stakeholders [21].

Effect: includes the facilitation process, training, monitoring, evaluation and continuous improvement/optimization process [22][6][24] for the GSKM approach. Roles must be ensured to be maintained throughout the iterative process to ensure a sustainable KM process.

For knowledge management between the development team, internal and public Social Software usage is applied. For those activities Figure 2 explains the concrete approach applied over the KIIP model (Figure 1).

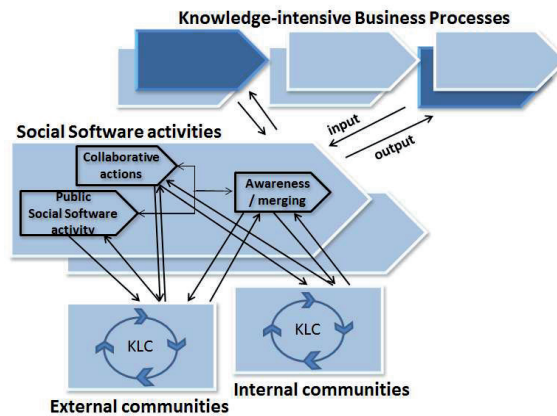


Fig. 2. Social Software activities in a collaborative business process

This representation of the KIIP model describes how the activities on Social Software can be embedded across different process types, involving different stakeholders. This exemplary representation links to both internal communities (such as project teams) and to external ones (external stakeholders). Within both approaches meanings and knowledge are created through discussions and interaction (respecting the knowledge life cycle), while these activities are constantly merged within the project team. Such approach is a typical example of Social Software application to KM as elaborated by Avram [2]. However, this aspect has not been previously raised in the pKM literature. It is crucial to align these Social Software activities with the knowledge-intensive (k-i) business processes of the organization, making sure the knowledge created/gained is constantly harmonized with the core activities of the organization. It is also very typical that not all key people of the organization who would be interested in the knowledge created by Social Software activities are

involved in this knowledge process. This makes it more important to provide the necessary outputs regularly to the k-i business processes.

Typical Social Software tools and related activities have been previously described by Pawlowski and Pirkkalainen [18]. Analysis of these findings can lead us to a conclusion that because most of available Social Software can be integrated to KLC steps, the crucial factor is not just which tools can support KLC steps but more about which selection is enough to bridge the gap between internal and external communities. Another crucial factor is how to ensure good enough data security for selected Social Software that complies with potentially restrictive organizational policies from various institutions working within the project. In order to explain the concrete application of this approach, we provide an example through a case study which adopted the KIIP approach.

4 Case: OpenScout

Within this chapter we will show how to adapt the KIIP model in a case study. We have applied and adapted the model to a typical collaboration setting – in a European R&D project OpenScout. The KIIP approach was adopted in OpenScout management level as a pKM strategy. These projects bring together stakeholders across (European) borders and cultures. In these projects, it is essential to set up collaboration infrastructures for project management and work processes in a very short time frame. The complex structure of tasks and partners as well as their cultural backgrounds makes it important to have clear KM goals, plans and actions. The OpenScout project deals with open educational resources (OER), re-use of learning materials and community building for different stakeholders in the domains of higher education, business schools and SMEs. The Figure 3 illustrates a high level integration of the KIIP model to KM of the OpenScout project.

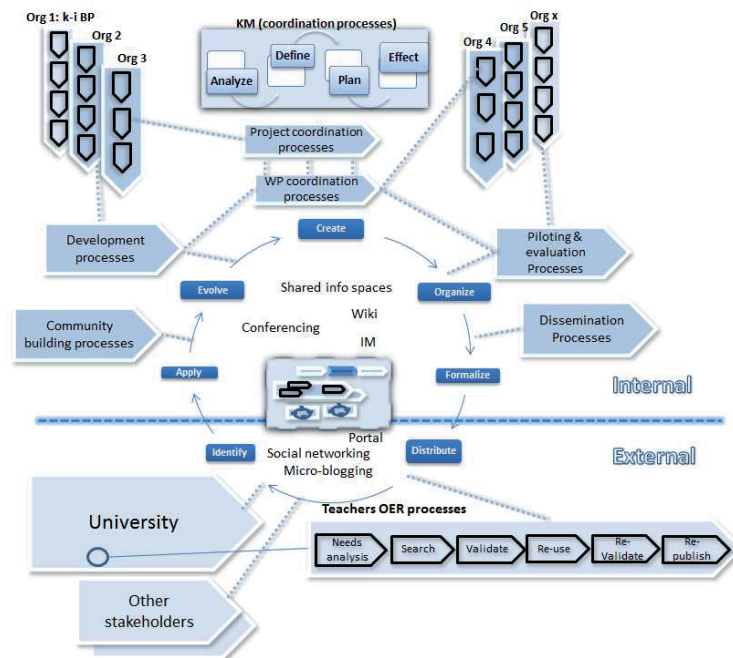


Figure 3: KIIP applied to OpenScout KM process

The KIIP model was analyzed and adapted to the case based on the focus of the project and the initial set of selected Social Software. Within this part, we will explain the adaptation/integration process of the KIIP model to the case and explain the adapted model in detail. As explained in the previous chapter, the key factor is to set up a consistent process for coordinating the KM efforts through the stages from *analyze* to *effect*. However, the KIIP approach was integrated to OpenScout at a later stage of the project when preliminary strategy was already in place which made the integration of the model more adaptive as the KIIP approach was merged to existing KM. See Figure 3 which presents the higher abstraction level of the integrated model to OpenScout.

Phase - Analyze: The KM activities are divided to internal and external stakeholders. Both internal and external approaches include their own sets of barriers that the case must take in to account in the *Analyze* phase of the KM coordination. The main barriers identified relate to the following:

- Internal: Coordination challenges between different processes, Geographical dispersion, Differing working styles and roles
- External (relating to the Social Software portal/product created by OpenScout): Unaware of IPR (intellectual property rights) issues, lack of time to contribute, Lack of national/cultural awareness on OER

Phase – Define: Within this phase of the coordination process, the tools and communication strategy were adapted (and are constantly monitored and revised) to

create interventions for the main barriers. From the internal perspective a set of Social Software interventions was set to address the challenges: Shared information spaces to handle project documentation, addressing the KLC steps: create, organize, formalize, apply and evolve. Wiki software was applied to manage internal synchronized writing, technical organization and notes, supporting the whole KLC. For the geographical and unawareness barrier, conferencing system was applied for weekly meetings, addressing KLC steps: distribute and identify. As a support mechanism, Instant Messaging tools are used to handle personal and more informal knowledge exchange, addressing KLC steps: distribute and identify. For external GSKM we have applied existing Social networking and micro-blogging services such as Twitter, LinkedIn and Facebook. OpenScout also develops a Social Software Portal for delivering and searching for OER. The portal utilizes multiple Social Software functionalities. The reason for engaging to external networks is to align these internal activities to external stakeholders from management domain which can be easily engaged through transparent and open Social Software, such as Twitter. Within both approaches meanings and knowledge are created through discussions and interaction (respecting the knowledge life cycle), while these activities are constantly merged within the internal team.

Phase – Plan: The different process types were preset within the project which are highlighted in Figure 3, including the internal, project related processes. The processes are presented within this model with high abstraction in order to ease the understandability of the relations. The detailed processes were managed within the project. The model indicates how the internal project processes and activities connect to the external stakeholders which are users of the OpenScout portal or potential collaborators. The interfaces to external stakeholders are managed by versatile Social Software services such as the OpenScout portal as well as public social networking and micro-blogging services. During the *planning* phase of the KIIP coordination process, knowledge flows were adapted with selected Social Software. The knowledge processes (KLC) now revolve around the utilized Social Software and integrate to the knowledge-intensive business processes.

The internal part on processes describes globally distributed KM of the internal team which is divided to technical development processes and to community building and dissemination oriented processes. The different levels of coordination include the KM coordination processes which follow the KIIP model, project coordination which deals with administrative and project substance related coordination and Work Package (WP) coordination which are divided for all the different streams of activities. The external part describes the processes for the end users and collaborators representing Universities, SMEs and so on. The processes are community-oriented and cannot be fully predicted but present typical sets of activities which for example teachers take to engage with the OpenScout portal and Social Networking activities. Within this high level pKM model for OpenScout, we have raised processes which relate to activities performed by teachers from universities when they get engaged with OpenScout and apply the OpenScout portal for their learning material development tasks. These processes relate to identifying needs for OER (which materials needed, where to find, which tools to apply etc.) and the steps for finding the material, validating its quality, discussing it with colleagues, adapting and using it for own purposes and sharing experiences through Social Software.

Phase – Effect: The facilitation process was embedded to project coordination activities and merged to existing project management documentation and guidelines. The GSKM approach is constantly evaluated by the coordination team, focusing on the feasibility of the integrated processes and interventions.

4.1 Detailed adapted model

The following model (Figure 4) describes more in detail how the dissemination and user management activities link to external stakeholders by the means of Social Networking activities. The key issue behind the KIIP model is to enable deep enough analysis on the processes to identify the key points for intervention. This detailed model shows one part of the OpenScout process concretely explained, which is not possible through the overview model presented before.

From the internal perspective the partners engaging in the project all deal with their own overall process which links to joint Knowledge-intensive business processes of the project. The promotion aspects of the project link from one angle to Social Networking activities to reach the end users and collaborators. This dissemination activity is constantly linked to internal process related activities supported by wiki and conferencing tools. The other processes of the project use the knowledge created for driving their own work, e.g. to portal development as presented here. This model shows some of the crucial points for challenges in both internal KM as well as in external stakeholder (user) management. The challenges on this example are similar to the ones expressed before. Especially regarding the internal KM those are related to how to manage the data flows and awareness between different process types and globally distributed work force. However, the focus through dissemination activities is more related towards awareness of the project and OER, as well as how to make the users share their own OER.

From the internal perspective, the key intervention is operationalized to connect the versatile processes in the globally distributed team by the means of collective Social Software, which is monitored within the coordination processes. The key interventions from the external view relate how to give better awareness support and show the benefits of using and sharing OER within the management domain. As OpenScout is using existing social networks to a large extent and additionally, building such functionalities as a crucial feature of the portal, it was crucial to analyze the intention of researchers and teachers to share OER in social networks [25]. As the results indicated that the key motivational factors include increased reputation, perceived usefulness of the system and reciprocal relationships, the intervention planning could feed back to the internal activities with a strong focus on supporting these aspects.

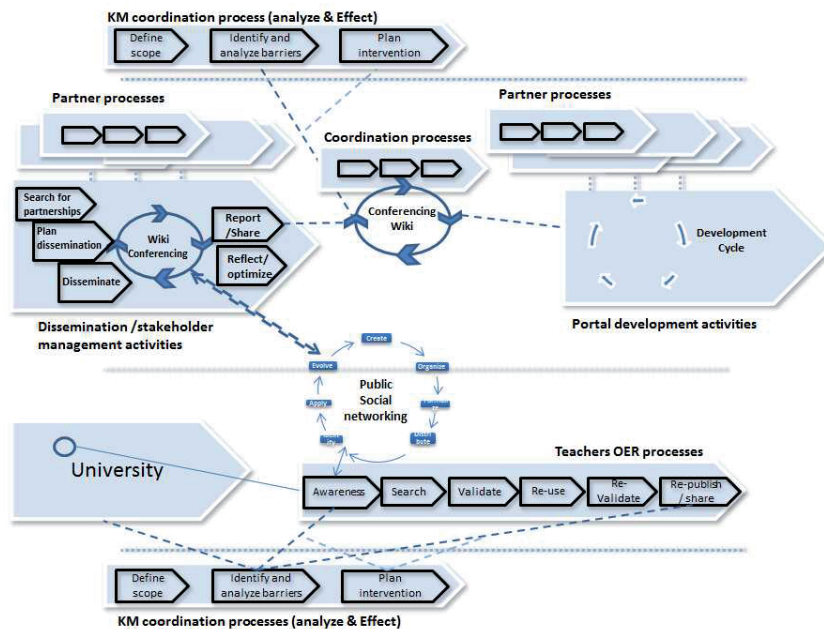


Figure 4: Detailed relation of dissemination and user engagement

4.2 Preliminary model validation

In order to show the feasibility of our approach, it is essential to investigate how demanding it is to adopt the model for globally distributed organizations or projects. For a preliminary validation of our model, we have applied the evaluation approach for reference models by Frank [19]. Evaluation of a comprehensive model is demanding and should take in to account a variety of perspectives from economic factors to engineering and epistemology [19]. There are several potential factors that can be applied for reference model evaluation as indicated by Frank [19], while we chose and conducted the evaluation for the following, best suitable factors:

1. *Adaptation efforts:* The adaptation process of the KIIP model to concrete globally distributed Social Software supported KM depends on abstraction levels and the arrangement of the processes within the organizations or projects. Within this paper, high abstraction models are presented enabling rather easy adaptation. However, the benefits for the organization might be less meaningful if the processes, interventions and barriers aren't explored detailed enough to share a common vision and agreement. As indicated by Frank [19], costs should be an essential part of the evaluation of a reference model. For applying the KIIP model, the modeling efforts are not to be considered as substantial if the GSKM approach of the organization is rather clear and the processes, actors, tools and responsibilities are well known. Additionally, if the KIIP model will be applied in

- a modeling environment in an organization, potential costs for modeling tools and efforts should be considered.
2. *Strategic/organizational re-design needs*: The goal of the model is to create interventions on GSKM processes and to align the Social Software activities, the required strategic adaptation can be considerable. If an organization already partly complies with the approach, the change will not lead to major investments, either in terms of adjusting the organizational processes or by utilizing different set of Social tools to support those processes.
 3. *Integration of the model to existing models*: The KIIP model is built on top of existing pKM models and guidelines as well as on global and culturally oriented Social Software barrier frameworks. Conceptualization requires contextualization during the integration process, meaning that the original concepts of the KIIP model might not be the same in another context where the model might be applied (different terminologies etc.).
 4. *Suitability*: The analysis steps within the KIIP approach require wide knowledge on the context and organization which can become time-consuming effort and thus, a major cost. However, the analysis can be linked to existing analysis methods applied in organizations and projects, e.g. SWOT and requirements analysis.
 5. *Understandability / engineering perspective / Abstraction / Originality /Critical distance*: The model has so far been applied only through Action Design oriented research [26], which can be argued not to provide enough support for comprehensive documentation and support for independent (cross-domain) organizational adoption. While the originality of the model can be argued by the contributions of this model, the factor of critical distance is evitable in our Action Design oriented approach. To deploy the model for public usage is part of our ongoing work.

