An Evaluation Framework for Social Software Supporting Global Work Processes

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Abstract

There are several problems related to collaboration at distance including coordination breakdown, cultural differences and time-zones. Finding collaboration tools that suit in certain scenarios and support globally distributed groups remain to be a crucial success factor and thus a research focus. In this study, we evaluate social software tools´ suitability in business processes of globally distributed organizations. Our evaluation framework provides a guideline to assess those tools. Applying the framework to selected applications such as Skype, TWiki and LinkedIn shows the tools' fitness to the global collaboration processes. The framework is validated in a case study regarding collaboration between Finland and Greece.

Keywords: Evaluation, social software, globally distributed work, evaluation framework

1. Introduction

Collaborating over distance has become a major research field during the last decades. One of the main research domains concerns virtual teams (Nunamaker et al. 2009, 113). According to Sivunen and Valo (2006, 57), a virtual team can be defined as a geographically distributed and closely together working group of people using multiple technologies (e-mail, shared databases, videoconferencing etc.) as their primary interaction. Virtual teams are often connected to global software development and outsourcing of organizations' activities abroad (Huang & Trauth 2007, 36). Conquering virtual teams' challenges remains to be one of the most crucial research topics. These challenges include time zone differences, cultural differences, different working habits, loss of communication richness and complicated technologies (Nunamaker et al. 2009 113-116).

To identify the problems related to global collaboration it is necessary to have a look on different research fields. CSCW (Computer-supported cooperative work) is a research field exploring different aspects of cooperation in computer-based work (Borghoff and Schlichter 2000, 92). The technologies used in collaboration are also widely researched. Social software tools have become a possible alternative to handle different organizational and collaborative tasks (Cook 2008, 22-25). According to Koskinen (2006, 381-383), social software is considered as an umbrella containing a mixture of technologies, internet services and software. It also involves the user perspective as well as group collaboration in a social way by fulfilling the needs of an individual (Wever et al. 2007, 512-513).

Problems related to distance and global collaboration still exist. Even though a lot of research exists on collaboration tools, there is still a lack of decision support for selecting the right collaboration tools for a particular purpose and process. While the evaluation framework is generic, we focus our study on identifying social software tools that support business and collaboration processes for Open Educational Resources (OER) in globally distributed settings. The research question is: "How to support organizations or individuals in their decision making and in the process to select the best suiting social software tools for their work and collaboration tasks?"

In order to address the research question, an evaluation framework is provided based on a literature review with a constructive approach based on the problems and success factors of global collaboration. The outcome of an evaluation is to provide information and decision-support whether a tool fits a task and purpose. The framework was modified and validated in a confirmatory case study (Brecher & Harvey 2002, 17) related to an international EU-project on management education "OpenScout".

2. Global collaboration

In this chapter, critical factors influencing global collaboration are explained. Research fields related to global collaboration are introduced. Collaboration has been defined in many ways depending on the context it's introduced in. According to Dillenburg et al. (1996, 1-2) collaboration can be defined as a coordinated effort where the problem is solved together by mutual engagement.

2.1 Challenges of Global collaboration

As stated before, collaborating globally can be challenging and it also sets certain requirements in order to cooperate efficiently. According to Carmel and Agarwal (2001, 22-29) there are various critical challenges related to distance in organizational processes. Distance negatively affects communication which in return affects the coordination of tasks in organizational units. Cultural distance is one of the greatest obstacles to struggle with when working in the global environment. Possible barriers to global collaboration also include the costs that occur of using and acquiring the software as well as language, interpersonal and technical skills needed to use the software. The more skills needed, more training has to be offered to the users. The same technology and software should be available to everyone who has to collaborate over distance. Building efficient, trusting teams with little or no face-to-face communication is challenging and therefore selecting the proper collaboration software is vital. (Duarte & Snyder 2001, 1-14)

2.2 Finding solutions to support global collaboration

As shown in the introduction, global collaboration is studied widely in order to find different possibilities to support distributed teamwork. A big part of research is related to global software development. Much research has also been done in educational settings. There are several drivers requiring virtual teams in organizational collaboration. The most crucial factors include globalization, outsourcing of firms' operations and strategic alliances between

the organizations (Huang & Trauth 2007, 36). These lead to competition growth, need for more efficient decision taking and shorter project running times. The importance and growth of technology and the internet as a part of everyday work plays a vital role in virtual teams' creation (Nunamaker et al. 2009, 113-116). Even though in the CSCW provide solutions for teamwork, it focuses more on how people use the tools or systems, whereas the research field of virtual teams focuses on problems of interaction faced by the teams. (Huysman et al. 2003, 411-412).

