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IMPACTS OF CIT: THE OPPORTUNISTIC USER

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Abstract

Applications that have been a huge success in private collaboration – such as video conferencing, application sharing or social tagging systems –, have been failures in business collaboration. The benefits of Collaborative Information Technology (CIT) have been discussed in research and acknowledged by many companies for quite some time. However, the usage of such technology in business context is still surprisingly low. Explanations have been sought through the investigation of CIT in various settings. These studies have been mostly conducted in the specific context of a single CIT tool and/or task, whereas in some businesses several CIT tools are used concurrently when attempting to achieve a certain goal.

In this paper we aim for a more holistic view of CIT usage by relating task, CIT functionality and its impacts. We followed a qualitative approach and conducted 10 semi-structured interviews with team leaders of collocated teams in 10 different companies.

Our preliminary results show that this approach has promise to further explain the usage of CIT tools and that CITs are used opportunistically. The employee seems to rather use a few established functionalities for different tasks than substituting functionalities and therefore changing her habit, even though new functionalities might better suit a task at hand.

Keywords: Collaborative Information Technology (CIT), Group tasks, Impacts, Organizations.

1 INTRODUCTION

The popularity of Collaborative Information Technologies (CIT) has certainly increased in the past years. Today's world is difficult to imagine without IT communication and collaboration tools such as instant messaging, audio conferencing, Wikis, Blogs or shared online documents. While these technologies are prevalent in private life, in many organizations the corresponding tools remain unused (Jasperson et al. 2005). This is surprising as in today's globalized world teams from ever different locations and organizations have to collaborate and CIT should be the ideal solution to overcome distance and time difference (Saunders 2000; Townsend et al. 1998). Looking at the features of these tools, CIT not only supports the communication and information flow, it also provides functionalities to achieve tasks or even realize projects. Several researchers have made the case that CIT should be used in organizations. Schwabe (2000), for example, has shown that Computer Supported Collaborative Work (CSCW) can reduce the fixed costs of large teams. Other benefits discussed in the literature include increasing quality, increasing flexibility and increasing productivity (Patnayakuni et al. 2006). Group Support Systems (GSS), for instance, have been investigated by numerous researchers (for a comprehensive review see Fjermestad et al. 2000). These studies support the notion that GSS have a considerable potential to increase team productivity. Organizations already have realized that collaboration is the most critical factor in achieving a sustaining competitive advantage (Frost & Sullivan 2006). As hitherto, organizations are still reporting problems with the implementation and acceptance of CIT (Bughin et al. 2008). While some CITs such as chat, e-mail and audio conferencing are used extensively in organizations, other (expensive) CIT such as GSS, electronic meeting systems, social software, or video conferencing remain mostly unused, even though they are provided for employees (Shumarova et al. 2008; Munkvold et al. 2001).

Many studies have been conducted in the past years with the goal of understanding the acceptance and use of CIT, thereby investigating various aspects of CIT use and their impacts (such as the effects of user training and expertise, collaboration processes, trust or cultural differences on team performance and productivity). Looking at the research efforts, we find that most studies are either focusing on specific tasks (e.g., creativity tasks, case solving, design a system, communication and coordination) or on a specific CIT function. Furthermore, most of these studies focus only on a few impacts – mainly effectiveness and efficiency. A holistic view, which combines the factors of organizational use of CIT and its impacts, is still missing.

In this paper we fill this gap by applying a task- and function-centric approach (Matter et al. 2009), which relates CIT functionalities with their impacts by considering a user's task. The approach focuses on CIT *functionality* (desktop/application sharing, polling, tagging audio conferencing etc.) – as opposed to CIT *types* (GSS, chat, instant messaging, e-mail, etc.) or tools (Skype, Lotus Notes etc.). As many tools offer several functionalities, taxonomies based on CIT types (such as chat, conferencing and application sharing) arguably are no longer appropriate. Skype, to name a prominent example, has a focus on audio conferencing functionality, but also supports chat, video conferencing and application sharing. We acknowledge this aspect in our approach, in that we base it on the assumption that a specific CIT functionality might be used for several distinct tasks. Our aim is to gain insights into the individuals' rationales of using or not-using CIT and the perceived impacts of using them in an organizational context. Consequently, the main research question of this article is as follows: *Do the perceived impacts of CIT use in organizations differ for various tasks?*