The case has shown that it is highly necessary to carefully plan and carry out the process of using Social Software interventions in complex project settings. By our approach, an active and consistent use of KM tools was achieved throughout the project for both, external and internal stakeholders. However, to complete the validation for the model based on the Frank approach [19], especially focusing on the factors of easiness/helpfulness and support for KM and coordination will be addressed in our upcoming research where we extend the model to other contexts.

5 Conclusions

Within this paper we have analyzed and indicated the implications globally distributed, Social Software-supported activities have on pKM. We elaborated on the need to respect the barriers which too often disrupt the KM projects. We proposed a Knowledge Intervention Integration Process (KIIP) model for GSKM which emphasizes on these factors and describes and visualizes the role of Social Software activities within knowledge-intensive business processes and knowledge activities. Recognizing the roles of Social Software applications in the knowledge processes that

tie the various business processes together is a crucial factor, both in research and practice. This integration approach was presented through a case study which adopted the focus of the KIIP model. As emphasized in the case study, the transferability of the KIIP model heavily depends on the stage the KM project or organization is at the moment. Adapting the KIIP approach to an organization which has deeply rooted ways of managing knowledge (e.g. tied to certain KMSs and procedures) will not be straight forward. Embracing an open sharing environment with less focus on authority and power structures may not work in all organizational and cultural contexts. We also must stress the fact that KM approaches vary from human- to technology-oriented approaches and the ones being in the middle are the easiest to comply with KIIP approach.

As emphasized by Kucza [21] and Maier and Remus [6], designing a sustainable coordination process for KM is crucial for the success of KM. With KIIP, we extend on this approach for Global Social Knowledge Management.

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IV

UNDERSTANDING SOCIAL OER ENVIRONMENTS - A QUANTITATIVE STUDY ON FACTORS INFLUENCING THE MOTIVATION TO SHARE AND COLLABORATE

by

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Understanding Social OER Environments – a Quantitative Study on Factors Influencing the Motivation to Share and Collaborate

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Abstract— Social software environments are increasingly used for open education: teachers and learners share and collaborate in these environments. While there are various possibilities for the inclusion of such social functionalities for OER, many organizational, individual and technological challenges can hinder the motivation of teachers to share and collaborate in these environments. Current research cannot explain what barriers teachers face in social OER environments and how those challenges influence their motivation to engage in such environments. An exploratory factor analysis was used in the context of schools and higher education institutions to investigate the possible barriers to engaging in social OER environments; a linear regression analysis was used to predict how the extracted factors influenced the motivation of teachers (N=754) to share and collaborate. The findings allude to barriers within social OER environments; the main challenges relate to the lack of organizational support, language and culture as well as quality concerns. The key results depict how teachers' motivation to share and collaborate in these environments decreases when they perceive higher language and cultural barriers. These findings can support OER providers as well as educational institutions in their efforts to minimize those barriers.

Index Terms— Social technologies, Knowledge Management, Knowledge sharing, User generated learning content

1 INTRODUCTION

ADOPTION of open educational resources (OER) and related services and practices has emerged as an important topic in distance education. Nowadays, several educational institutions and organizations provide their learning materials freely online. One of the most recognized examples is MIT Open Courseware [1], which offers all educational materials as OER, including clear conditions of intellectual property rights (IPR), by attaching licensing information to each resource. Several OER researchers have recognized the lack of sustainability of existing OER projects that do not seem to result in active participation and usage of their environments [2], [3], [4]. On the other hand, Ochoa and Duval [5] pointed to exceptions of a few OER repositories that have showed exponential growth over time. Still, there is a high interest in research on why educators and providers struggle with OER.

OER has been discussed as an efficient mechanism to complement other types of learning materials and to make education more transparent [2], [6]. Focus points for increasing the adoption of OER have varied in the existing literature. One focus area concerns identifying and overcoming barriers that hinder or negatively influence OER usage for educational purposes [2], [4], [6], [7], [8], [9]. The focus has often been on reaching sustainable initiatives and business models for OER [2], [4], [9]. As indicated by previous studies, the successful adoption and usage of OER is influenced by several factors. Some key aspects relate to the practices of educational institutions

[2], [4], [7], the technological readiness of the institutions [2], [7], [9], awareness of OER and its purpose [2], [7], and knowledge of how to find good quality OER [8], [9], [10]. Finally, it has much to do with users and their willingness to use such offerings. Arguably, one of the main drivers of OER is the motivation to share [4], [6], [9]. Agarwal et al. [11] elaborated on how teacher/student sharing practices often failed because of lack of motivation.

The motivation or willingness to share knowledge has been extensively discussed outside the OER context, especially in organizational knowledge management [12], [13] and on user-generated content in Wikipedia [14], [15]. Some of the key motivators in organizational knowledge sharing are reciprocity, incentives as well as contributing to the success of the team and organization [12]. In terms of user-generated content, contributors to Wikipedia are rarely compensated; a belief in their own abilities as well as the satisfaction they receive from their contributions are key motivators [14]. Based on a survey by Nov [15], Wikipedians share because contributing to Wikipedia is fun, and respondents feel that information should be free. While the factor of openness is the same as in OER, it is important to recognize what makes the OER context distinguishable, that is, the community-orientation instead of the organizational view. Additionally, the artefacts that teachers share are their own ideas, lesson plans and learning materials that many teachers do not want to expose to public [7].

It is important to point to the strong connection or interrelation between versatile barriers and motivation or willingness to share. As shown by Agarwal et al. [11], many organizational (e.g., the need for rewards and acknowledgements) and individual barriers (e.g., lack of

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trust) influence teachers' motivation to share information. Therefore, overcoming a particular barrier is likely to positively influence other related challenges.

As the usage of social networking and media sharing services have rapidly increased in popularity in recent years, the educational domain and OER movement have, in turn, reacted to these developments. Existing studies have clarified opportunities to support pedagogy and facilitate teaching through different types of social software services [16], [17], [19]. However, current OER-related studies do not specifically address the implications of social and collaborative services for OER environments. Many initiatives and OER providers have now moved from the provision of basic repository functions to the inclusion of social and collaborative services around resources [19], [20], [21]. This approach sees teachers and educators as the key users of the services. Another difference with traditional OER repositories is that these social OER environments allow educators to prepare their courses, re-use, adapt and collaboratively work to prepare their teaching resources, the focus being, therefore, on the preparation of learning materials as well as sharing best practices with other educators. Sharing and collaborating over distance can give rise to multiple challenges. Noll et al. [22] and Pallot et al. [23] showed that cultural and language distances are some of the key barriers to distributed collaboration. In social environments, there is also a strong risk that only a few people will contribute, while the majority remains as passive consumers [24]. As many initiatives and OER environments have now established this connection, to provide social functionalities around the resources, possible emerging challenges must be understood in order to avoid unnecessary pitfalls and to find ways of overcoming such challenges. Current barrier-related studies conducted for OER can inform providers, educational institutions and, most importantly, educators on the challenges of OER in general. However, those studies cannot indicate how social functionalities are perceived and which factors influence the motivation of teachers to share and collaborate in these social OER environments.

We have addressed this key issue for OER adoption by analyzing the types of factors that influence motivation in social OER environments. We address this by means of exploratory research in the form of a survey ($N=754$). Our focus is on teachers in schools and in higher education as these institutions are the main users of OER. This study allows us to contribute to the existing OER literature by defining the key challenges for engaging stakeholders in social OER environments. Specifically, the exploratory factor analysis and linear regression allow us to extend the existing body of knowledge with new factors that determine the impact of those key challenges. Most importantly, our contribution enables an indication of the barriers that can predict motivation. Such knowledge is necessary for both providers and adopter organizations to attract and support OER adoption.

The paper is organized as follows. In the next section, we describe the theoretical background of the topic, and the subsequent section describes the methodology of the

study. After this, the key results of the exploratory study are presented. The paper concludes by discussing the implications of the results for both theory and practice.

2 BARRIERS TO OER

2.1 OER Usage and Adoption

Studying barriers to and opportunities within OER was recognized in research on distance education after the UNESCO Declaration on OER in 2002. OER was described by UNESCO [25] as "technology enabled, open provision of educational resources for consultation, use and adaptation by a community of users for non-commercial purposes". Resources for open education could therefore be in any study subject, educational level/context and appear in any format. Barriers to OER have been a subject of study, which aims to understand and find ways of overcoming challenges that may hinder OER adoption. Existing research has approached the classification of OER barriers according to specific areas of focus. Chen [2] categorized OER barriers on the basis of availability and interoperability, awareness and promotion mechanisms, and fitness of the resources to curriculum. Hatakka [7] focused on factors that inhibit content developers from re-using existing resources instead of creating new ones from scratch. The qualitative analysis of Hatakka [7] found a variety of challenges, e.g., educational rules, language issues, relevance of materials, access, and technical issues.

OER studies that focus on barriers have also been conducted at different levels of education. One of the focus sectors has been universities and institutions of higher education [26], with further focus on the management domain [19]. Similar studies have been conducted to explore social practice barriers to OER [8]. Richter and Ehlers [8] showed that teachers often lacked proper support and equipment; there were also limitations in an awareness of ways of adapting resources for one's own purposes. Additional approaches have emerged to extend OER to industry and the corporate world [27]. Notwithstanding, within the current study, the focus is especially on the school and university context with teachers as the adopters of the environments.

As existing barrier studies on OER concentrate on ways of improving stakeholder engagement and active participation in available OER environments, ways of fostering change must be identified. One of the key aspects for OER appears to be motivation or willingness to share information as well as aspects that influence the motivation to share [6], [7]. According to OECD research [6], the motives for sharing might be varied, ranging from altruistic to personal reputational gain, publicity, and so on. These factors seem to differ from other contexts. Nov's [15] study on Wikipedia saw career advancement and networking as less important for Wikipedians. Vuori and Okkonen [12] summarized key motivational factors from studies on organizational knowledge sharing and stated that contributing to organization's success, incentives, reputation gain and reciprocity are some of the most important to enhance knowledge sharing. Hen-

driks [28] argued that personal ambition has to match the group ambition for organizational knowledge sharing to succeed. Studies on Non-Governmental Organizations (NGOs) have shown that cohesive groups, high interpersonal trust and strong internal motivation are strong predictors to active knowledge sharing between the members of the organization [29]. Comparing the contexts between each other, knowledge sharing in OER environments, similarly to Wikipedia, can be distinguished from organizational knowledge sharing by the lacking goal-orientation and organizational commitment. In organizational knowledge management, shared goals and reciprocity or peer support with closely working colleagues are key motivators in the sharing of knowledge [12]. Similarly, NGOs strive towards common goals [30] and deal with internal knowledge flows between workers. OER environments often are community-oriented [19], [21] and in theory, enable intra-organizational formation of groups. However, such restricted sharing of good practices and materials is not typical usage of the environments that strive for openness [19]. Similar to Wikipedia, OER aims towards access for wider communities but does differ from Wikipedia by different motivators as explained previously as well as the types of contributions that are expected from the users. While users of Wikipedia contribute with their knowledge on entries rather anonymously to wider public [15], users (mostly teachers) of OER environments share their own teaching materials and practices so that the contributor is visible for the visitors [21].

As OER research is still in its embryonic phase, the existing research cannot yet explain which barriers are most

<i>Lack of motivation to share resources or information around those resources [11]</i>
<i>Lack of resources for sustaining services, content and infrastructures [31]</i>
<i>Lack of time for production and localization of OER [7]</i>
<i>For sharing OER, Need for Rewards and Acknowledgement [11]</i>
<i>Hard to find suitable material – where to look from [7]</i>
<i>Lack of contextual information for the resources – how can be used or modified [26]</i>
<i>Open content do not fit the scope of the course / Curriculum [2]</i>
<i>Lack of training how to apply and re-use resources [7]</i>
<i>Lacks policy support from the institutional level [2]</i>
<i>Lack of trust towards unknown authors or systems where resources retrieved from [7]</i>
<i>“Not invented here” notion. Hesitation to receiving knowledge someone else has created [7]</i>
<i>Language of the resources [26]</i>
<i>Lack of support from top management and IT practice for using and producing OER [32]</i>
<i>Hard to assess the quality and relevance [9], [31]</i>
<i>Unclear Intellectual property rights (IPR) and copyrights [9], [26]</i>

likely to occur in a given context or how they might influence motivation. Notwithstanding, the available literature can inform us well on the basic challenges surrounding OER and some of the aspects that might explain the lack of motivation. Table 1 summarizes some of the basic challenges according to the OER literature.

In this paper, our focus is on social OER environments. As these environments are based on well-established functions and concepts in the social software and knowledge sharing literature, it is important to clarify the implications to our study.

2.2 Implications of Social Software and Knowledge Sharing

The rapid adoption of social software services has led to increasing interest from OER providers towards collaborative environments with knowledge sharing possibilities. In this paper, we address the connection between social software and OER repositories. This connection is established by recent OER providers [19], [21] but has not been properly addressed in research. Such environments provide social functionalities to share OER within an online community and to discuss and collaborate with peers within the portal or platform. These functionalities have various purposes, e.g., to support user communication, group building, cohesion, and networking, all of which are key components of social software as presented by Wever et al. [33]. Social software can be described as a set of tools that enable interactive collaboration, managing content and networking with others [33]. While exposure to social functionalities and services around OER can lead to many benefits, our focus is to understand the barriers that hinder the adoption of such social OER environments.

There are many possible barriers to using social software, such as technical aspects for security and privacy [34], [35], [36], and lack of interoperability between systems [35], [36]. One of the most critical barriers to overcome is the lack of understanding of the possibilities of the tool itself [34], [37], [38]. The analysis of these social environments is based on knowledge sharing activities for various application areas that have been discussed in the literature in recent years. Agarwal et al. [11] found that culture can play a crucial role in the knowledge sharing activities of teachers and students. As reported by Riege [39], there are various other challenges related to knowledge sharing. Those can relate to individual, organizational as well as technological aspects, for example, how to reward contributions [39], [40] and the lack of opportunities for sharing in terms of availability and allocation of time or established physical and online networks for sharing [39], [40]. One of the crucial issues for knowledge sharing is the lack of motivation to share information [11], [40], which is also the focus of this study.