In this paper, we develop an evaluation framework based on the aforementioned challenges and relevant functionalities of available collaboration technologies. The framework is used to find the most suitable collaboration tools that fit certain global collaboration processes. We have selected social software tools for the evaluation because they offer a promising informal way to collaborate in organizational settings. The following chapter introduces social software and its application to organizational collaboration.

3. Social software

The purpose of this chapter is to show possibilities of new web technologies and social software in solving challenges that arise in distributed teamwork. We describe social software's current state and implementation in educational and organizational collaboration settings. Finally, selected social software tools are introduced.

Institutions and instructors have started to move towards a direction where social software tools are considered a possible method of organizational collaboration. In order to successfully integrate social software tools as a possible way of collaboration, organizational cultures, structures and hierarchies have to change and adapt to different working methods. Organizations should be able to identify which working processes should be changed and which tools could support them. In addition, everyone's involvement in integration process of the new tools should be well defined. This enables new ways to work with the help of the social software. (Koch 2008, 422-423)

3.1 Social software tools

Cook (2008, 36-72) has classified essential social software tools into four different categories: connection, collaboration, communication, and cooperation ("4C model"). The classification is quite straight forward based on functionalities. However, many tools overlap between different categories:

- *Connection* includes technologies that enable connections between people, content or both. For example, social networking of people (Facebook, LinkedIn etc.) and mashups that aggregate access to different online resources in one page.
- *Collaboration* includes software that enables people to work with each other on a shared problems or tasks. Examples are wiki-tools that allow users to create content for a website collaboratively.
- *Communication* includes software that allows people to communicate with each other either synchronously or asynchronously with text, audio or video or all together. Examples are blogging tools to create online diaries for personal and for

organizational use and instant messaging tools for users to communicate with each other.

- *Cooperation* includes software for sharing contents like audio, video and images as well as bookmarks of internet resources.

This chapter discussed social software and its application to organizational collaboration. In the following chapter, we will apply and extend Cook's 4C-model. We explain the functional characteristics of certain tools in order to evaluate the functions' suitability to support global business collaboration processes and finally providing support for decision-making when choosing a tool for a specific scenario.

4. An evaluation framework for social software

As presented in the previous chapters, global collaboration and virtual teams lead to several challenges that need to be identified and overcome. One of the most crucial factors is finding the best suiting collaboration tools for specific tasks. In order to overcome the challenge of finding the right tools, an evaluation framework was built. The purpose of an evaluation is usually to provide support in assessing certain situations or for decision making. The results of an evaluation in our context have to provide information regarding the suitability of a tool to its purpose and can an organization afford it. (Kitchenham 1997, 14). The suitability of a tool for the case study is evaluated with a qualitative feature analysis method (Kitchenham 1997, 13-15) where the framework consists of tool functionality aspects as well as on the challenges and critical factors of global collaboration. Each part of the framework is measured with descriptive or a scoring model. Decision support is achieved by the comparison of selected tools and their fitness to the scenario.

4.1 Constructing the framework

When constructing the framework, certain aspects need to be taken into consideration. In this study the following criteria were considered to address the majority of challenges in global collaboration. We have divided these challenges into several distinct parts which are presented in the following chapters. It should be noted that the following criteria are a base framework. They are extensible and subject to be changed for different scenarios and purposes.

4.1.1 Culture

The effect of culture to social software usage in our scenario is evaluated based on Henderson's Multiple cultures theoretical model (Henderson & Cook 2007) and Hofstede's cultural dimensions (Hofstede & Hofstede 2005).

Hofstede divides culture into five distinct dimensions, represented as indexes. The dimensions are power distance index (PDI), individualism index (IVD), masculinity index (MAS), uncertainty avoidance index (UAI) and long-term orientation index (LTO).

Power distance index (PDI) indicates how people accept and expect unequally distributed power. Individualism index (IVD) indicates the degree of individual’s integration into groups.

Masculinity index (MAS) divides culture into either masculine or feminine, based on the distribution of hard and soft values. Uncertainty avoidance index (UAI) indicates society's tolerance to cope in uncertain or unknown situations. Long-term orientation index (LTO) or Confucian dynamism determines whether the culture is long term or short term oriented. (Hofstede & Hofstede 2005)

As our model is applied to an educational setting, additional aspects specific for education are taken into account using the model by Henderson and Cook (2007). The following categories are considered: E-learning instructional design is applied because further developing open educational materials and life long learning are crucial aspects in the case study. The aspect of E-learning instructional design explores how instructional design is influenced by certain cultural group's selective traditions. These were added to our framework consisting of instructors' own views, academic culture which covers the procedures and learning materials executed in certain university or faculty, society's dominant culture views, gender of the instructor, class, ideologies and values (Henderson & Cook 2007). These factors might not have a straight effect on the use of certain social software tool, but these factors might influence collaboration of partners in distributed teamwork and by that might have an effect on the use of a tool. Analyzing the effect of these factors requires further comprehensive studies and for the purpose of this study these factors are not analyzed in detail.