2 CONCEPTUAL BACKGROUND

To build our research framework, we reviewed the literature according to our research question's main components: "Do the *perceived impacts* of *CIT use in organizations* differ for *various tasks*?" In a generic definition, CIT encompasses different technologies and functionalities; *CIT use*, however, may only be measured by investigating the concrete usage of technologies and functionalities. To include CIT use into our task- and function-centric approach, we analyzed different classifications of CIT in search of a CIT taxonomy that allows a concrete mapping to software products used in organizations.

Similarly, we scanned existing *task* classifications to find a suitable set of collaborative tasks that may be observed in real-world team collaboration. Finally, we also researched the existing literature for *perceived impacts* of CIT that we could relate to the identified CIT functionalities and tasks.

2.1 Classification of CIT

Collaborative information technology (CIT) addresses a category of information systems, which helps teams to enable or facilitate collaborative work. In the literature, this category has also been termed *collaborative software*, *collaborative systems*, *group support systems* or *groupware*.

In the past, researchers have proposed several classifications of CIT. One of the first classification schemes can be found in Johansen's (1988) Time-Space-Matrix, which focuses on the geographical location and time as main dimensions. Today's CITs, however, allow spanning geographical distance as well as time differences. Therefore, these dimensions are becoming less important when it comes to classify CIT: a tool providing brainstorming functionality, for example, may be used locally or distantly as well as synchronously and asynchronously. Thus, the matrix proves to be too generic to assign CITs into disjoint classes and therefore does not allow a clear mapping between CIT classes (*face-to-face interaction, asynchronous interaction, synchronous distributed interaction and asynchronous distributed interaction*) and functionalities (e.g. brainstorming, polling, messaging).

Teufel et al. (1995) suggest another scheme that classifies CIT with respect to the degree of support for *communication*, *coordination* and *collaboration* (3C model). They arrange the degrees of support as a triangle and therein distribute four classes of CIT (communication, shared information spaces, workflow management and workgroup computing). This scheme complements Johansen's Time-Space-Matrix such that CITs may be arranged between the boundaries of three types of social interaction. It is, however, rather generic and does not allow a disjoint classification of technologies or functionalities.

Furthermore, Bafoutsou and Mentzas (2002) analyzed 47 software products and identified 28 basic functionalities or characteristics. Partly, these functionalities were used in specific applications (e.g., polling) or were related to general purposes (e.g., e-mail, which can be used for polling, votes, surveys, etc.). In their research, however, the authors do not establish relationships between the identified functionalities, e.g., by introducing categories and subcategories. Thus, notification functionality, for example, is attributed solely to e-mail. However, many other systems could also provide such functionality, such as bulletin boards or discussion functionalities, which notify the user about new posts.

Finally, based on the analysis of 250 CIT products, Mittleman et al. (2008) address the weaknesses of the models discussed thus far by providing a set of comprehensive, disjoint categories and subcategories for CIT tools. Their classification scheme incorporates four categories and eleven subcategories according to their core capabilities and other attributes (i.e., core functionality, content, relationships, supported actions, action parameters, access controls, and session persistence). Table 1 provides an overview of this classification schema. While a tool (e.g. Skype) still can be assigned to more than one category, its functionalities (such as, chat, screen sharing, audio or video conferencing etc.) can be assigned to only one subcategory. Since the subcategories are disjoint and may be related to concrete technologies or software products used in organizations, we integrated this classification scheme into our task- and function centric approach (see Section 3).

2.2 Collaborative Tasks

In its understanding of tasks, the literature proves to be quite inconsistent. The popular Media Richness Theory (MRT) (Daft et al. 1986, Daft et al. 1987) distinguishes between two characteristics of tasks: *uncertainty* and *equivocality*. Dennis Fuller and Valacich (2008) complement these task characteristics of the MRT and suggest task-independent communication processes: *conveyance* and *convergence*. Goodhue and Thompson (1995), on the other hand, differentiate between three task characteristics within an organization: *non-routineness*, *interdependence* and *job title*. Finally, Wood (1986) suggests that tasks may be distinguished by their complexities.