Studies on specific social software services have been investigating what aspects influence the motivation of users to participate and share. Such influencing factors seem versatile and context specific. As explained by Dimicco et al. [41] in the context of social networking within IBM, key motivations to participate include career

advancement, building new relations and campaigning for projects. It is crucial to point out that motivational factors are closely related to behavioral intention when a user intends to take an action [42]. Kalb et al. [43] indicated in the context of higher education that various aspects influence researchers' intentions to share OER on social networking services. Expected reputational gain, anticipated reciprocal relationships, and support from top management were the most important factors. The study of Paroutis and Al Saleh [44] on employee's participation in social media showed that expected benefits as well as perceived support from colleagues and the organization affect knowledge sharing positively. In relation to using Twitter in informal communication at work, Zhao and Rosson [45] reported that keeping in touch with friends and colleagues, raising visibility, increasing one's own professional competences, seeking support and releasing emotional stress were the key motivations. As elaborated within the theoretical background, the key influencing factors for increased motivation do have similarities in heterogeneous contexts and for different social software tools. However, the context of OER seems to differ from the others inspected not only because of the artefacts being shared but also in terms of the context and modes of collaboration that lack the organizational goal orientation and reciprocity. Thus, the key motivations to share and collaborate in the context of social OER environments require further investigations. Table 2 highlights some of the key barriers to social software and online knowledge sharing in general.

As elaborated by Riege [39], while barriers are discussed separately in the literature, it is highly likely that

TABLE 2 Barriers to the Adoption and Use of Social Software/Knowledge Sharing Reported in the Literature
<i>Management does not give or allocate sufficient amount of support [24], [39]</i>
<i>Alternative technologies harder the adoption choice [39]</i>
<i>Security and privacy concerns [34], [36]</i>
<i>Lack of training for the technology [39]</i>
<i>Lack of motivation to share information [11], [40]</i>
<i>Lack of collaboration incentive [23], [24], [46]</i>
<i>Behavioral intention / how much would I benefit from using the system [34]</i>
<i>Differences in experience levels [39]</i>
<i>Lack of common ways for the usage of the technology [23]</i>
<i>Cultural distance in differing values, perceptions, viewpoints and practices [22], [24]</i>
<i>Different preferences in working styles [47]</i>
<i>Language distance and differences [22], [23]</i>
<i>Difficulties to receive or transfer knowledge from and to others [24], [39], [40]</i>
<i>Geographical /temporal distance in distributed collaboration [22], [23]</i>
<i>Lack of compatibility between diverse IT systems and processes [39], [46]</i>
<i>Lack of understanding of the possibilities of the tool itself [24], [34], [37], [38]</i>
<i>Existing relationships preferred [48]</i>

combinations of barriers are present in organizations as well as in real life contexts. Such knowledge is not available for social OER environments or knowledge sharing in general. As elaborated previously, OER sharing practices often fail because of lack of motivation. In our study, the focus is to see which of the barriers can engender lack of motivation to share and collaborate in social OER environments.

3 METHODOLOGY

As previously elaborated, motivation is widely researched in the field of social software; however, there is a gap in the literature on key factors that influence the lack of motivation to engage with OER and especially social OER environments. In order to analyze how the barriers to social OER environments influence teachers' lack of motivation to share and collaborate in such environments, a large-scale study was conducted with teachers across Europe. Utilizing a survey, the study sought to understand which barriers negatively affected the usage of social OER environments. The study first identified the possible barriers; by incorporating barriers that describe the lack of motivation, the analysis allowed an inspection of which aspects included in our study could explain higher or lower levels of motivation in teachers. The methodology and research design were based on design science research (DSR) [49]. Following the DSR process for design and development [49], this problem-centered study is part of a design effort in the new social OER environment. This paper only describes the factors influencing motivation, not the design of social OER environments.

The research effort can be divided into three main parts:

- 1) The exploratory inquiry was first set to operationalize the survey to be used in the data collection, and the selection of barriers needed to be justified for social OER environments. As the barriers for such environments are not addressed in the OER and social software and knowledge sharing literature, a focus group approach with OER experts was chosen to refine and enrich the potential barriers identified from the literature (Table 1 and Table 2). Items describing lack of motivation were also operationalized.
- 2) Data collection was conducted in OER workshops in 19 European countries.
- 3) Data analysis defining how barriers to social OER environments can influence lack of motivation in teachers to share and collaborate.

The details of the methodology are clarified in the next sections.

3.1 Operationalization

As expressed in the theoretical background, the number of potential factors influencing the usage of social software supported OER environments can be rather comprehensive. For the purpose of this study, the selection of barriers needed to be very specific as teachers could not

remain engaged throughout a large and time-consuming taxonomy. In order to select most of the promising barriers for this study, the challenges presented in Table 1 and Table 2 were used as a basis of the discussion to then eliminate irrelevant barriers by a group of experts. Such an approach helped us understand which of the barriers could become relevant in social OER environments and eventually be used in our study.

In order to enrich and specify the barriers to social OER environments, a group of experts was addressed in a focus group session co-located at the Open Discovery Space project meeting in Athens in the spring of 2012. This focus group session served as the pre-phase and orientation for the study. The experts were from Open Discovery Space – consisting of project management and work package lead. All 26 participants had previous experience with OER, including development projects, working as consultants or educators. During the session, each barrier from Tables 1 & 2 was discussed, and poten-

tial related challenges were identified by the experts. The discussion was focused especially on the social component of OER environments to consider potential challenges not covered in the existing OER literature. The discussion was recorded and analyzed for the selection of barriers for the study and for the discovery of potential new barriers. The final selection of barriers for the exploratory study was determined on the likelihood that it would be relevant for social OER environments and for the teacher community.

Since the possible challenges of using social OER environments is not fully explained in the existing OER literature, the possible challenges related to knowledge sharing and usage of social software were included in the focus group discussion. Each identified item was formulated as a barrier addressing the usage of social OER environments. The barriers in Table 3 were selected for the study to measure how teachers perceived them and to the extent they could predict their motivation to share and col-

TABLE 3
Barriers Included In The Study

Barrier	Reference
<i>Do not have enough time to use digital educational resources</i>	Adapted from Humbert et al. [32]
<i>Lack of training on how to use digital educational resources for my work</i>	Adapted from Hatakka [7] towards use of OER in work.
<i>Lack of reward for the efforts made (e.g. not getting paid extra to prepare digital educational resources)</i>	Adapted from Agarwal et al. [11] with clearer focus on steps to prepare OER for lessons
<i>Lack of support within my own organization on how to use digital educational resources</i>	Adapted from Humbert et al. [32]
<i>Difficult to find relevant digital educational resources for my purpose</i>	Adapted from Hatakka [7]
<i>Hard to judge the quality of digital educational resources without spending time evaluating them</i>	Adapted from Hylén [9]
<i>Hard to judge the quality of tools and services (around digital educational resources) which I'm unfamiliar with</i>	A new barrier identified in the session to describe quality of services and tools that are essential components of OER social software
<i>Digital educational resources should be available in my own native language</i>	Adapted from Hatakka [7] with clear indication for native language
<i>Language is the key". I only want to contribute to online communication/collaboration when my own native language is used</i>	A new barrier for OER identified in the session based on language distance barrier [22] and multi-lingual setting being a source of misunderstanding in distributed collaboration [23]
<i>Challenging to apply digital educational resources which are culturally distant (values, symbols, beliefs etc.) from my own</i>	Partly new barrier that was discussed in the sessions and adapted from Richter [50] and Hatakka [7] to the extent that culturally distant resources are harder to handle in adaptation process
<i>Impact of cultural and geographical distance - Lack of trust towards authors of digital educational resources</i>	Adapted from Pallot et al. [23] for <i>lack of interpersonal awareness creating distance</i> , from Hatakka [7]: <i>lack of trust for OER in terms where they get it from</i>
<i>Lack of common practice - People are not accustomed to use and share digital educational resources within my organization</i>	Partly new barrier adapted from <i>lack of policy</i> [2], <i>missing culture of practice</i> [8] and <i>lack of university rules and regulations for OER</i> [7]
<i>Digital educational resources do not give enough information on the context where it is / was created and used</i>	Adapted from Davis et al. [26] with clearer differentiation of the origin and the actual usage
<i>I feel reluctant to use the digital educational resource if there is license or copyright information attached to it</i>	Adapted from Hylén [9] with stronger emphasis on reluctance to use such resources
<i>Matching digital educational resources to own curriculum is extremely demanding</i>	Davis et al. [26]

laborate. As presented in the table, many of the existing barriers were adapted from the expert discussions in order to focus the study at hand. Additionally, two new and two partially new barriers were identified during these expert discussions. The new barriers indicated that assessing the quality of services and tools around OER might be challenging and that contributing to online communication and collaboration might only be suitable when one's own native language is used. The partially new barriers related to applying culturally distant OERs as well as organizations lacking a common practice for using and sharing OER. Each barrier was noted down, as per the discussions, and cross-referenced against the existing literature on OER, social software and knowledge sharing. The closely related challenges from the literature are presented in Table 3 alongside the newly identified ones.

As the main interest of the study was the lack of motivation towards sharing and collaborating in social OER environments, the decision was taken to use two Likert-scale items to describe lack of motivation. The first item was "I lack the motivation to share my own digital educational resources" [11]. It was selected as it provided an understanding of the sharing barrier rooted in the OER literature. Since the existing research does not provide barriers that address the social interaction aspect of OER, which goes beyond sharing, a barrier was formulated on the basis of the existing challenges of *lack of collaboration incentive* [22] and *lack of motivation to contribute / what's in it for me* [51] as the second item: "I lack the motivation to contribute to discussions around digital educational resources". Both items were included in the survey in addition to the previously presented barriers.

Finally, we needed information on the level of maturity and experience of respondents and their organizations in terms of ICT (information and communications technology) usage in general. This information also helped us to understand whether more experienced teachers and organizations were more motivated. The ICT maturity of an organization was operationalized as a Likert-scale of five variables. The items were adapted from items created from the project activities of the Discover the Cosmos project [52]. These items were originally applied from the VALNET validation framework, which served to facilitate knowledge about innovation in schools [53]. Those variables were "The Internet is commonly used as a source for learning resources throughout my school"; "I integrate ICT to provide learning opportunities in my classes"; "My students use ICT to collaborate and develop knowledge on curriculum activities"; "eLearning and ICT are used to promote learning in my school on campus"; and "eLearning and ICT techniques are used to promote learning in my school off campus".

3.2 Data Collection

The focus of this enquiry was on teachers in primary, secondary and higher education. The data collection was conducted within Open Discovery Space – project engagement activities with schools. Open Discovery Space [21] is an EU-funded FP7 project that builds a federation

from existing learning object repositories and provides a social online environment around the resources. The research effort is part of the design process of the upcoming social OER environment relating to the requirements analysis of the constructive effort.

Within these engagement activities, a total of 92 workshops were organized in 19 countries where approximately 2300 stakeholders participated. Each country is expected to run a series of workshops during 2012-2014 with schools adopting and learning to adopt OER. This step was conducted for the initial engagement activity – introducing social OER environments to schools. Our focus was especially on teachers, but students could also attend. Additionally, teachers from several universities took part in the sessions. Four of the workshops were organized online; the remainder were face-to-face sessions organized by local partners. Each workshop followed the same structure:

- 1) Participants were introduced to OER
- 2) Participants were introduced to the aims and services of Open Discovery Space
- 3) Good practices and sample cases of OER usage in their curriculum areas were presented
- 4) The main needs, limitations and barriers for making use of the resources in school practice were discussed
- 5) A survey of participants' views was collected.

The intention of the survey was to explore various aspects around possibilities of and barriers to OER in the school context. While the scope of the survey went beyond this study, our focus here was only on the quantitative aspect of the barriers. As the social software of Open Discovery Space would be designed and developed according to the needs and requirements of the participants, a selection had to be made on the environments to be presented during the sessions. Each workshop presented one or more OER environments that focused on the curriculum areas or topics of the participants. As the intention was to explore the needs and limitations of collaborative and social functionalities, the selection of environments favored those with such functionalities. The most common OER environments demonstrated within the workshops included:

- OpenScout¹ – OER for business and management
- OSR² – Open science resources
- Discover the Cosmos³ – Astronomy resources
- Photodentro⁴ – Greek Digital Learning Object Repository

A total of 1175 individuals from 19 European countries returned the questionnaire. The respondents were mainly teachers in primary, secondary and higher education. Additionally, a number of students and policymakers responded to our survey. For the purposes of our analysis, we only included the responses from teachers, which resulted in $N = 754$ responses. The mean age of the re-

¹ <http://learn.openscout.net>

² <http://www.osrportal.eu>

³ <http://www.cosmosportal.eu>

⁴ <http://photodentro.edu.gr/jspui/>

spondents was 39.8 years ($SD = 10.00$), and 70% of them were female. The missing data patterns were analyzed, and multiple imputation was used to replace the missing data.

3.3 Data Analysis

The main variables used in the analysis were the five items on the scale of organizational ICT maturity, two items on the lack of motivation towards online collaboration, and the 13 barriers. Missing values were imputed for these data. The scale for organizational ICT maturity was calculated as the average of its five items, and the lack of motivation towards online collaboration as the average of its two items.

In order to construct latent variables to represent barriers to social OER environments, an exploratory factor analysis (principal axis factoring) was performed. The correlation of the extracted factors was permitted by using the promax rotation. The Kaiser-Meyer-Olkin measure of sampling adequacy greater than .600 and a statistically significant Bartlett's test of sphericity were expected to suggest that the factoring of the barriers would be possible. We tested different extraction and rotation methods to confirm the robustness of the resulting factor structure. The latent barrier variables revealed by the exploratory factor analysis were calculated as the mean of the variables, which were chosen for their factor loadings and contextual similarities. Cronbach's alphas were calculated to confirm the internal consistency of the scales. In addition to alphas, we reported the factor score covariances of the

factors (true reliability). In constructing the summated scales, averages were used instead of factor scores because the study was exploratory and we wanted to retain the original scale of one to five.