Social software can support collaboration across cultures. However, certain adaptation possibilities must be given to take culture-specific needs into account.

4.1.2 Required user skills

The Level of user skills required to use tools varies from person to person. Therefore it is important to determine the level of required user skills to use certain software effectively in a given environment. Spoken language is an important success factor for offshore IT work (Carmel and Agarwal 2001, 22-29). Writing, speaking and reading skills are also crucial factors. Some software might need more technical skills and training (Duarte & Snyder 2001, 1-14). In this paper, our focus is on social relationships. Therefore, the level of interpersonal skills required to use certain social software is included in addition to required written, verbal, reading and technical skills. These factors are evaluated with a ranking system on a numerical value from 1 to 5 (1 means low skill requirements and 5 means highest skill requirements).

4.1.3 Cost

The cost of a tool is a crucial factor when a new tool is acquired. The cost of running software in a company is varying depending on the initial investment and the amount of maintenance cost required spending during the usage (Duarte & Snyder 2001, 1-14). Installation, maintenance and license costs are included in the framework.

4.1.4 Customizability

Customizability of social software is an important factor which affects the usage of a tool in a global scale when many geographically dispersed organizations are involved. For example for the design of the user interface, there are several factors that affect the usage in a global

setting. These are, for example, the possibility to change the language and the appearance. Customization of access rights to different resources of social software tools is also important in order to prevent unauthorized access (Kirda, Fenkam et al. 2002 513-518). The possibility to integrate social software with other application programming interfaces (API's) (Fox, Wu et al. 2003, 1-8) and to have customizable data exchange options with other data sources in order to exchange data (Bafoutsou and Mentzas 2001, 1-5). Hence, support for multiple languages, user interface customization options, access control, API's and data exchange possibilities have been included in our evaluation framework.

Additionally, notification mechanisms play a major role to keep all the team members up to date with information when working in geographically dispersed locations where face-to-face communication is rare (Bafoutsou and Mentzas 2001, 1-5). In order to prevent unnecessary notifications, it is important to have options to customize these services. This option is also included in our framework. Evaluation is done with a numerical scale from 1 to 5 (1 means poor customizability and 5 means excellent customizability).

4.1.5 Usability between distributed teams

Distributed teams face many challenges when working from remotely dispersed locations. One of them is time zone differences which prevent communication with colleagues regularly and in a synchronized manner (Carmel & Agarwal 2001, 22-29). Some countries and organizations have restricted the use of certain software by means of national laws and organizational policies (Delmonte and McCarthy 2003, 1-8). Knowledge identification, creation and sharing by using IT tools is increasingly becoming important to manage the knowledge across organization and geographically dispersed locations (Hedlund 1994, 73-90; de Souza, Hildenbrand et al. 2007, 1-10). Therefore time and law issues as well as support for knowledge management are included to our framework.

4.1.6 Infrastructure

Equal access to technology is vital for successful communication and collaboration (Duarte & Snyder 2001, 1-14). Social software requires a basic infrastructure in order to operate in global scale. This is the reason why we have included the options of available networks, internet servers and administrators into the framework.

4.1.7 Privacy and legal issues

Privacy describes who controls what kind of information as well as the applications and systems that construct and disseminate that information. Therefore privacy of social software tools is a really important issue when it comes to the global usage. Considering this we have included available user privacy possibilities and privacy options with in specific group to the evaluation framework. Use and copying of unauthorized software is generally considered as theft and not acceptable in organizations (Weckert 1997, 1-8). Intellectual property rights address the copyrights and patent rights of a piece of software and therefore we have included that into our framework (Gambardella, Harhoff et al. 2008, 1-42). As an example software's with creative common licenses is provided the possibility to give legal rights from the creator in a way that others can share, remix, use commercially, or any combination of the software

legally (Seneviratne, Kagal et al. 2009, 1-8). Privacy and legal issues are included and evaluated using a values ranging from 1 to 5 (1 means poor privacy options and 5 means excellent privacy options).