Hackman (1969) explores the nature and differences of task types. He distinguishes three types of group tasks: *production*, *discussion* and *problem-solving*. These differentiations of tasks are useful

when investigating tasks in a restricted environment (e.g., solving specific tasks using different tools or using a specific tool to solve different tasks), but prove to be too generic for a task- and function-centric approach in a broad and complex area (i.e., organizations), where different tasks are solved using several tools and vice versa.
McGrath's (1984) Group Task Circumplex, on the other hand, systematically describes the different types of tasks relevant for group performance. It includes eight distinct tasks (*planning task, creativity task, intellective task* (solving problems with correct answers)*, decision-making task* (deciding issues with no right answer)*, cognitive conflict task* (resolving conflicts of viewpoint)*, mixed-motive task* (resolving conflicts of interests), *competitive task* (resolving conflicts of power) and *performance task* (such as fulfilling a project's defined milestone by, e.g., implementing an already specified software component)) and allows distinguishing different purposes of collaboration. The model specifically focuses on collaborative tasks and addresses the different problems a team typically faces while collaborating. It therefore suits our aim of a holistic view of the relevant tasks and corresponding use of CIT functionalities, while being concrete enough to allow a mapping to real-world tasks found in organizational team collaboration.

Category	**Subcategory**	**Description**	**Example**
Jointly Authored Pages *Technologies that provide one or more windows that multiple users may view, and to which multiple users may contribute, usually simultaneously.*	Conversation Tools	Optimized to support dialog among group members.	E-mail, Chat
	Joint Document Authoring	Optimized for the joint production of deliverables like documents, spreadsheets, or graphics.	Wiki
	Group Dynamics Tools	Optimized for creating, sustaining or changing patterns of collaboration among people making joint effort toward a goal (e.g. idea generation, idea clarification, idea evaluation, idea organization).	Idea Management Tool
	Polling Tools	Optimized for gathering, aggregating and understanding judgments, opinions, and information from multiple people.	Doodle
Streaming Technologies *Technologies that provide a continuous feed of changing data.*	Desktop/Application Sharing	Optimized for remote viewing and/or control of the computers of other group members.	Citrix
	Audio Conferencing	Optimized for transmission and receipt of sounds.	Skype
	Video Conferencing	Optimized for transmission and receipt of dynamic images.	Skype
Information Access Tools *Technologies that provide group members with ways to store, share, find, and classify data objects.*	Shared File Repositories	Provide group members with ways to store and share digital files.	Windows Shared Folders
	Social Tagging Systems	Provide means to affix keyword tags to digital objects so that users can find objects of interest and find other users with similar interests.	Flickr
	Search Engines	Provide means to retrieve relevant digital objects from among vast stores of objects based on search criteria.	Google Search Engine
	Syndication Tools	Provide notification of new contributions of interest that have been added to pages or repositories.	Feed readers
Aggregated Systems	Technologies that combine of functionalities of other technologies and tailor them to support a specific kind of task.		Skype

Table 1: Classification scheme for CIT (based on Mittleman et al. 2008)

2.3 Impacts of Collaborative Information Technology

Identifying impacts of CIT from existing studies is somewhat difficult, as some impacts can be regarded as input or output variables. Team cohesion, for example, can be measured before (as an influencing variable) or after CIT use (as an output variable). Also, the results of such studies are rather inconclusive. While, for example, some have found CIT to be hindering the development of cohesion in virtual teams (Warkentin et al. 1997), others postulate that virtual team members can develop strong cohesion though exchanging social information (Chidambaram 1996).