To predict the lack of motivation towards sharing and collaboration, we constructed two linear regression models. The first model included the control variables, which were the age and gender of the respondents, and the ICT maturity of the organizations. At this point, the model included 730 responses due to missing values, which could not be imputed. The second model included the sum variables representing the latent factors of the barriers towards increasing adoption of social OER environments.

The results of our inspection are presented in the following sections.

4 RESULTS

4.1 Factor Analysis of OER Barriers

The Kaiser-Meyer-Olkin measure of sampling adequacy for the OER barriers was .859, and the Bartlett's test of sphericity was statistically significant ($p < .001$). The promax rotated factor matrix is displayed in Table 4. The first factor included items associated with lack of organizational support for OER and explained 36.6% of the total variance. Lack of organizational support therefore consisted of lack of support for using OER, lack of training on how to apply OER for one's own work, an organization does not dedicate enough time to apply OER, lack of

TABLE 4
Factor Loadings for Exploratory Factor Analysis of the Barriers

Barriers for sharing and collaborating in social OER environments	Factor		
	1	2	3
Lack of support within my own organization on how to use digital educational resources	.82	-.08	-.13
Lack of training on how to use digital educational resources for my work	.63	-.02	.15
Lack of common practice - People are not accustomed to use and share digital educational resources within my organization	.57	.09	-.03
Do not have enough time to use digital educational resources	.55	-.02	.09
Lack of reward for the efforts made (e.g. not getting paid extra to prepare digital educational resources)	.39	.08	.09
"Language is the key". I only want to contribute to online communication/collaboration when my own native language is used	.06	.71	-.19
Digital educational resources should be available in my own native language	.11	.58	-.02
Challenging to apply digital educational resources which are culturally distant (values, symbols, beliefs etc.) from my own.	-.13	.68	.02
Impact of cultural and geographical distance - Lack of trust towards authors of digital educational resources	-.05	.54	.18
Digital educational resources do not give enough information on the context where it is / was created and used	.12	.39	.12
Hard to judge the quality of digital educational resources without spending time evaluating them	-.07	-.05	.92
Hard to judge the quality of tools and services (around digital educational resources) which I'm unfamiliar with	.07	-.01	.67
Difficult to find relevant digital educational resources for my purpose	.28	.09	.40

Note. $N = 744$. Highest factor loading is in boldface.

common practices for using OER. Lack of reward for efforts in using OER had a slightly lower factor loading and was excluded from the sum variable.

The second factor included items associated with language and cultural barriers and explained 11.4% of the total variance. The factor combined language challenges regarding collaboration in the social platform and resource availability in one's own native language. It also included cultural and context-related barriers regarding the cultural distance of the resources and the impact of such distance in relation to trust in other authors. Resources that did not give enough contextual information on origin and use were also associated with this factor, but the item was not used for the sum variable calculation because its factor loading was smaller.

The third factor included two items associated with the difficulty of assessing the quality of educational resources and associated services. The next item on the third factor was also associated with the difficulty of assessing the relevance of the resources and was hence included in the third factor despite its smaller loading and cross-loading on the first factor. These barriers explain the challenges of assessing the quality of resources and services as well as finding relevant resources for one's own purposes.

The additional barriers chosen for the exploratory inspection were left out from the remainder of the analysis because of the methodological decision to apply factor analysis. These included barriers to integrate the retrieved OER with one's own curriculum as well as IPR challenges. The loadings of those barriers were too low to be included. However, this does not imply that they would not have significance in terms of adoption of social OER environments. This should therefore be an aspect of further research on the topic.

The descriptive statistics of the five constructed sum variables are displayed in Table 5. Internal consistencies (Cronbach's alpha) of the scales were all sufficient (over .70). We chose to calculate the sum variables as means of the items instead of using factor loadings as regression weights as this was an exploratory study and we wanted to preserve the range of the original questionnaire items.

The means of the three factors were all slightly under the midpoint scale of 3.00. Language and cultural barriers recorded a mean of 2.86; lack of organizational support recorded a mean of 2.82, and the barrier of assessing the quality of resources and services recorded 2.94. The variable representing the focus of our study, lack of motiva-

tion towards OER collaboration, had a relatively low mean of 2.35, and the ICT maturity of the organizations, as reported by the respondents, had a relatively high mean 3.90.

4.2 Predictors of Motivation

To predict the lack of motivation towards sharing and collaborating, two linear regression models (Table 6) were used. From the first model, it was evident that the ICT maturity of the organization was associated with the lack of motivation towards OER. This implied that higher ICT maturity of an organization reduced motivational barriers. However, the amount of variation explained by Model 1 was low, only $R^2 = 2\%$. The second model increased the explained variation to $R^2 = 26\%$ and allowed for an elaboration of the predictors of lack of motivation towards sharing and collaborating in social OER environments.

The findings suggest that language and cultural barriers are the best predictors of lack of motivation. This tells us that the less challenges a teacher experiences in relation to language and culture, the higher the motivation to share his/her own resources and collaborate in a teacher community. Another crucial finding is that lack of organizational support and quality concerns also influence motivation although not as strongly. Organizational support and efforts to improve quality mechanisms in social OER environments therefore have a strong influence on reducing these barriers. The findings finally suggest that on its own, the ICT maturity of an organization cannot predict lack of motivation as implied by the first model.

5 DISCUSSION

The key results implied that language and cultural barriers showed the strongest influence on lack of motivation. Lack of organizational support and quality concerns also showed a strong influence in decreasing motivation. As for language and cultural barriers, the focus was on the language of the resources, the language of collaboration, the cultural distance of the resources to one's own context and the cultural distance of OER authors. These findings are in line with existing research especially on knowledge sharing and collaboration over distance where culture has been one of the strongest inhibitors of knowledge sharing [22], [23]. Also, existing qualitative

TABLE 5
Descriptive Statistics of the Sum Variables

	<i>N</i>	rel	α (items)	Mean	<i>SD</i>
Lack of motivation towards online collaboration	742	–	– (2)	2.35	1.17
ICT maturity of the organization	749	.81	.78 (5)	3.90	0.75
Lack of organizational support	751	.82	.75 (4)	2.82	1.02
Language and culture barrier	752	.76	.72 (4)	2.86	0.99
Barrier for quality of OER and services	746	.84	.77 (3)	2.94	1.09

Note. rel = factor score covariance. α = Cronbach's Alpha. *SD* = Standard Deviation. Range for each scale is 1–5.

TABLE 6
Predictors of Lack of Motivation towards Sharing and Collaborating in Social OER Environments

Variable	Self-reported lack of motivation towards OER online collaboration		
	Model 1 B	Model 2 B	95% CI
Constant	3.008**	0.447	[-0.158, 1.052]
Age	0.002	-0.001	[-0.009, 0.006]
Gender	-0.013	-0.002	[-0.163, 0.160]
ICT maturity of the organization	-0.191**	-0.025	[-0.304, -0.077]
Lack of organizational support		0.213**	[0.118, 0.308]
Language and culture barrier		0.314**	[0.230, 0.399]
Barrier for quality of OER and services		0.189**	[0.104, 0.275]
R ²	.02	.26	
F	3.75*	43.00**	

Note. N = 730. CI = confidence interval.

* p < .01. ** p < .001.

research on OER has elaborated on the strong role of culture in the adoption of OER [2], [26], [50]. The language of collaboration or OER resources has only been discussed in OER research to the extent of the language of the resources [2], [7]. Previous study by Vuorikari and Ochoa [54] on cross border OER discovery interestingly pointed out that every fourth tag entered by a user is not in his/her mother tongue. Therefore, discussion on interventions for language and cultural barriers should not exclude the use of foreign languages in social OER environments.

The findings of our study indicate that the language used for collaboration in OER environments should be taken into account when discussing barriers to OER. This is especially the case when the OER environments build upon services for communication and collaboration, e.g., social networking and collaborative adaptation. The finding of contextual information attached to resources was heavily correlated with language and cultural factors but was not included in the sum variable because of the smaller factor loading (< .40). Despite being highly related to how teachers perceive resources that are created or used in a context that is distant from their own, the item should still be discussed because of its strong correlation. Existing initiatives have shown efforts to specify the right amount of cultural and contextual information as part of the metadata provision for OER [19], but the issue has not been elaborated in detail in OER research. However, Davis et al. [26] described how OER should contain rich information to describe where the material was used, how it was used, and where it is supposed to be used. We argue that OER initiatives should consider as much rich metadata as possible for lowering any perceived barriers to culturally distant OER.

Another important finding of the study was the strong connection between organizational support and motivation. This finding is supported by the study of Kalb et al. [43] that top management support has positive influence

on the OER sharing intentions of researchers in social networking services. The finding is also supported by Igharia et al. [55] on personal computing performance in small firms. However, our focus of organizational support differs from these studies. While our exploratory study indicated that lack of support, training, allocated time and common practices form the organizational barrier, the focus and context differ in related studies. The study of Igharia et al. [55] addressed only the role of top management support. The study of Lin [56] addressed organizational knowledge sharing and organizational support from the perspective of encouragement and expected participation in knowledge sharing. The similarity was in the allocation of support, while the hypotheses of the confirmatory approach were not comparable with our study because of the lack of a viewpoint on motivation. Similarly, various studies on knowledge sharing have been undertaken but do not focus on OER and related social environments, e.g., while Karahanna [57] and Venkatesh and Bala [58] addressed training, it was in the context of technology acceptance. While lack of rewards was not used for the sum variable, similar to lack of contextual information, it should be discussed because of the strong relation to the factor. Gao et al. [48] explained that rewarding mechanisms should be developed to increase motivation for sociability aspects of social software. In terms of OER, Hylén [9] elaborated that for educational institutions, the lack of a rewarding system was one of the most critical barriers to devoting time to produce OER. Our results indicate that the lack of allocated time is part of the factor of organizational support. Such a barrier was previously elaborated by Hylén [9] and Humbert [32] in the context of OER. However, the findings of this study indicate that the role of common practices, allocation of time and provision of training significantly increase the motivation to share and collaborate in social OER environments in addition to the previously addressed management support.

Similar to organizational support, quality aspects included in the study influenced the motivation of teachers. During the expert discussions in the pre-phase of the data collection, a new barrier was identified that related to the difficulty of assessing the quality of tools and services. This barrier is new and discusses how teachers might find it difficult to assess the value of the social and collaborative tools and services of the environment. This issue becomes especially relevant when teachers are not accustomed to using social software. As elaborated by Zhang [24], there might already be existing competitive networks. Therefore, teachers must consider and spend time evaluating whether the adoption of a new tool is beneficial. In our study, the relevance of the resources remained part of the sum variable even though the factor loading was relationally smaller compared to the assessment quality of the resources and tools. While we cannot fully explain why the loading was smaller, the existing literature shows a strong connection between the quality and relevance of OER. Hylén [9] elaborated on the issue of assessing the quality and relevance of OER as one of the fundamental challenges for OER. Similarly, Hatakka [7] elaborated that quality relates not just to relevance but also to correctness, coherence, context, differences in opinion of the subject, and so forth. Therefore, as also shown by Clements & Pawlowski [10], the relevance of OER should be considered when discussing the variety of issues relating to quality.

The influence of ICT maturity on motivation was shown in the first linear regression model. However, the inclusion of the barriers in the second model reduced the influence and implied a non-significant correlation. However, we should consider whether a mediating effect through organizational support could exist on the basis of the initial finding of the influence on motivation. One explanation could be that ICT-maturity increases as more organizational support is given, e.g., increase in the competence of individuals and the organizational unit, as more training or other types of support are in place.

Another crucial remark has to do with the significance of lack of motivation within the sample. As indicated, the mean of the latent variable was rather low on the significance scale and could be interpreted as a minor issue for respondents. Before jumping to conclusions on what this means, we must understand the context of the data collection. The set of workshops organized across Europe mostly relied on enthusiastic teachers to participate in our sessions through invitations or co-located events. One could argue that the participants were already motivated or interested as they participated in the sessions. Naturally, this can have an impact on the results.

The focus of our study was to see which barriers could predict lack of motivation. It is important to also discuss how the respondents perceived the barriers in general. The challenge for assessing the quality of the resources and services was perceived as the strongest barrier while the mean (2.96) did not imply that the selection of teachers was a highly significant problem. Language and cultural barriers were, in general, regarded as a bit less critical (2.86), and organizational support attained a rather

good level (2.82). From an in inspection of the predictors of motivation, we see that the means of the barriers are in line with the target barrier of motivation. Higher perceived lack of motivation would have implied more significant barriers. It can be interpreted that the respondents were rather motivated and had sufficient support; did not feel a strong cultural distance in terms of using resources created in a foreign context or to engage with an unknown online community; and did not think it was too demanding to assess the quality of the resources or tools. The results on ICT maturity indicated that the teachers regularly applied ICT in their work.

5.1 Limitations

There are some limitations to our study that should be addressed. The width of the exploratory study cannot explain all factors that influence motivation. The study could not take into account all potential barriers in the final survey, which targeted teachers. We do recognize the variety of challenges that relate to re-use and adaptation of OER [10], [50], which have not been addressed in detail in our study. Since these limitations were recognized before the study was initiated, the decision was made to specify the focus of our inspection through the explained focus group procedure. Another limitation relates to the data collection method through face-to-face workshops across Europe. The teachers were mainly invited to take part in such events and mostly motivated or active teachers attended. Such a sample does not necessarily represent the entire teacher community and the barriers they perceive. Our study highlights the perceptions of teachers from both school and university contexts. We acknowledge that the practices between these contexts differ and additional influencing factors for motivating teachers might well differ.

5.2 Theoretical Contributions of this Study

This article describes some of the key barriers to uptake of social OER environments and shows how those predict lack of motivation. By the factors identified within this exploratory study, we were able to determine OER-specific constructs. The statistical analysis showed that the reliability of the constructs was good, which is a requirement for construct validity. The items were also contextually closely related to each other, therefore being understood as depicted by the regression. Existing constructs do have similar focus points, as addressed by Igarria et al. [55] in relation to management support and Lin et al. [56] in terms of organizational support measures, but they do not highlight or reflect the challenges addressed by the OER domain as well as teachers when they collaborate and share in social OER environments. As an example, the identified factor for organizational support combines many of the mechanisms that organizations can apply to increase the level of support.