4.1.8 Required level of monitoring

There are various security and data validity threats associated with distributed computer systems (Georgiev & Georgiev, 2001, 178-186). To avoid these, companies are required to implement a monitoring system depending on the social software tools used by its employees. Taking this into account we have included the required level of monitoring data validity, data security and individual user monitoring into the framework. Evaluation is done with a ranking system on a numerical scale from 1 to 5 (1 means poor monitoring options and 5 means excellent monitoring options).

4.1.9 Functionality

Team leaders' choice of technology for everyday work in virtual teams is crucial (Sivunen & Valo 2006, 57-58). In order to find the best fitting tools for global business collaboration aspects it is necessary to identify relevant functionalities of social software tools and study the fitness of separate functions to a single process. For the framework, the 4C classification by Cook (2008, 36-72) was taken as a base functionality classification. We wanted to address the issue of separating possible functionality to different classes in a way that relevant collaboration functionalities would be covered in these classes. We have made a functional classification identifying relevant TEL-technologies and their functionality as a part of a background research. Our research identified functionality of collaboration technologies in the level of abstraction we felt them usable in the framework. That is the reason why Cook's categories were extended to awareness of contents or people, communication, collaboration, collaborators and sharing.

Awareness of contents includes search mechanisms, tagging of contents and RSS-feeds. Awareness of people includes social networking and micro blogging. Communications includes blogging, instant messaging, E-mail, conferencing possibilities, forum and possible mobile device extensions. Collaboration include collaborative writing and annotation possibilities, time management, to-do-lists, whiteboarding, group decision support in the form of surveying, mindmapping, polling, rating and workflow possibilities. Sharing includes document sharing, videos, audio, images and bookmarks. In the evaluation phase, certain tools' functionalities are identified and the fitness of the functionality is matched to different phases of global business collaboration.

4.1.10 Business collaboration

A crucial factor of the framework is to evaluate the suitability of social software tools for global business collaboration processes. The processes were identified and modified to serve the case study from ICT-supported unified process model of offshore outsourcing (Yalaho 2006, 47). The identified processes include different steps of business collaboration in global projects from establishment until the end of cooperation and experience exchange. These added steps into the framework include analyzing business processes, building awareness of

the partners and the objectives of the cooperation, planning collaboration procedures with partners, planning budgets and time usage, executing the collaboration and finally sharing experiences.

In the following framework (Figure 1), we demonstrate how global business processes can be matched with functions of a social software tool. A matrix to identify the relations of the functions and processes will be constructed. The relations are evaluated in the case study and are shown as simple plusses and minuses in the matrix.

Social software evaluation framework									
Social software	Short Description of the tool								
Culture	Hofstedes Dimensions				Henderson E-learning instructional design				Extension
Required user skills	Required written, verbal and reading skills		Technical Skills	Interpersonal Skills	Extension				
Cost	Installation cost		Cost of Maintenance	License cost	Extension				
Customizability	Language		Appearance (GUI)	Access control	Updates	Interfaces to external data sources	Integration with API's	Notification services	Extension
Usarbility with distributed teams	National laws		Time difference	Organizational Practices	Knowledge Management support	Extension			
Infrastructure	Network Local / Global		Internet	Severs	Administrators	Extension			
Privacy and legal issues	With Peer to peer, with in a group and with the public		User Privacy	Intellectual property rights (IPR)	Extension				
Level of monitoring required	For data validity		Security issues	Individual user monitoring	Extension				
Functionality	Awareness of contents: RSS | Search | tagging		Awareness of people: Social networking | micro-blogging	Communication: Blogging | Forum | IM | E-mail | Conferencing | Mobile ext	Collaboration: Collab writing | Time management | brainstorming | Annotation | GDSS | Workflow	Collaborators: P2P | Group | Public	Sharing: Audio | Video | Images | Documents | Bookmarks	Extension	
The fitness of tools functionality to global Business processes		Awareness of contents	Awareness of people	Communication	Collaboration	Collaborators	Sharing	Extension	
	Cooperation establishment								
	BP analysis and modeling								
	Awareness Building								
	Collaboration planning								
	Time and budget planning								
	Collaboration								
	Experience Exchange								

Figure 1. Social software evaluation framework

The figure shows which aspects of social software should be considered in an evaluation. The framework is extensible and modifiable to suit different purposes. For the purpose of this study, the framework was modified to suit the case study in the domain of technology-enhanced learning (TEL).