Further, and for the most part, the literature on impacts of CIT is concerned with specific technologies, e.g., e-mail (Kettinger & Grover 1997), GSS (Fjermestad & Hiltz 1999), videoconferencing (Olson & Olson 2000), Wikis (Majchrzak et al. 2006), audio conferencing and chat (Löber et al. 2006).
However, to be able to relate the identified tasks and functionalities to specific impacts, we analyzed the existing literature for the most important impacts of CIT – regardless of their scope (CIT in general or specific technologies). These impacts are summarized in Table 2.

Impact	Description	Related Literature
higher project effectiveness	Project effectiveness is related to "doing the right things", i.e., to reach a project goals in an optimal way. It is often linked to other impacts, such as increased creativity.	Lind et al. (1995), Lurey et al. (2001), Pavlou et al. (2008)
increased creativity	In the analyzed studies, creativity is often conceptualized as the number of ideas a team generates (e.g., in a specific time period and on a specific task).	Dennis (1996), Fjermestad et al. (1999), Löber et al. (2007)
higher quality of work	Higher quality of work is related to whether a result is perceived to be optimal (e.g., the optimal decision has been made or the provided solution meets all requirements)	Dennis (1996), Fjermestad et al. (1999), Löber et al. (2007)
higher time savings	In the context of CIT use, higher time savings (or efficiency) is related to consuming less working time when using CIT. The analyzed literature, however, does not allow a general statement that CIT use leads to time savings.	Dennis (1996), Lind et al. (1995), Löber et al. (2007), Olson et. al. (1992)
higher cost savings	Successful collaboration of teams can lower costs (e.g. travelling costs or fixed costs).	Pavlou et al. (2008) Schwabe (2000)
higher parallelization of work	Parallelization of work denotes the division of work into several packages and their concurrent execution.	Diehl et al. (1987), Lamm et al. (1973), Löber et al. (2007), Olson et. al. (1992),
higher interruption of work	The interruption from executing a current task on behalf of a secondary task (e.g., incoming e-mail or chat message).	Cutrell et al. (2000), Horvitz et al. (2003), Jackson et al. (2001)
higher transparency of work	Transparency denotes the possibility of team members to trace a decision path or supervise the work process of others.	Nonaka et al. (1995), Olson et. al. (1992)
higher group cohesiveness	The extent to which members are attracted to the group and to each other. It is an important factor for group collaboration, especially in distributed teams.	Chidambaram (1996), Lurey et al. (2001), Straus (1997)
better work practices for collaboration	CIT has been found to potentially optimize work processes in collaborative work situations and change work practices.	Blau et al. (2009), Olson et. al. (1992)

Table 2: Identified impacts of CIT

3 RESEARCH FRAMEWORK

The task- and function-centric approach (Matter et al. 2009) is based on group tasks that can be supported by CIT and focuses on CIT functionalities (rather than tools or CIT types) and their impacts on different levels. It is based on the rationale that CIT functionalities are used for specific tasks and thereby lead to specific impacts, which may differ depending on the functionality and task. This also implies that CIT may be used differently in terms of functionality depending on the task it is used for (Matter et al. 2009). An audio conference system, for example, can be used to generate ideas (e.g., the marketing slogan of a new product) or to solve conflicts (e.g., conflicts of interest). Therefore the impacts of an audio conference are clearly different depending on the task it is intended to support. One can imagine that a team member is located abroad and takes part in an audio conference for brainstorming. In such a setting the team could perceive the benefits of higher group cohesiveness, as one member is not physically present. However, for brainstorming the audio conferencing tool might be not very practical in terms of efficiency, as it does not allow for any graphical or video submission. In the conflict-solving scenario, on the other hand, the team might choose audio conferencing over other CIT, because it provides all the functionalities needed for this specific task (namely the personal call to discuss the conflicts).

In our research framework (cf. Figure 1) we consider the context of CIT usage as fundamental for an understanding of their impacts. The context is defined by the tasks the technology is intended to support. Within this framework we define CIT use by the specific functionality employed for a specific group task. The use of CIT (the combination of functionality and task) then leads to specific impacts.