As outlined in the theoretical background, the existing research on OER does not provide evidence of the factors that influence motivation in the context of social OER environments. Studies that address motivational factors

or willingness to share in other contexts, such as in organizational knowledge management, NGOs or in open approaches such as Wikipedia, are not applicable to OER as such. While previous studies have showed similar predictors of successful knowledge sharing between these contexts, teachers' engagement to OER environments lacks the organizational and team view that organizational knowledge sharing hugely relies on. While collaboration around OER can be specific to certain individuals that share with each other, the principles of openness aim towards wider access. In addition, the artefacts being shared differ since in OER these vary from learning materials teachers have created to ideas about improving pedagogy. Existing studies on OER have often raised the delicacy of sharing such personal knowledge as own teaching assets [3], [7]. Especially because of the general lack of awareness about IPR and re-use [2]; what is allowed to be shared online without getting in to trouble or even violating institutional regulations. These OER-specific issues do point out the need for studying motivational factors even further. The influencing factors identified within this study do not consider the whole spectrum of motivational factors but do contribute to setting the basis for such research.

5.3 Recommendations for Overcoming Lack of Motivation in OER Uptake in Schools

We can argue that the findings cannot necessarily be addressed and overcome by one entity in the educational domain, e.g., a teacher or educational institution. The implications for practice can be discussed both from the perspective of an OER provider as well as that of an educational institution. If we consider an OER provider and developer of social software for OER, only a few of the related challenges can be addressed, namely, quality of services, provision of meaningful and rich metadata for resources, and striving for multilingualism and good coverage of resources in the native languages of users. The importance of mechanisms that improve the quality of resource discovery as well as the access and usability of social OER environments should not be underestimated. Through the widespread adoption of mobile devices and tablets by learners, the preparation of OER as well as access to the environments have to comply with new hardware-influenced requirements [59]. The exploitation of recommender systems and linked data are promising to improve information discovery and precision [60]. Recent efforts that seek to improve recommender systems and to support large-scale learning analytics by combining social and usage data from different learning environments are an important step forward for users to find relevant material that fits their context and language requirements [61]. Similarly, the work on social tagging [54] addresses the same requirements and can help with reducing some of the language and cultural barriers.

From an organizational point of view, there are many steps an educational institution can take to foster motivation. One of the key lessons on knowledge sharing is the

organizational adoption. As emphasized in several studies on organizational knowledge sharing, striving towards same goals and reciprocity are key enablers [12], [28], [29]. Such adoption and organization-wide adoption of OER environments is not common but would be likely to increase the uptake. Additionally, organizations should provide a common ground and an overall practice/strategy for OER and ensure that each teacher has proper training and an adequate amount of time to learn how to apply OER. While our study does not provide an answer to this, we can emphasize the impact of dedicated support and common practices of OER in lowering some of the language and cultural as well as quality barriers. As argued by Hatakka [7] and Chen [2], lack of awareness is a serious challenge. In many cases, challenges might seem bigger than they actually, especially when a new system or form of sharing is introduced with little information or prior experience. As an example of organizational activities that increase awareness, OER training could be designed to introduce teachers to the contextualization and adaptation of existing resources for their own purposes. Emphasis could therefore relate strongly to the usage of collaborative services and adaptation mechanisms for this purpose. Such activities could build stronger awareness of the possibilities and limitations of social OER environments and could finally make it easier for teachers to assess the appropriateness and quality of resources and services.

6 CONCLUSION

In this paper, we have addressed OER barriers in one of the first quantitative studies on the topic. Through regression and exploratory factor analyses, we were able to define how the inspected barriers influenced lack of motivation. Our focus was on social OER environments where teachers are the main users. The results indicated that language and cultural barriers were the strongest predictors of lack of motivation. An almost similar level of influence was identified in lack of organizational support and quality aspects. These findings provide evidence of measures that both OER providers and educational institutions can take. Through this research effort, providers and educational institutions can likely lower those challenges that negatively influence the motivation of teachers to share and collaborate in social environments around OER.

Our intention is to enhance discussion in the educational domain on whether existing theories can actually explain the adoption decisions and actions around OER environments that strongly rely on social software functionalities and services. The identified constructs can be incorporated as part of future research in confirmatory studies to determine whether existing theories could be enriched with aspects that explain OER phenomena. As part of future research, the focus should be on separating the perceptions of behavior from actual behavior. As explained in the theory of planned behavior [42], the actual behavior of an individual depends on various influencing factors, from attitude towards behavior and perceived

behavioral control to subjective norms. As this study set an exploratory approach to identify barriers that can influence lack of motivation, it would be crucial to address a theoretical verification of these findings to estimate and capture actual behavior around OER. As elaborated by Ajzen [42] and Triandis [62], social factors and normative beliefs that describe social pressure or what is expected behavior in a particular role and context are important factors in studying user behavior. These aspects should be incorporated in follow-up studies on motivational aspects in social OER environments. As educational systems and practices vary between many countries, OER integration and adoption might also vary. Regarding upcoming research on this, an understanding of whether some of the predictors of motivation are more specific to certain countries would be beneficial.

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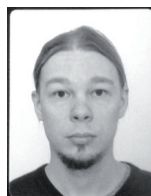
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by

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Overcoming Cultural Distance in Social OER Environments

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Keywords: Barriers, culture, TEL, cultural distance, social software, OER

Abstract: Open educational resources (OERs) provide opportunities as enablers of societal development, but they also create new challenges. From the perspective of content providers and educational institutions, particularly, cultural and context-related challenges emerge. Even though barriers regarding large-scale adoption of OERs are widely discussed, empirical evidence for determining challenges in relation to particular contexts is still rare. Such context-specific barriers generally can jeopardize the acceptance of OERs and, in particular, social OER environments. We conducted a large-scale (N = 855) cross-European investigation in the school context to determine how teachers and learners perceive cultural distance as a barrier against the use of social OER environments. The findings indicate how nationality and age of the respondents are strong predictors of cultural distance barrier. The study concludes with identification of context-sensitive interventions for overcoming the related barriers. These consequences are vital for OER initiatives and educational institutions for aligning their efforts on OER.

1 INTRODUCTION

Open educational resources (OERs) and practices to increase the sharing behavior of both educators and learners have been widely discussed in the domain of technology-enhanced learning (TEL) in the recent years. Online OER environments have been receiving attention because they serve as platforms for educators and learners to search and collaborate in. While many initiatives have been rather successful in keeping their OER environments in linear growth with increased amounts of published learning objects (Ochoa, 2009), maintaining active participation in and use of the OER environments remains the key challenge (Chen, 2010; D'Antoni 2008; Yuan et al., 2008). Existing research has been discussing various barriers that hinder or negatively affect OER adoption and use in teaching and learning activities. Such barriers relate to lack of awareness of OER and related copyright and intellectual property issues (Chen, 2010; Yuan et al., 2008; Hatakka, 2009), Institutional regulations and restrictions (Yuan et al., 2008; Hatakka, 2009), quality of resources (Hatakka,

2009; Richter & Ehlers, 2011), and so on. As indicated by Chen (2010) and Hatakka (2009), not all challenges become significant, and barriers can be highly context-dependent. Therefore, many challenges could occur depending on the types of educational practices in the region or country and depending on the background, experiences, and perceptions of the educators and learners. One of the crucial topics for OER is cultural distance. As depicted by Hatakka (2009), cultural expressions also pose a challenge for understanding where language plays a strong role in inhibiting factors of OER.

The OER movement must consider the implications of knowledge sharing carefully, as many initiatives are basing their OER services and environments on social software-like functionalities that place educators and learners as key users to share, discuss, and collaboratively work on OERs (Ha et al., 2011; Sotiriou et al., 2013). Knowledge sharing is implying, in this case, not only sharing of OER but also the collaborative practices around the resources. The established connection between social software and OERs to social OER

environments can have multiple potentials. As indicated by research on social software in provision of teaching and in pedagogy, these services can provide positive learning outcomes and intriguing experiences for both educators and learners when applied to teaching practices (Hall & Davison, 2007; Wever et al., 2007). However, the connection to OER places educators even more in a key role in OER environments with a strong focus on functionalities for networking and collaboration. Such environments build on international educator and even learner communities, providing materials across subject areas of the curriculum in various languages. As elaborated by Lai and Chen (2011) and Zhang (2010), adoption of specific social software services might be highly country dependent because of differences in culture and context. As argued by Agarwal (2007), there are various challenges to knowledge sharing while so-called cultural distance becomes highly important in a context where people deal within online social environments. The finding is in line with the studies of Noll et al. (2010) and Pallot et al. (2010) that deal with collaboration across distance. However, the current literature has been very limited in studies that could inform the domain regarding how strong those cultural barriers are perceived across nations, within educator and learner communities that adopt these social OER environments. Such information is necessary for any educational institution or educator evaluating the suitability of the OER environments to own purposes. This information is also vital for OER providers to understand the barriers for their end users and the circumstances around those challenges.

We address this gap by the means of a large-size exploratory study ($N = 855$) to inspect how strongly cultural distance barrier is perceived by teachers and learners in primary and secondary schools across Europe. Within our inspection, the aim is not to define culture or different types of influencing factors for it. However, we aim to understand in a cross-national view to what extent teachers and learners perceive cultural distance when dealing with OER online social environments. In addition to observing the barriers of cultural distance, our study strives to understand possibilities to overcome such barriers. These interventions are discussed on a technical and nontechnical level to describe the possibilities for OER content and technology providers as well as educational institutions.

The structure of the paper is as follows. The next section describes the theoretical background for culture and social software focused OER. Then, we

will describe the methodology for the study. The results are presented in the fourth section, followed by the discussion of the results. The paper concludes by describing the limitations of this study as well as the key contributions to both research and practice.

2 THEORETICAL BACKGROUND

OER has been a widely discussed topic since 2002 when UNESCO coined the term in a global OER forum. OER was described (2002) as “technology enabled, open provision of educational resources for consultation, use and adaptation by a community of users for non-commercial purposes.” The research on OER has been focusing on potential usage in varying contexts, ranging from higher education (Yuan et al., 2008) and schools (Richter & Ehlers, 2011) to the corporate world (Manisha & Bandyopadhyay, 2009; Ha et al., 2011). Those cross-context studies are often connected to barriers or challenges that hinder OER adoption. These barriers are discussed on various levels, on the missing organizational support mechanisms (Chen, 2010; Yuan et al. 2008), lack of infrastructure and proper hardware (Chen, 2010; Hatakka, 2009), lack of quality of the resources as well as in the provided services (Clements & Pawlowski, 2011), and so forth. Existing research is yet to define in which contexts and even in which countries or regions certain barriers are likely to occur. One of the key issues in the literature that could explain contextual differences is culture and specifically, culture of OER sharing (Davis et al., 2010; Richter, 2011).

As argued by Kroeber and Kluckhohn (1952), there is no definite concept of culture. Scheel and Branch (1993) provided one possible description for it as a manifestation of patterns of thinking and behavior relating to social, historical, geographical, political, economical, technological, and ideological environment. Studying cultural factors or differences for TEL is not an entirely new focus. Richter and Pawlowski (2007) studied standardization of context metadata within e-learning environments. They defined *cultural metadata* and showed a number of factors concerning language, which is one of the key cultural factors. Those range from language, communication style, specific symbols, attitudes and perceptions of learners and educators, and culture-specific idioms, to more technological issues, such as types of date and time formats. As elaborated by a number of researchers, studying cultural differences

can be problematic. Church and Katigbak (1988), e.g., argue that while “one needs culture-comparable constructs to make cross-cultural comparisons, their use may distort the meaning of constructs in some cultures or miss their culture-specific aspects.” Goldschmidt (1966) even goes a step further, claiming that it generally is inappropriate to compare cultures at all, as every “institution” needs to “be seen as a product of the culture within which it developed. It follows from this that a cross-cultural comparison of institutions is essentially a false enterprise, for we are comparing incomparables.” As a consequence, most culture comparisons are limited to value systems, as there is a hope that there are general values, which at least play a certain (even if not exactly the same) role across most of the human societies. However, in such investigations, the position of the researcher rarely is neutral, as the perspective taken to choose particular values for comparison already is culturally biased. In a multinational study, Schwartz and Bilsky (1990) investigated 36 values in comparative culture research and found that just seven of those had the meaning of values across the investigated contexts. In order to overcome this challenge, we focus on educational contexts and define culture, according to Oetting (1993), as “customs, beliefs, social structure, and activities of any group of people who share a common identification and who would label themselves as members of that group” (herein, perceptions of educators and learners in the educational context).

Henderson (2007) described how the process of preparation of e-learning materials demands the analysis of cultural influence, especially when the separation of local, national, and international context of usage can be identified. Such separation of contextual modes is becoming even more prominent for OER as initiatives strive for aggregation of existing repositories or databases in one single access point (Ha et al. 2011; Sotiriou et al., 2013). Additionally, social interaction and collaboration mechanisms are crucial components of such environments, and they increase cultural influence. One way to address such cultural influences is to focus on cultural distance. The concept of cultural distance depends on the recipient’s perceptions on how strong the difference between the home culture and host culture are; the greater the perceived difference, the more difficult it is to establish a relationship (Ward et al., 2001). As an example, such distance can be perceived when educators or learners try to adopt OERs or teaching practices that are exceptional or unfitting to their

own context. Another case of clashing home and host culture could be when an educator is doubtful of joining a relevant conversation with a colleague from a distant location because it would not take place in her mother tongue. Investigating cultural distance provides information that crucially is required to decide when conflicts may occur in OER environments. In the context of OERs, cultural distance becomes a highly relevant issue when educators and learners shall use OERs from different contexts; being constantly exposed to potential learning materials and forms of collaboration that may not fit to their own preferences of working and learning or take place in their own native language.

Recent research in the educational domain shows the increasing interest toward social software. Social software can be described as a set of tools to enable interactive collaboration, managing content, and networking with others (Wever et al., 2007). While the application of social environments has been discussed as a support mechanism for pedagogy (Lai & Chen, 2011; Hall & Davison, 2007), the connection to OER is rather emerging. The focus of social and collaborative services in OER environments sets educators as key users of the environments. Such “collaborative content federations” (Ha et al. 2011; Sotiriou et al., 2013) often provide materials in various languages, while the environments are not equally translated to support international users. While language skills and preferences vary across educational level and countries, the preferences of educators and learners in terms of language or collaboration are not well known. As elaborated by Agarwal et al. (2007), knowledge-sharing activities of teachers and learners can be highly influenced by culture. Similarly, Noll et al. (2010) and Pallot et al. (2010) evidenced that culture and language distance are two of the strongest barriers in distributed collaboration, and this sets the focus for our study.