5. Case Study: Social Software in Global Educational Settings

As presented in the introduction, the framework was validated and improved using a case study related to the EU-project *OpenScout*. The project deals with open educational resources, re-use of learning materials and community building for different stakeholders in the domains of Higher education, Business Schools and SMEs (Small and medium-sized enterprises). Our purpose is to evaluate specific aspects of social software tools and their fitness to global collaboration processes. These processes present different stages of a partnership and cooperation of businesses when they for example enter a new project Settings.

In the study business collaboration between Finnish and Greek partners were observed in order to find the best suiting tools for the different stages of the cooperation life cycle. In order to demonstrate the use of the evaluation framework, three social software tools were evaluated: Twiki, Skype and LinkedIn. In the following chapter, we demonstrate how the framework can be applied. The evaluation was done for each part of the framework but only the aspects of social software description, customizability, functionality and application to business collaboration processes are demonstrated in this paper. In addition, we point out cultural aspects that might affect the usage of a tool.

5.1 Evaluating the social software tools

In this chapter, we demonstrate how the evaluation framework can be applied. We demonstrate different parts of the framework for the applications Skype, Twiki and LinkedIn. The evaluation part is divided into three sections. We provide an overview, and focus then on cultural aspects. Thirdly, we emphasize on functionality, incorporating the awareness of people and awareness of contents. For the functionality application to business processes, we only present an aggregated version after evaluating the other factors of each tool. In chapter 5.2, we compare the results and give out recommendations which tools fit the different phases of business collaboration phases of the case study OpenScout.

5.1.1 Evaluating Skype

Skype can be considered as multipurpose communication software. It makes possible voice and video calls and SMS (text messages) over the Internet as well as instant messaging and much other functionality. (Skype 2009)

Some minor cultural issues may occur when using Skype. Individualism index is higher in Finland which means Finns are more loosely (compared with Greeks) tied to groups and that may lead to lesser information sharing. Also higher power distance index in Greece may affect in communication richness. However, we strongly recommend Skype to communication purposes.

Skype provides customizability options to change the language according to the user preference. If the preferred language is not available, it provides an option to add a language by using a language file. Skype is not providing many possibilities to change the user interface and the appearance. Users are allowed to use all the content of the applications. Therefore users can add contacts out side of the corporate network and there is no option to

restrict this behavior using the customization options. Nevertheless, Skype has attractive set of options to customize the user privacy and notifications. For example, Skype users can configure to play a sound when other users sign in. It is also possible to integrate Skype with web pages. However, there are fewer options to integrate with other API's as Skype uses proprietary communications protocol. (Skype 2009)

Skype does not have social networking functionality. Micro-blogging to one's contacts is possible through the status field, but integration into Twitter or other micro-blogging services, requires extensions that have to be manually found by each user which makes it quite inconvenient. Awareness of contents is not considered, but the communication possibilities are good. Skype's main functions are instant messaging and conferencing. It also includes extensions for mobile devices for mobile users. Collaboration aspects are not part of Skype. In the communication user can decide to communicate with single users or groups. Skype also can be used to transfer files to your contacts.

5.1.2 Evaluating Twiki

Twiki is a highly customizable open source collaboration platform which is based on the wiki technology. It is designed for private, enterprise as well as educational use. The main features are document management, knowledge base, intranet and groupware tool. Additional functionalities can be added via several available plugins. Twiki allows efficient and seamless cooperation between distributed teams. (Twiki 2009)

Twiki is a flexible tool with many customizability and localization capabilities. It supports different languages and easily adjustable user interface by means of skins. Twiki also provide comprehensive add-on and plug-in support to customize the features according to the user preference and to create interfaces to other data sources and API's. Access control, security and admin tools plug-ins are offering variety of options to manage the access control in Twiki pages. Furthermore Twiki is also capable of providing customizable notifications by means of feeds and emails. (Twiki 2009)

Twiki is extremely versatile software when the users know what they want to and can do with it and thus have related skills. A big part of the functionality comes with downloadable extensions. Awareness of people in the form of social networking is possible only in the enterprise version that is available but not for free. Microblogging is not possible yet. Awareness of contents is possible by tagging contents and RSS feeds. Search is possible for wiki contents only. For communication aspects Twiki offers extensions for blogging, forum and e-mail notification. Mobile extensions, instant messaging and online conferencing aren't possible. Twiki has good collaboration possibilities. Collaborative writing, project time management, workflow possibilities, brainstorming and group decision support are all possible. The administrator can choose which users can collaborate and access certain pages. Twiki can be used to share and upload documents and flash video. (Twiki 2009)