We based our investigation on McGrath's (1984) Group Task Circumplex and therefore included the following tasks into our notion of group task: *planning task, creativity task, intellective task, decision-making task, cognitive conflict task, mixed-motive task, competitive task and performance task.*
As state-of-the-art CIT tools typically include more than one functionality, the mere classification of such tools by functionality is clearly too narrow. GSS, for example, typically include polling functionality and additionally support audio or video conferencing. Hence, to compare the CIT usage profiles of different teams from different companies, a classification scheme based on functionalities is more appropriate. Only recently, such a categorization has been provided by Mittleman et al. (2008).
We incorporate their results by integrating the following functionalities into our research framework: *conversation functionality, audio conferencing functionality, shared file repository functionality, video conferencing functionality, polling functionality, search functionality, joint document authoring functionality, desktop/application sharing functionality, group dynamics functionality and other information access functionality* (syndication tools and social tagging systems).
Finally, based on previous research (see section 2.3) we have included the following 10 impacts of CIT: *higher effectiveness, increased creativity, higher quality of work, higher time savings, higher cost savings, higher parallelization of work, higher interruption of work, higher group cohesiveness and better work practices for collaboration*.

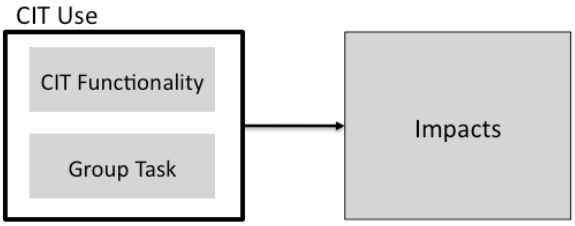

Figure 1: Research Framework

4 METHODOLOGY AND DATA COLLECTION

The exploratory study reported in this paper entails a qualitative approach to gain a detailed understanding of organizational CIT use and its impacts. We conducted 10 semi-structured interviews in 10 companies (i.e., one interview was conducted per company). The interviews were supported by guidelines and an electronic survey tool. For these interviews, we selected team leaders of collocated teams that were in the project realization phase. The smallest teams of the participants included five members and the largest 300 members. The interviews took place between October 9, 2009 and January 29, 2010. One interview had to be rejected, as it was incomplete due to interruptions and time limitation during the interview. The interviewees received the questionnaire about two weeks in advance, including an introduction and all question items. The semi-structured interviews took 60 minutes on average. An electronic survey tool captured the relations between task, CIT functionality and impacts. All interviews were recorded and transcribed.

To relate the task to functionalities and impacts, team leaders created triples by relating task with CIT functionality and the perceived impacts (task-functionality-impact relation). For each task they selected the CIT functionalities in use. For each link between task and functionality, they then selected the perceived impacts. Using audio conferencing to solve a cognitive conflict and perceiving higher transparency as an impact, for example, would thereby lead to the triple *cognitive conflict* (task) – *audio conferencing* (functionality) – *higher transparency of work* (impact). As a result of our pretesting efforts, we limited the number of CIT-functionalities and impacts, mainly because of time

constraints in the interviews and the overall complexity of the research model. The interviewees had to relate to 5 most important functionalities and 3 most important impacts. Furthermore, we asked for the rationales behind the relations the participants had selected.

We analyzed the interviews as follows: for each task we ranked the task-functionality-impact relations by their number of mentions. For each task the three most frequently mentioned functionality-impact relations were considered as important. To understand the rationales behind these relations, we consulted the interview transcripts.

5 RESULTS

The smallest teams of the participants included five members and the largest 300. Some of the collocated teams had such big time differences, that their shared working hours were between 2 and 4 hours, while others had no time differences at all.
In general, all of the CIT functionalities we discussed with the team leaders were available to the teams. All teams reportedly used the CIT functionalities of conversation, audio conferencing and shared file repository. Search functionality was used by six teams. Functionalities, which needed some preparation or technical experience (such as desktop sharing and video conferencing), were adopted by five and four teams, respectively. Three teams used joint document authoring and two the polling functionality. Functionalities like group dynamics and other information access functionalities were not used by any of the investigated teams.