OER as well as social software research focuses on understanding particular barriers in order to overcome them. Solutions and interventions have been suggested as possible mechanisms to lower the barriers (Chen, 2010; Yuan et al., 2008; Hatakka, 2009), such as technology and policy-related strategies to be implemented (Chen, 2010) or short-to long-term drivers or enablers from cooperation to OER development (Yuan et al., 2008). Within this paper, we aim to determine mechanisms for lowering the barriers of cultural distance.

3 METHODOLOGY

Our study targeted school education, focusing on teachers and learners in primary and secondary schools across Europe. The aim was to find out 1) how far cultural distance is perceived as a barrier against the use of social OER environments, and 2) how to overcome such barriers.

In our study, we first investigated cultural distance barriers in general, by asking teachers and learners for their experiences regarding the use of (selected) social OER environments; we wanted to know which aspects in particular were understood as the major barriers against the use of existing OER environments. Second, we asked the participants to determine the improvement potential for the experimentally used social OER environments, in order to identify possible interventions that would be appropriate for overcoming the found barriers.

3.1 Operationalization of “Cultural Distance Barriers”

To address cultural distance barriers and to observe which aspects can predict its significance, a decision was made to operationalize related barriers into this one latent factor. The focus of the source literature has not fully covered all of the barriers to a culture of sharing and collaborating in OER environments. As discussed, studying cultural influence factors in a holistic setting is impossible because of the wide variety of cultural aspects and the lack of knowledge regarding their distinction (dependencies and interrelations). The approach for the operationalization and selection of related challenges was set based on the previously presented understanding of cultural distance by Ward et al. (2001). For our investigation, we focused on barriers that are related to aspects of sharing and collaboration in social OER environments, the language of collaboration, and the distance of the identified OERs they come across.

As the found literature has not focused on social OER environments, modification of approaches to analyze barriers was necessary. A particular barrier towards cultural distance that was found in the literature was related to knowledge sharing and collaboration (Noll et al., 2010; Pallot et al., 2010). This barrier was related to language component of cultural distance, as well as the perceived difference of the home and host context. As a common language is one of the greatest challenges for

organizing distributed work (Noll et al., 2010; Pallot et al., 2010), we focused on this in our context. In our setting, teachers and learners are connected within an international community. The first item for our survey was therefore: “Language is the key”. I only want to contribute to online communication/collaboration when my own native language is used (based on Noll et al. (2010) and Pallot et al. (2010)).

Richter & Ehlers (2011) and Hatakka (2009) discussed that teachers might experience an unmanageable distance when adapting resources from other cultural contexts particularly regarding language and culture-specific idioms. The second item chosen for the survey was: Challenging to apply digital educational resources which are culturally distant (values, symbols, beliefs, etc.) from my own (based on Hatakka (2009) and Richter and Pawlowski (2007)).

Distance can also result from a lack of trust against the authors of the OERs (Hatakka, 2009; Pallot et al., 2010). While cultural distance can be perceived without geographical or temporal distance (Noll et al., 2010), the notion of geography was included in the item to highlight the very likely geographic dispersion of users in the social OER environment. Thus, the third item was: Impact of cultural and geographical distance - Lack of trust towards authors of digital educational resources (based on Hatakka (2009) and Pallot et al. (2010)).

Another important issue that derived from OER research was that OERs often do not provide enough information on the context where they were created and designed for (Davis et al., 2010). This led to our fourth item: Digital educational resources do not give enough information on the context where it is / was created and used (based on Davis et al. (2010)). The focus was therefore set to study how the participants perceive OER that is created in a context that is distant from own, whether the distance has impact on the trust for the authors and providers of OER and if language plays a strong role for collaboration. The starting point of our analysis was, that these four culture barrier questionnaire items were indicators of a single latent factor.

3.2 Data Collection

The data collection was conducted within the scope of the Open Discovery Space project (ODS). The ODS (Sotiriou et al., 2013) is an EU-funded FP7 project that builds a social OER environment for the European school context around a federation of learning content repositories. In the context of the

ODS project, workshops for teachers and learners were organized. In the context of these workshops, existing social OER environments were introduced: OERs within their topics of teaching (and interest) exemplarily were used, and the potentials for adopting these environments were discussed. In the end of the workshops, the participants were asked to complete a questionnaire that addressed the particular challenges the participants experienced in this experiment and their expectations toward the upcoming ODS portal. The role of each workshop was to introduce the concepts addressed in the questionnaire. This ensured that the respondents were aware of what was asked from them.

One of the main parts of the ODS-questionnaire focused on aspects that we addressed as being related to cultural distance. The depth of the survey, however, goes beyond the scope of this paper. The instrument was operationalized with a total of 23 items and 10 open questions. Other parts of the questionnaire addressed organizational and quality-related OER-barriers that were derived from OER-literature. The purpose was to see which barriers the respondents perceive as most critical. The second part of the survey included open questions asking for enablers and interventions to overcome such challenges. The inspection was solely limited to perceived cultural distance because of its significance in the analysis of both quantitative and qualitative data.

Approximately 2300 educators and learners participated in 92 workshops in 19 European countries. While schoolteachers were mainly expected to participate, ODS invited students, educators from higher education as well as policy makers to understand the restrictions and possibilities for influencing the European education system. The selection of schools was based on the longitudinal engagement plan of ODS for the schools of each country. Most of the workshops took place in a face-to-face setting and were organized by the local project partners. Four workshops were conducted online through video conferencing facilities. Each workshop focused on one or more particularly selected OER environment(s). The main criterion for the selection of the OER environments was related to supported social functionalities around the educational resources. The most frequently demonstrated environments within the workshops were:

- OpenScout – OER for business and management (<http://learn.openscout.net>)
- OSR – Open science resources (<http://www.osrportal.eu>)

- Discover the Cosmos – Astronomy resources (<http://www.cosmosportal.eu>)
- Photodentro – A Greek Digital Learning Object Repository (<http://photodentro.edu.gr/lor/>)

In the study, 1175 individuals from 19 European countries actually completed the questionnaire (nonresponse rate of 49%). The countries were: Austria, Belgium, Croatia, Cyprus, Estonia, Finland, Germany, Greece, Ireland, Italy, Latvia, Lithuania, the Netherlands, Portugal, Serbia, Spain, and the United Kingdom. The respondents were mainly educators in primary, secondary, and higher education. Additionally, a number of learners and policy makers completed our survey. For the analysis herein, we excluded policy makers and participants representing higher education and only considered the responses of teachers and learners from primary and secondary school education (N=855). The reason was to avoid mixing differing contexts of higher education and schools together. Additionally, the interventions could also be discussed more accurately when restricting the focus to a certain context. Some questionnaires were only partially completed. Because this was particularly the case in Romania, we finally excluded the country's participants from the evaluation. The mean age of the respondents was 37.4 years (SD = 11.1). Among the respondents, 69% were female, and 83% were teachers.

3.3 Data Analysis

The previously discussed four questionnaire items were used in constructing a summated scale to represent the cultural distance barrier for the study at hand. The reliability of the items was confirmed using principal axis factoring. Factor loadings over .50 were expected, as well as loadings relatively comparable in size. The reliability coefficient of the cultural distance scale was calculated using both factor score covariance and Cronbach's alpha. After the reliability inspections, we proceeded to construct a summated scale by calculating the average of the four cultural distance barrier items. The average of all variables was used instead of factor loadings, because the study was exploratory and we wanted to retain the original scale (from one to five). Any missing values for the culture barrier items were imputed to replace missing data. The amount of missing values for the selected four items was between 6.1% and 7.2%. Analysis of the missing value patterns revealed no significant differences between the gender and the role of the respondents.

To explore the country differences regarding experienced barriers based on cultural distance, a generalized linear model (GLM) predicting cultural distance barrier was constructed. The fixed factors of the model were, in addition to the country of the respondent, the gender and professional status (teacher or learner). The age of the respondent was used as a covariate. An intercept was included in the model, which was full factorial, e.g., interaction effects between the fixed factors were also tested. The second part of our study was to look for potential interventions against the cultural distance barrier. This part of the survey applied open questions purposing to understand what could solve or lower the particular barriers reported by the respondents. The following open questions were applied to our survey for this purpose:

- “HOW COULD TECHNOLOGY SOLUTIONS AROUND RESOURCES SOLVE THESE PROBLEMS (E.G., ONES PRESENTED TO YOU/WHICH YOU TRIED IN THE WORKSHOP)?”
- “HOW WOULD YOU IMPROVE THE CURRENT SOLUTION?”
- “WHAT KIND OF HELP/TRAINING/TOOLS WOULD YOU NEED?”

Our intention was to find solutions to overcome the barrier of cultural distance. Key interventions against cultural distance barrier were found through clustering of the responses, which was accomplished with a focus on technical and organizational issues. The findings were understood as guiding steps for the ODS implementation.

4 STUDY RESULTS

The factor loadings for the four culture barrier questionnaire items that were derived in section 3.1 are displayed in Table 1. The Kaiser-Meyer-Olkin measure of sampling adequacy was .73, and Bartlett’s test of sphericity was statistically significant ($p < .001$). The single factor solution displayed in Table 1 had an eigenvalue of 2.2, and explained 56% of the variance of the four cultural distance barriers. The reliability of the scale using factor score covariance was .74, and Cronbach’s alpha was .72. The mean of the summated scale of culture barrier, calculated as the mean of the four items, was 2.65 (SD = 0.95), and both its theoretical and observed range was 1.00–5.00.

Table 1: Factor loadings for principal axis factoring of cultural distance barrier items.

Item	Loading
Challenging to apply digital educational resources which are culturally distant (values, symbols, beliefs etc.) from my own.	.71
Impact of cultural and geographical distance - Lack of trust towards authors of digital educational resources.	.69
Digital educational resources do not give enough information on the context where it is / was created and used.	.58
“Language is the key.” I only want to contribute to online communication/collaboration when my own native language is used.	.54

Note. $N = 861$.

The results of the general linear model predicting the barrier of cultural distance are displayed in Table 2. The number of observations for GLM was smaller than for Principal Axis Factoring, because six respondents had failed to report their age and were therefore removed from this analysis. From the main effects, age and country were statistically significant. Gender, role (teacher/learner), and the interaction effects between the fixed factors were nonsignificant. The coefficient of the model intercept was 1.88, and the upper and lower bounds of 95% confidence interval were 1.50 and 2.29, $p < .001$. The coefficient of the age was .01 [.01, .02], $p < .001$. In other words, the older participants were more likely to report a higher barrier of cultural distance.

Table 2: General linear model predicting cultural distance barrier.

Source	df	F	sig.
Corrected Model	55	3.6	< .001
Intercept	1	227.3	< .001
Age	1	15.8	< .001
Gender	1	2.9	.088
Country	17	4.7	< .001
Role: teacher/learner	1	1.5	.227
Gender × country	17	1.0	.483
Gender × role	1	2.6	.111
Country × role	11	0.8	.581
Gender × country × role	6	0.4	.867

Note. $N = 855$. Model R squared = .20, adjusted = .14.

The GLM revealed how the cultural distance barrier depends on the nationality and age of the respondent. Results also indicated how the roles of teacher or learner do not explain the barrier of cultural distance. This implies that teachers are not more likely to perceive cultural distance barrier than learners and vice versa. The mean of the cultural

distance barrier variable for learners was 2.52 (SD = 1.03), and for teachers 2.68 (SD = 0.93). For both males and females, the mean was 2.65, and standard deviations, respectively, were 0.93 and 0.96. The findings imply that the perceived cultural distance is not a barrier for majority but is likely to occur depending on the age and nationality of the teacher/learner.

The means of the cultural distance barrier variables between the countries are shown in Figure 1. Based on post-hoc analysis (least significant difference) we identified Croatia, Latvia, and Estonia to be the countries with statistically significantly high means as compared to the countries with relatively low means: Austria, Belgium, Spain, Finland, Ireland, the Netherlands, Portugal, and Serbia. The implications of these results will be discussed in the last section of this paper.

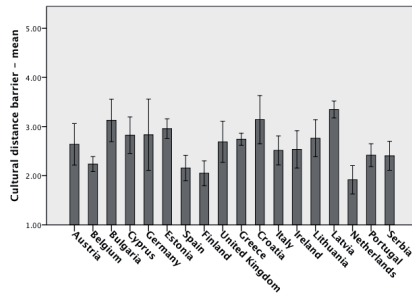


Figure 1: Country separation for cultural distance barrier. Smaller lines denote 95% confidence interval.

5 INTERVENTIONS

As previously explained, our research was not limited to investigating which parameters particularly affect cultural distance. In addition, we also studied interventions for the corresponding barriers. The answers we received on the open questions asking for potential mechanisms to overcome the barriers were related to both technological and organizational/contextual levels: Overcoming cultural distance barrier, firstly, regards the quality and suitability of the OER environment (technology) and, secondly, the community and OER initiatives themselves, as they act as change enablers toward new practices of sharing. In Table 3, both aspects for interventions are discussed.

In addition to the technical interventions, the respondents made recommendations to remove the barriers on the organizational level as well as the OER community-level (Table 4).

The results on interventions to potentially overcome or reduce barriers that are related to cultural distance indicate the key opinions of teachers and learners of our study. As shown in the technical dimension, the provision of functionalities as well as the variety of resources has to match the particular requirements and needs of the individual users. As presented in the previous section, not all users in the different European countries have the experience or are able to collaborate in a foreign language or to adopt OER that might be culturally distant. The key intervention seems still to be stimulating a change in OER knowledge-sharing practices by leading examples through the engagement and training activities of the OER initiatives that also provide the OER environments.

Table 3: Technical interventions.