5.1.3 Evaluating LinkedIn

LinkedIn is a social networking site. Its target audience is considered to be professionals of all fields around the world. The main idea is to exchange and share contact details (contact

network) which enable certain level of collaboration. It can be used in job searches, problem solving, group discussions and most of all, expanding individual's professional network. These assets separate LinkedIn from other social networking tools, for example, Facebook. (LinkedIn 2009)

LinkedIn is supporting only four languages in the current version. LinkedIn home page is rather fixed and not providing options to modify the layout of the webpage other than options to edit the content of the page. It is also providing the options to integrate the users' Twitter account, integration to job databases over the LinkedIn homepage. LinkedIn provides customizable integration options to integrate with limited amount of widgets and APIs. Customizable access control features and the notification features are also available with LinkedIn. (LinkedIn 2009)

LinkedIn is a social networking service. Awareness of people with social networking with business partners and micro-blogging in LinkedIn or straight to Twitter is possible. Content awareness is possible through RSS feeds and notification e-mails. Communication aspects are not well covered, though blogging, forums and mobile extensions are possible, instant messaging and conferencing are not possible. Collaboration possibilities for businesses are only available as a buyable project management-product where additional functionality costs. Group administrator can decide which information is visible for everyone. Sharing possibilities are not well covered in LinkedIn yet, but bookmarking profiles and groups is possible. (LinkedIn 2009)

5.1.4 Tools' suitability in global business processes

After identifying the functionality of Skype, Twiki and LinkedIn, we can see how these functions fit to different phases of the case study collaboration phases (Table 1.). The added values of the functions to processes are marked with pluses or minuses by our own reasoning. The criteria are as follows: (--) no usage in the process, (-) not relevant, (+) recommended and (++) highly recommended.

	Awareness of people	Awareness of contents	Communication	Collaboration	Collaborators	Sharing
Cooperation establishment	Skype -- Twiki - LinkedIn++	Skype -- Twiki - LinkedIn+	Skype ++ Twiki - LinkedIn -	Skype -- Twiki + LinkedIn -	Skype + Twiki - LinkedIn +	Skype + Twiki + LinkedIn-
Business process analysis and modeling	Skype -- Twiki - LinkedIn--	Skype -- Twiki - LinkedIn+	Skype + Twiki - LinkedIn -	Skype -- Twiki + LinkedIn -	Skype + Twiki - LinkedIn -	Skype + Twiki + LinkedIn-
awareness building	Skype - Twiki - LinkedIn++	Skype -- Twiki - LinkedIn++	Skype ++ Twiki - LinkedIn +	Skype -- Twiki + LinkedIn -	Skype + Twiki - LinkedIn +	Skype + Twiki + LinkedIn-
collaboration planning	Skype -- Twiki - LinkedIn-	Skype -- Twiki - LinkedIn-	Skype + Twiki - LinkedIn +	Skype -- Twiki + LinkedIn -	Skype + Twiki - LinkedIn +	Skype + Twiki + LinkedIn-
Time and budget planning	Skype -- Twiki - LinkedIn-	Skype -- Twiki - LinkedIn--	Skype + Twiki - LinkedIn -	Skype -- Twiki + LinkedIn -	Skype + Twiki - LinkedIn -	Skype + Twiki + LinkedIn-
Collaboration	Skype - Twiki - LinkedIn++	Skype -- Twiki ++ LinkedIn++	Skype ++ Twiki + LinkedIn +	Skype -- Twiki ++ LinkedIn -	Skype + Twiki + LinkedIn +	Skype + Twiki + LinkedIn-
experience exchange	Skype -- Twiki - LinkedIn++	Skype -- Twiki ++ LinkedIn+	Skype ++ Twiki + LinkedIn +	Skype -- Twiki ++ LinkedIn -	Skype + Twiki + LinkedIn +	Skype + Twiki + LinkedIn-

Table 1. Comparison between selected social software tools

5.2 Comparing social software tools

In the previous section the use of the evaluation framework was demonstrated with three different social software tools. The last part, application to business processes showed how different software fit different tasks. The evaluation showed the strengths of Skype in communication through the whole business cooperation life cycle. It is an efficient tool when it comes to one-on-one discussions as well as within small groups, when a partner needs a fast reply or a quick instant messaging or phone call with video feed discussion with the partner abroad.

The evaluation showed how Twiki was the best tool of the three when it comes to customizability and how the use of wiki software is most crucial in the actual collaboration phase where multiple organizations work intensively together. It is usable in the earlier phases for internal planning of an organization as well as for collaborative planning of the desired project outcomes and methods to accomplish this but it is most crucial in the actual collaboration phase where the project is cut down to different work packages and the work of each partner has to be very organized to accomplish the tasks assigned to them. Twiki cannot be suggested as an awareness tool or a communication tool when people want to discuss project related issues efficiently. It is at best when relationships have already been made between the partners and each partner knows who they are working with.