	Key aspect	Explanation
Multilinguality	Resource availability in own native language	Many are unwilling or cannot handle foreign language
	Equal distribution of materials in different languages	Users need to have materials that are easy for them to apply
	Portal translated to own language	Shows that their language is important for the provider/developer
Functionalities	Methods for communication/collaboration	Synchronous/asynchronous, Formal/informal
	Sharing and collaborating	With anyone, With selected people/group/community
User interface	Intuitive and localized for specific user groups	Providing customized views for s/learners from different countries/regions
Metadata provision	Rich and versatile metadata	E.g., indicating clearly for each resource, the context where it is created/used
Trusted communities	Quality mechanisms, indicating when resources are from reliable and active source	Aiming to increase trust toward user/- generated content

6 DISCUSSION AND CONCLUSIONS

Within this paper we investigated the perception of cultural distance as a barrier against the use of social OER environments and ways to overcome those barriers. The perceptions of teachers and students from school education were in key role for defining whether they feel such cultural distance when using OERs and collaborating with international communities around those OERs. Our study focused on barriers against social software services that are provided for/within OER environments, creating social OER environments. As the understanding on how cultural distance barrier is perceived and how to overcome related challenges was rather limited, the findings of this study can provide a significant contribution to fill this gap. The results indicate how age and nationality affect the significance of cultural distance barrier. Younger respondents are more likely to experience a lower level of barrier when dealing with learning resources from and online collaboration with a distant culture. The results also evidence which of the 18 investigated countries' participants perceive cultural distance as a barrier. Interestingly, the professional role of the respondents did not significantly affect the perceptions towards cultural distance barrier.

The findings indicated that cultural distance is statistically significantly perceived as a barrier, particularly in the Baltic countries of Latvia and Estonia, and in Croatia. However, our study cannot explain why some countries had relatively low means in this context (e.g., Belgium, Spain, Finland, and the Netherlands). More research is needed to indicate the general validity of our results as well as to explain the reasons for the between-country deviations. While one argument could be that language skills and preferences differ between countries, such results might also be explained by awareness on OER in general. If the schools have a

strong background in using textbooks, a rapid change to apply and modify OERs provided by an international community might not be realistic or trivial. Such a basic change of thinking and towards practical ways to approach preparation of lectures and teaching can be problematic. However, the findings do indicate how applying OERs that are prepared in/for a specific national/educational context might raise even more significant barrier within another context.

The influence of age regarding the perceived impact of cultural distance barrier is an important finding as it has not yet been reported in the context on OER. However, Onyechi and Abeyasinghe (2009) reported similar results regarding the use of technology; they found that users under 35 years old are more likely to accept collaborative tools.

Regarding interventions against barriers that are related to cultural distance, we found both technical and nontechnical issues. The respondents elaborated on how social OER environments must fulfill their basic needs in terms of the quality of provided services and resources, and multilinguality. In order to generally reach a higher level of acceptance, OER initiatives should not just provide the technology for the OER usage but additionally foster the change toward openness in education. In this context, intense cooperation with the schools is required, e.g., approaching joint campaigns and collaborative efforts to contextualize/translate OERs for the contexts of the schools.

Our study and the related results have limitations: First of all, our results need to be limited to the context of school education, where the research took place. It is yet unclear to which extent those can be transferred to other educational scenarios. The participating schools were selected from existing networks of the partner organizations in the project. In many cases, only teachers from one specific area of the country participated. Thus, the sample might not be fully representative for all schools in the country. Additionally, we did not

Table 4: Nontechnical interventions.

Key aspect	Explanation
Translating/localizing resources to fit the context	Setting a group within small communities and schools to translate the best materials for that purpose into their own language. Setting contests that include translation/localization/adaptation tasks, rewarded by the ODS network in cooperation with the local schools. Rewards could be free access to events such as summer school, training events, or conferences.
OER initiative stimulating the creation of knowledge-sharing culture in schools	Teacher's practices still vary for sharing their resources as well as using resources provided by others, even within their own schools. This process should happen from the bottom-up and then expand to the European level. To create this culture of sharing resources, experiences, and competencies with others, the OER initiatives should motivate teachers on local, national, and international levels to do so by showing some good examples of collaboration across countries.
	OER initiatives should aim to be open communities focusing on support and experience exchange. Teachers and learners should feel a sense of belonging and be given something that they feel comfortable using. Otherwise they might feel afraid that they'll be criticized about what they wrote or contributed.
	OER initiatives should provide opportunities for teachers to attend international training events, in order to help overcome cultural barriers in trusting resources from different cultures, as well as to feel that they are members of an international community.

investigate the previous experience of the participants with OER. In retrospective, this might have been valuable information for both the analysis as well as the interpretation of the actually received results. We do acknowledge that the actual barriers differ between teachers in different contexts and educational institutions. However, this study focused on understanding to which extent teachers perceive cultural distance barrier when using OER environments, not to explain the types of barriers teachers face nor various cultural influencing factors that affect their behavior.

As the research was conducted as a part of the requirements analysis for the development of the social OER environment for the ODS project, the practical implications of our study are clear, especially for OER providers and developers: The results are relevant for any engagement activities with teachers and learners in similar OER scenarios. As OER provision through resource-/repository-federations becomes even more frequent, our results support the decisions on how to overcome some typical challenges. The results also give pragmatic suggestions to engage through the younger teachers as early adopters and community builders. Our findings can therefore help to significantly reduce efforts placed for the identification of needs and requirements of teachers and learners during the development of social OER environments.

Our contribution to research lies in the exploratory factor analysis conducted within this study. The identification of the factors representing barriers that are related to cultural distance provides a meaningful construct for future quantitative studies on OERs. Future studies on the topic could apply the proposed construct on variance models to verify and enrich existing theories on, e.g., technology acceptance. It would be important to address further studies to explain which barriers (e.g., lack of support within the organization, lack of awareness on OER) can predict barriers on the level of cultural distance.

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VI

COLLABORATING ON IDEAS: TACKLING BARRIERS TO OPEN EDUCATION

by

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Collaborating on ideas: Tackling Barriers to Open Education

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Abstract: This paper presents key issues around collaborative idea development in the context of open education. Current initiatives and solutions around OER have been successful in promoting the concept of openness that is now broadly recognized. However, the actual adoption of OER services and re-use of materials is a constant struggle. We present an alternative for managing OER development, taking a step back and starting from educational ideas. This paper conceptualizes the idea sharing activities, building on the strong foundation evidenced in other contexts for organizational knowledge sharing and social sciences. The study demonstrates the key possibilities and barriers for collaborative idea development by analyzing a series of focus group sessions (with 64 participants) conducted as face-to-face and online meetings.

Introduction

Collaborating around educational ideas is nothing new. Educators both in higher education and in school context have collaborated and exchanged ideas to build courses, educational activities, research and so on. Collaborative development of Open Educational Resources (OER) is one of the promising developments of Open Education and has been previously raised as an opportunity by several initiatives. Some of the initiatives have provided tools to manage collaborative work (Ha et al., 2011) while other have focused on leveraging communities to become active re-users of educational resources (Sotiriou et al., 2013). Sharing development efforts around OER and re-using previously validated and successful resources sounds wonderful in theory. However, educational initiatives have not been able to build movement around the collaborative practices around their systems and in fact, OER initiatives still struggle to have an active and interacting user base (Ochoa and Duval, 2009). Parts of this can be surely explained by various barriers on lack of awareness on OER, IPR issues and lack of time to spend for engaging within these environments (Chen, 2010; Hatakka, 2009). One of the re-occurring challenges is the usage and adoption of resources that are created by others in differing cultures and contexts (Hatakka, 2009; Richter, 2011). This unwillingness to adopt existing resources does not take away the opportunity to build on them and add your own unique ideas in but such practices do not seem to exist, at least visibly.

Thus it might be time for the OER community to take one step back and reflect how to boost re-use and sharing that leads to new services and resources. Idea sharing and motivation towards active knowledge sharing have been studied in various settings and such behavior is not a myth. The key motives for sharing in organizations have been evidenced to relate to reciprocity and striving towards same organizational goals that bring benefits for the employee in one way or another (Vuori and Okkonen, 2012). Some of the key motives to share in OER contexts are related to increase in personal publicity and altruistic motivation and so on (OECD, 2007). One question is whether an OER solution is created by a self-driven community and active educators based on altruistic motivation or by teams that work towards same goals and objectives. It is rather obvious that the latter is more likely to be more successful approach for facilitating sharing.

Based on these initial thoughts, our study focuses on two main questions:

- 1) Are educators interested on exploring collaboration opportunities around educational ideas and OERs with their peers (locally or even globally)?

- 2) Is openness and collaboration around OER more likely to take place when educators feel emotional ownership (Jones & Jordan, 1998) of the knowledge they create?

Within this article, we attempt to identify key issues that would support educators to get engaged to OER development in early phases when the ideas are yet evolving and not matured to OERs. We have addressed this issue by organizing a series of focus group sessions. We discussed with educators what keeps them and what would support them to get active on sharing educational ideas with the open education communities. This study allows us to explain knowledge sharing practices on open education that are not yet addressed within the educational literature. In specific, we address the key problems and enablers of such idea sharing practices. The results of this study are crucial for development of sustainable open education practices and services.

Theoretical foundation

The concepts of openness and transparency are in the core of the sharing educational ideas. The movement around open education has been largely based on Open Educational Resources (OER). UNESCO (2002) described OER as "technology enabled, open provision of educational resources for consultation, use and adaptation by a community of users for non-commercial purposes". While being gradually spread to new territories and being acknowledged by different institutions, the adoption of OER services and offerings has been rather slow (Ochoa and Duval, 2009) and educators have been mostly passive consumers of the resources and services (Hatakka, 2009). OER initiatives have recognized barriers to OER adoption. These are rather similar compared to the findings by OECD (2002), Clements and Pawlowski (2012) and Hatakka (2009). As environments around OER start to offer services and tools for collaboration and re-use of materials (Ha et al., 2011), educators are expected to get active knowledge sharers and OER movement faces a set of other challenges that need to be addressed.

As practices of open education are assumed to succeed in a collaborative manner, what seems to be missing are the lessons learnt from other domains where teamwork and striving towards same goals have long roots. One of such domains is organizational knowledge sharing that has been studied in the context of globally distributed teamwork (Noll et al., 2010) and in knowledge management (Riege, 2005; Vuori and Okkonen, 2012). From these studies we can identify some key success factors for knowledge sharing that clearly highlight relationships, reciprocity and striving towards shared goals.

The "not invented here"-syndrome keeps many educators from re-using resources created and shared by others (Agarwal et al. 2007; Hatakka, 2009). It has not been properly addressed in the field of open education so far. One possible way for addressing such a problem could be to strive towards stronger connection and collaboration processes where a binding to the knowledge created emerges as an outcome. Such "emotional ownership" describes the degree that individuals perceive that the knowledge belongs to them (Pawlowski, 2012) and has been studied for ownership of knowledge created in firms (Jones and Jordan, 1998) as well as in family businesses (Björnberg & Nicholson, 2012). The findings in these contexts are similar to the ones within organizational knowledge sharing, indicating that strong personal relations in a collaborative creation process of knowledge are key success factors for successful collaboration and lead to stronger bindings to the artifacts created. Within this paper, our aim is to firstly identify existing collaboration processes of educators. Secondly, we aim to explain what would enable them to engage in collaboration activities around open education, focusing especially on developing educational ideas to OER.

Methodology

As previously elaborated, the context of open education must look for alternative approaches for facilitating and increasing the uptake and re-use of OER. We have based our approach for building emotional ownership to the resources and the collaboration around those. In order to capture the perceptions of educators on idea sharing and collaborative OER development, a series of workshops was launched within Open Educational Ideas and Innovations (OEI2)-project¹. The project (LLP ERASMUS programme) deals with new ways for students and educators to share and collaborate on educational resources. The workshops were organized as a part of requirements gathering for 1) development of conceptual framework and 2) development

¹ <http://www.idea-space.eu>

of tools and services for idea-generation and sharing. A total of 6 workshops were organized within March 2014 from which 4 took place face to face and 2 were managed as online events through Adobe Connect-conferencing system. The face to face workshops were organized with local University participants in ECSP Europe Business School (Berlin, Germany), Duale Hochschule Baden-Württemberg (Heilbronn, Germany), Northern Lithuanian College (Šiauliai, Lithuania) and NCSR Demokritos (Athens, Greece). The online events were facilitated by University of Jyväskylä (Finland) and European Foundation for Quality in e-Learning (EFQUEL, Brussels, Belgium) with international participants around Europe. The workshops were mainly focused on the higher education context while some of the examples were given for school context within the event lead by University of Jyväskylä. For the purpose of this study, we will limit the inspection to higher education to increase the transferability of the research. Altogether 64 participants participated in the workshops that were organized in form of focus group sessions. Participants of the sessions were professors, heads of departments, lecturers, professionals, teacher trainers, researchers, project researchers and Ph.D students. Focus groups can be seen as a group interview that focuses on exploring the knowledge and experience of the participants (Kitzinger, 1995). Within such sessions, the approach taken for documenting the discussion becomes crucial and the success highly depends on the organization of the sessions (Kitzinger, 1995).

In order to comply with the guidelines of Kitzinger, all of the workshops were planned and organized with a unified methodology and approach. The basis for the empirical investigation within the focus groups was set by cross-disciplinary literature research on organizational knowledge sharing, focusing also on motivational and idea sharing related issues. As the OEI2-initiative builds on the foundation set by OER, the sessions were tightly connected to it. Each session was organized as follows: 1) introducing open education and practices around it, 2) Group discussion on how each of the participants has been dealing with open education and OER. Any collaborative practices around OER were discussed as well as developing courses together with peers and educator communities. Both of these were used as an example to consider sharing educational ideas that materialize to new resources and offerings. From the introductory part the session proceeded to 3) Introducing the key concepts of open educational ideas, 4) group discussion on the following topics around OEI: who would you share your educational ideas with? In which situation would you share your ideas? How would you share the ideas? Which tools would you prefer? What is the best way to express new ideas and innovations? How would you structure your collaboration process? The discussion topics were derived and influenced by the literature presented within this article. For each of the topics, potential context-related issues and barriers were discussed.

The discussions were recorded and analyzed for the purpose of this study. The analysis followed the qualitative content analysis guidelines by Mayring (2000). Qualitative content analysis is an empirical, methodological controlled analysis that follows a set of rules and step by step models (Mayring, 2000). The analysis was accomplished by deductive category development as the objectives and aims of the study were derived from existing literature on knowledge sharing. The results of the investigation are presented below.

Findings

The key findings from the focus groups can be categorized to topic areas. Firstly, there are common patterns identifiable under which conditions and situations educators would share their ideas. This includes contextual issues, who they are likely to share with, where this would take place and so on. Thirdly, commonalities can be seen how educators would like to structure their idea sharing process and the tools they would use for doing so. The findings indicate barriers and issues that inhibit sharing of educational ideas, relating to the topics above. From the 64 participants, only 3 had previous experience on collaborative development of OER. Only a handful of the participants had been engaging in activities where courses are developed in a collaborative manner while all had collaborated around ideas with their colleagues.

Preferable conditions for sharing ideas

The perceptions of the educators in the higher education context point out that sharing ideas is highly dependent on the work environment and field you work in. We can differentiate organizations that are by *policies and strategies* set towards openness and transparency. When a certain practice is part of everyday work (paid for doing so) and rooted in the sharing culture of an organization, it is likely to be followed. Such examples are organizations that e.g. provide all of their educational materials openly for wider publics, attached with a creative commons-scheme.

Situations when educational ideas are most likely to be shared can be identified. The approaches incorporate *push* (idea you want to create movement around) or *pull* (crucial question or request that creates movement).

Likely situation for pushing an idea

- When there is a need to develop a new course or practice
- The idea has some innovative elements
- The idea enables new collaborations and networks

Likely situation for pulling towards ideas

- When under time pressure / need to set up a course or teaching offering quickly
- When expertise and inputs from others are needed to build on top of own ideas

Preferable conditions for responding to the request could be expected when the request comes from 1) trusted colleague or 2) a respected person known by a good reputation. The actual collaboration will differ in both settings as in case no. 1 actors are familiar with each other and are likely to collaborate on an open manner. Educators are also more likely to join collaboration if there are *immediate benefits*.

What educators actually share, and what they *could imagine sharing* varies quite a lot. Educational idea in the context of higher education is easily connected to educational resources or learning offerings such as full courses. Simultaneously, educational ideas can be research oriented (open data), towards new innovative technologies or potential projects and initiatives. However, to enable reciprocity, *simplicity of contribution* should be acknowledged. The respondents saw that *ideas could be presented simply as textual descriptions, outlines or drafts but highly depending on individual preferences*. Some prefer mindmaps while another enjoys questions that trigger ideas. Educators would like to learn and would embrace the concept of *valuable failures*, while such are not commonly shared.

“It’s important to share something that can be easily contributed by the kind of person. So if it’s a teacher, something she can simply enrich upon. And fast. Something that is already well structured and not too abstract.” – Lecturer, UK.

Key barriers: Why to share, what is in it for me?

The analysis revealed several **barriers** related to the higher education context. The *educational landscape* is mostly still very *competitive and knowledge and fresh ideas are often kept to oneself*. Educators might wonder *“why prepare a joint course or mutual development in general?”* or *“why to take part in such a process initiated by someone else?”* Many of these concerns and perceptions are influenced by the educational settings where collaboration and openness are not common practices. Many educators felt that colleagues would fear criticism from peers if they would share their course materials openly. Either they expect comments such as *“your material is outdated - or scientifically low standard”*. *Fearing losing ones original ideas* is another concern to collaborative work; *“we do not know who will use our own idea just for his own personal benefit*. *Lack of Information literacy skills* with educators was seen as one general theme and too often students are ahead of their teachers. The participants elaborated whether a teacher can nowadays survive without being a digital scholar. Teachers’ need to move with the societal changes and update their practices. Can they actually survive in a longer run without being open to share?

To overcome some of these barriers *knowing the person the idea is developed with would reduce reluctance to knowledge sharing*. Taking the *lead in the process boosts motivation* as well. Collaborative course development could be useful in order to *support different pedagogical perspectives for collaborative development of course curricula* etc. One of the great opportunities was seen in the possibility for extended collaboration that is more than just sharing few ideas here and there – *Strategic partnerships*. The participants of the workshops elaborated how educators have to be open one day and how personal development and learning requires getting fresh perspectives and innovative ideas from the community. Peer-reviewing ideas and providing feedback in each step that you take is a matter of quality and can be very beneficial in a long run.

“...once you open your own content you need to be prepared for another persons review, feedback. And if you have an idea and have already introduced to others it is already in a peer review process, as you are now offering the idea” – Educator Y, Lithuania

“We do take ideas from others, that’s why we are going to the conferences, to hear something new from others.”
– Educator Z, Lithuania

Who would you share with?

When sharing educational ideas, educators are most likely to *start the sharing process in a trusted environment with existing personal relationships*. From the idea sharing practices inspected within the focus groups, sharing in a safe and close community with close colleagues was a practice that everyone were engaged in already. Such sharing *only takes place if all the actors within such environment can be seen trustworthy*. Sharing with such people reduces the chance that somebody would literally steal your idea. Someone whose *reputation and merit stands for itself might qualify for such trusted network* as well. Only more experienced people on open education saw that sharing ideas with the relevant community would be done directly from the start. Others saw the need to initiate in a closed environment.

Idea sharing and the process it initiates were generally seen *similar to collaboration in projects*: Trying to find motivated partners that will keep the collaboration ongoing. While *community feedback and development were seen beneficial* in the later stages when ideas mature, *the role of students and industry were seen crucial* as well, especially when discussing teaching and skill development where students are the ones targeted.

The type of an idea will form the basis for networking as well. *“If I have an idea and need money I’m going to look for the sponsor and we do it together, but if you have great idea, that is relevant for the community, then why do you need to keep it?”* – Educator Y, Lithuania. Accordingly, *levels for openness should be the main approach for idea development process*. Some parts might be closed while some relevant for a wider community.

Where would you share?

What becomes clear from the opinions and perceptions of the educators is that sharing ideas is extremely demanding to initiate on a larger scale. Sharing of initial and rough ideas might not be technology-mediated. Rather than putting rough ideas on display for online communities, idea development, whether it is about a new course or a new service, is most likely to take place *firstly in discourse with close colleagues*. Technology might not play a role within such step at all but at the same time can be crucial for facilitating the collaboration. The place for *sharing ideas was often seen to take place face-to-face or in informal discussions where the discourse shapes our thoughts and leads to new ideas*. Typical location for such is at the office coffee break or an evening out with colleagues. However, based on the topic and context, idea sharing can initiate *in an academic or non-formal online network* as well in Research Gate, Google+, Twitter, Facebook, LinkedIn and so on. This depends highly on the *level of publicity and awareness you want to reach*. Posting an idea and announce it to a large audience of unknown people is not suitable for most participants. The key factor was seen in *utilizing tools and networks that your collaborators already use*. However, for an environment to build on ideas, educators are not expecting one-single-solution that can handle everything but a *good way to bring the components together as there are already applied tools for different purposes and tasks*.

Structuring and supporting idea sharing

There are multiple ways how educators would see idea generation to happen. *Approaching idea generation as a project* and learning from other domains such as open source development were seen beneficial:

“Collaboration should be organized to involve the relevant stakeholders, specifically educators and learners.”
– Lecturer - Finland

“ Looking at a process of participative inquiry and peer production in and outside educational organizations, process in which users collaborate with each other and interact with OER in an iterative cycle of design and evaluation.” – Researcher, Sweden

For such collaboration or a project around an idea, *participants should be able to enter the collaboration at any time of the process*. Even late entries to collaboration might be successful, as people might still contribute a lot. However, idea sharing should not be seen as an open-ended process. *People do need deadlines*, otherwise the collaboration and engagement is always postponed. The idea sharing was seen to

possibly develop from early ideas (discussions) to drafts and elaborated outcomes and courses. In such collaboration, one needs to get different types of contributions for each phase and *someone needs to have a holistic overview (Leader) how to proceed and keep in the timeframe*. In such collaboration, there needs to be some form of an *agreement what one is expected to do*. When discussing openness, *contributions from small to big can be beneficial*: commenting, providing peer-review for different phases when ideas develop and mature to actual educational artifacts, defining outlines, leading the collaboration and so on.

“Think about sharing in Facebook, like you ask people and they give two hundreds like buttons, but none of them will deliver anything for you” – Professor, Germany

“..in many scripts or slides I read, you can absolutely see that more than one person was involved in it. And it is a problem to take something from the script if it is not align or fluent.” –Lecturer, Germany

Key arguments for collaboration around educational ideas and movement towards openness were especially *developing partnerships and long-term collaborations*. As facilitators of such movement, the participants saw the *bottom-up approach* in a key role - *educators leading by example*. However, the role of projects and initiatives as builders of awareness were seen important as well.

Discussion and recommendations

The findings indicated that educators do see the benefits and need to be engaged to collaborative actions on developing educational resources and activities, even on a global scale. The findings show that the previously attempted approaches of providing tools and services for re-use and adaptation of OER do serve a need. But at the same time, educators did emphasize that such approaches are not yet facilitated properly. Facilitation of such activities is not supported by the initiatives, the learning institutions they work for with the exception of personal activeness to collaborate face-to-face with own trusted circles of colleagues. The findings indicate that rather than giving tools for collaboration and expecting the community to act, collaborations on educational ideas should learn from open source community and build the collaborations as tiny projects. Depending on the interests of people and the aim for the collaboration, wider networks might be relevant from the start but at the same time it has to be acknowledged that collaborations and idea generation will most likely initiate in closed environments as an outcome of discourse of with trusted peers. How open education domain supports the next steps from closed to open needs to be inspected.

The online mode will likely be the greatest opportunity and limitation for collaborative idea sharing as it has been for OER and also for MOOCs that rely on information transmission solely (Clow, 2013). Our inspection highlighted one common problem for OER that still remains to be unsolved: OER that originates from a differing context and not tied to own curriculum is very hard to adopt. Especially when didactical principles and reasons for selecting those specific components for the OER are only in the head of the person who firstly created the OER. The greatest opportunity in sharing educational ideas with the open education communities was not only the expected quality improvements from the discourse and peer-reviews of trusted international colleagues but the potential partnerships and long-term collaborations you would not come across in your daily context.

We do recognize there are limitations to our study. The respondents within this inquiry did not necessarily have any personal background on open education and their perceptions to sharing educational ideas were mostly hypothetical and based on their own assumptions how they would act in such situations. However, the topic of idea sharing in a closed environment is familiar to every single one of them based on the collaboration they already perform in their daily business.

As an outcome of the investigation, several recommendations can be given to enable and facilitate rich idea sharing of educators. Firstly we can identify how sharing of educational ideas relates to OER. Idea sharing process precedes OER development and sharing but should not be inspected as an isolated set of steps as the collaborative efforts could lead to various types of artifacts and educational solutions, such as OERs. Reflecting the findings of this study, Figure 1 represents how the iterative idea development can lead to outcomes and solutions in the domain of open education.

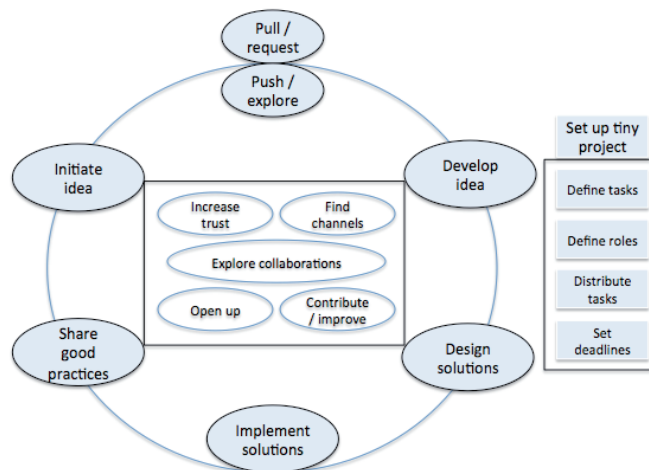


Figure 1 Open Educational Ideas life-cycle

As part of the recommendations, the findings of this study can be used to explain a best practice for idea sharing that takes into account the challenges and success factors.

Table 1 Recommendations for the idea sharing process

Main activity	Tasks	Issues to consider
Initiate idea	-Set the basis for your idea -Decide form of initial collaboration (push/pull)	-Is your organization already open and transparent? -Should you find external contacts for the very first ideas or stick with your closest ones? Build a foundation with a trusted network. -Discuss the overall plans and aims with all actors
Choose channel(s)	-Consider scale (exploring and publicity or directed requests and specific expertise -Select the key networks and services	-Simplify both your public invites to collaborate as well as the contributions you make (much easier to contribute in an online context) -Explain benefits and aim towards reciprocity (to overcome “what is it in for me” barrier) -Aim for personal relationships -Decide what type of contributions are minimum. Simplest contributions might have their place
Set your tiny project	-Define tasks, roles and deadlines related to your ideas so far -Discuss and agree on everyone’s contribution	-Don’t call it a project! Make it as informal as you can -Taking lead boosts motivation, give everyone a chance to shine -Not all will be active and people should be able to do only what is interesting for them. -Iterate! Find new people, open new doorways
Design and implement your solutions	-Keep it organized -Extend the collaboration to industry and students if relevant	- What ever your idea develops to, define one key place for managing your collaboration, no matter which tools and services you use -Levels of openness are crucial. Ideas can lead to many directions, what is discussed in a closed setting can be later opened -Not all has to end up being Open. Explore other business opportunities and collaborations
Increase visibility	-Make noise on your collaboration -Distribute good practices -Share the artifacts and solutions you create	-Personal collaborations might enable cross-institution opportunities, shared learning offerings or projects. -Lead by example -Bigger movement will happen slowly and you will come across resistance

	-Explore and extend partnerships	- Iterate! Discourse leads to new ideas
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Conclusions

This article presented the views and opinions of educators towards sharing of open educational ideas. The findings indicate that educators do see the benefits of collaborating on idea development that leads to mutual, local and global learning and teaching opportunities. At the same time, it is clear that existing initiatives on open education have not yet been able to set such practices in motion. The paper presented key contextual barriers that keep educators from sharing their ideas as well key enablers and conditions when and how such collaborations could be initiated. The findings of this study will be used as a requirements analysis for developing practices and supporting tools for open educational idea sharing. Upcoming work should especially aim at finding ways to shift the idea sharing that takes place in closed environments to relevant online communities where the opportunities for strategic partnerships around open education could be explored.

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