LinkedIn provides most value when new relationships are built and in awareness building, collaboration and experience exchange phase where people share relevant news through feeds or profile updates about project related items. Building a project related group and using it as a form of dissemination is a cost efficient way of showing project results to the outside world. The evaluation showed that LinkedIn cannot compete with Skype or Twiki when it comes to communication and collaboration between the project partners.

6. Conclusions

Advancing technologies as well as social software applications and sites are mature for enterprise use, in particular in global settings. Collaboration across national borders happens every day in global organizations, but the wide range of software and the differing quality among them makes it hard to find the best fitting software for companies' use. The purpose of our work was to find out which of the selected social software tool fit best in a given scenario. Our scenario related to project cooperation of a Greek and Finnish organization.

For our study we selected three social software applications for an in-depth evaluation. The selected tools were the social networking service LinkedIn, the instant messaging service Skype and the wiki platform Twiki. Based on the scenario, possible problems and barriers for global collaboration and functional aspects fitness to case study related global business processes we proposed a framework for the evaluation of the selected tools. With our framework, it is possible to see which tool will fit best different stages of the business cooperation. As there are various problems and barriers depending on different contexts, the evaluation framework is extensible and modifiable. Companies can extend the framework and modify it to suit their own situations and purposes.

In our work, we came to the conclusion that the tools selected for the evaluation suit different processes. LinkedIn is best in the awareness creation, when people want learn who they are working with and seeing what interests they have. Skype was the most suitable tool for communication while Twiki is highly recommended in the collaboration phase between organizations when relationships have already been built.

Finding the best tools for the right use is a crucial for an efficient company. The study conducted showed the value of the framework in the evaluation phase and as a decision support instrument. Further and more comprehensive studies are needed to find out which are the best tools for which processes and which cultural aspects effect the usage of a tool. It is important to notice that good functionality and fitness to a certain process doesn't mean successful use in itself. The usability of a tool is another thing and has to be studied in addition to suitable functionality to find out whether users are able to use the tool.

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8. References

Bafoutsou, G. & G. Mentzas 2001. A comparative analysis of web-based collaborative systems. In: A.M. Tjoa & R.R. Wagner (editors) Proceedings of the 12th International Workshop on Database and Expert Systems Applications, September 3-7, Munich, Germany.

Borghoff, U. M. & Schlichter, J. H. 2000. Computer-supported Cooperative Work: Introduction to Distributed Applications. Germany: Springer.

Brecher, M. & Harvey, F. P. 2002. Evaluating methodology in international studies. USA: University of Michigan Press.

Carmel, E. & Agarwal, R. 2001. Tactical Approaches for Alleviating Distance in Global Software Development. IEEE Software. Vol. 18. No. 2, 22-29.

Casalo, L. V., J. Cisneros, C. Flavian & M. Guinaliu 2009. Determinants of success in open source software networks. Industrial Management & Data Systems. Vol. 109. No. 4, 532-549

Cook, N. 2008. Enterprise 2.0: How Social Software Will Change the Future of Work. UK: Gover.

De Souza, C., T. Hildenbrand & D. Redmiles 2007. Toward Visualization and Analysis of Traceability Relationships in Distributed and Offshore Software Development Projects. Lecture Notes in Computer Science. Germany: Springer.

Delmonte, A. & McCarthy, R. 2003. Offshore Software Development: Is the Benefit Worth the Risk? In: AMCIS 2003 Proceedings, August 4-6, Tampa, FL, USA.

Dillenburg P., Baker M., Blaye A. & O'Malley C. 1996. The evolution of research on collaborative learning. Published: Learning in humans and Machine: Towards an interdisciplinary learning science [online], [Accessed December 2nd, 2009]. Available online at: < http://tecfa.unige.ch/tecfa/publicat/dil-papers-2/Dil.7.1.10.pdf>

Duarte D. & Snyder N. 2001. Mastering Virtual Teams. Strategies, Tools, and Techniques that Succeed [online], [Accessed December 2nd, 2009]. Available online at: <http://media.wiley.com/product_data/excerpt/92/07879558/0787955892.pdf>

Fox, G., W. Wu, A. Uyar, H. Bulut & S. Pallickara 2003. A Web services framework for collaboration and videoconferencing. In: Workshop Proceedings of Advance Collaboration Environment (WACE), June 22, Seattle, USA.

Gambardella, A., Harhoff D. & Verspagen B. 2008. The value of European Patents. European management review.Vol. 5. No. 2, 69-84.

Georgiev, I. K. & Georgiev, I. I. 2001. A security model for distributed Computing. Journal of Computing Sciences in Colleges archive. Vol. 17, No. 1, 178–186.

Hedlund, G. 1994. A model of knowledge management and the N-form corporation. Strategic Management Journal. Vol. 15, 73-90.

Henderson, L & Cook J. 2007. Theorizing Multiple Cultures Instructional Design Model for E-learning and E-teaching. In: A. Edmundson (editor) Globalized e-learning cultural challenges. USA: Idea Group inc.

Hofstede, G. & Hofstede, G.J. (2005). Cultures and Organizations: Software of the Mind, Revised and expanded 2nd edition. New York: McGraw-Hill

Huang H. & Trauth E. M. 2007. Cultural Influences and Globally Distributed Information Systems Development: Experiences from Chinese IT Professionals. In: D. Lending & C. Vician (editors) Proceedings of the 2007 ACM SIGMIS CPR conference on

Computer personnel research: The global information technology workforce, April 19-21, St. Louis, Missouri, USA.
Huysman, M., Steinfield, C., Yang Jang, C., David, K.T., Veld, M.H.I., Poot, J. & Mulder, I. 2003. Virtual Teams and the Appropriation of Communication Technology: Exploring the Concept of Media Stickiness. Computer Supported Cooperative Work. Vol. 12. No. 4, 411–436.
Katainen, T. & Nahar, N. 2008. Using methods and IT tools innovatively for the management of International IS development projects. In: D.F. Kocaoglu (editors) Proceedings of the International conference on Management of Engineering & Technology PICMET. July 27-31, Cape Town, South Africa.
Kirda, E., P. Fenkam, G. Reif & Gall, H. 2002. A service architecture for mobile teamwork. In: G. Tortora & S-K. Chang (editors) Proceedings of the 14th international conference on Software engineering and knowledge engineering. July 15-19, Ischia, Italy .
Kitchenham, B.A. & Jones, L. 1997. Evaluating software engineering methods and tool part 5: the influence of human factors. ACM SIGSOFT Software Engineering Notes. Vol. 22. No. 1, 13–15.
Koch, M. 2008. CSCW and Enterprise 2.0 - towards an Integrated Perspective. In: Proceedings of the the 21th Bled eConference eCollaboration: Overcoming Boundaries through Multi-Channel Interaction, June 15-18, Bled, Slovenia.
Koskinen T. 2006. Social software for industrial interaction. In: J. Kjeldskov & J. Paay (editors) Proceedings of the 18th Australia conference on Computer-Human Interaction: Design: Activies, Artefacts and Environments OZCHI'06, November 20-24, Sydney, Australia.
LinkedIn. 2009. [online], [Accessed December 1, 2009]. Available online at: <http://press.linkedin.com/about>
Nunamaker, J. F. Jr., Reinig, B. A. & Briggs, R. O. 2009. Principles for Effective Virtual Teamwork. Communications of the acm. Vol. 52. No. 4, 113-117.
Seneviratne, O., Kagal, L. & Weitzner, D. 2009. Detecting creative commons license violations on images on the world wide web. In: Y. Maarek & W. Nejdl (editors) Proceedings of the 18th International World Wide Web Conference WWW2009, April 20-24, Madrid, Spain.
Sivunen, A. & Valo, M. 2006. Team Leaders' Technology Choice in Virtual Teams. IEEE transactions on professional communication. Vol. 49. No. 1, 57-68.
Skype. 2009. All Skype products. [online], [Accessed December 1, 2009]. Available online at: <http://www.skype.com/intl/en/allfeatures/>
Twiki. 2009. TWiki - The Open Source Enterprise Wiki and Web 2.0 Application Platform. [online], [Accessed December 1, 2009]. Available online at: <http://www.twiki.org/>
Weckert, J. 1997. Intellectual property rights and computer software. Journal of Business Ethics. Vol. 6. No. 2, 101-109.
Wever B. D., Mechant P., Veevaete P. & Hauttekeete L. 2007. E-Learning 2.0: social software for educational use. In: P. Kellenberger (editors) Proceedings of the Ninth IEEE International Symposium on Multimedia Workshops, December 10–12, Honolulu, Hawaii.
Yalaho A. 2006. A Conceptual Model of ICT-Supported Unified Process of International Outsourcing of Software Production. In: Proceedings of the 10th IEEE on International Enterprise Distributed Object Computing Conference Workshops, October 16–20, HongKong, China.