The identified task-functionality-impact relations are summarized in Figure 2. For each task the relations between the functionality and impacts were ranked by the number of mentions and marked by their rank ("+++" = 1st rank, "++" = 2nd rank, "+" = 3rd rank and "o" = below 3rd rank). If a relation was mentioned less than three times, the relation was disregarded in our content analysis of the transcripts. Figure 2 only depicts those CIT functionalities that have a strong relation (rank 1 to 3) to an impact – all other functionalities were excluded.

Conversation functionality and audio conferencing were used for virtually all group tasks. But audio conferencing did not show any strong relations to impacts for competitive tasks. Likewise, a file repository was used by all teams and adopted for all eight tasks, however, only in three tasks were some impacts identified by more than two team leaders. Search functionality relates only to a single impact, even though it is reportedly used to achieve planning, creativity intellective and decision-making tasks. All other functionalities did not show strong relations to impacts.

Planning task: For planning tasks conversation functionality the respondents repeated that it lead to time savings and a higher transparency of work. Whenever audio conferencing was reportedly used for planning tasks, it was related to higher time saving. One participant pointed out that audio conferencing reduced the need of traveling and enhanced the team members' reachability. Furthermore, the participants brought forward the argument that personal conversations were more efficient than their written counterparts. The most prominent functionality-impact relation can be found for shared file repositories and their perceived impact of higher work transparency. The participants' explanations for this relation can be summarized in three aspects: firstly, all team members have the same basis to work on; secondly, the progress of work is transparent and, thirdly, every team member can see the actual state of the results. For planning tasks three functionalities are basically used – conversation, audio conferencing and shared file repository – and two impacts are perceived in this setting, namely higher transparency of work and higher time savings.

Creativity task: When conversation functionality is used for creativity tasks, teams seem to perceive impacts that are very different from those perceived for planning tasks. Unsurprisingly, increased creativity – which is an important aspect of creativity tasks – is perceived as a relevant impact. Team leaders justified their perceptions by pointing out that conversation tools (such as e-mail or chat) allowed team members to remain at their own workplace and therefore better concentrate and keep their minds free, which is very important in a creative task. The participants also considered the reduction in meeting time or coordination an advantage. When using conversation functionality the groups also perceived higher group cohesiveness. Reasons that were put forward included that such

functionality enables the inclusion of the opinion of timid or reserved people who would normally not speak up in face-to-face meetings. Audio conferencing was related to the same two impacts, except for their higher ranking. According to the answers of the participants, audio conferencing is perceived as being close to a face-to-face conversation as it enables the feeling of being collocated even when the team members are dispersed. Regarding the increased creativity it was argued that all participants could directly interact with ideas contributed by others. Hence, mostly conversation tools and audio conferencing were used for creativity tasks and the impacts perceived in this setting were higher group cohesiveness and increased creativity.

Task	Functionality	Impacts: Better work practices for collaboration	Higher group cohesiveness	Higher transparency of work	Higher interruption of work	Higher parallelization of work	Higher cost savings	Higher time savings	Higher quality of work	Increased creativity	Higher effectiveness
Planning	Conversation		o	+		o	o	++			o
	Audio Conferencing	o	o	o		o	o	+		o	o
	Shared File Repository			+++		o		o	o		o
	Search										
Creativity	Conversation	o	+		o			o	o	++	o
	Audio Conferencing	o	+++	o	o			o	o	++	
	Shared File Repository	o						o	o		o
	Search	o						o		o	
Intellective	Conversation	o				++	o	+++	+++	o	o
	Audio Conferencing					++	o	++	o	o	
	Shared File Repository	o				o		o	o		
	Search	o				o	o	++	o	o	o
Decision Making	Conversation	o	o	+++			o	o	o		++
	Audio Conferencing	o	o	+		o		o	o		++
	Shared File Repository			++		o	o		o		o
	Search								o		

Task	Functionality	Impacts: Better work practices for collaboration	Higher group cohesiveness	Higher transparency of work	Higher interruption of work	Higher parallelization of work	Higher cost savings	Higher time savings	Higher quality of work	Increased creativity	Higher effectiveness
Cognitive Conflict	Conversation		o	+				o			o
	Audio Conferencing		++	+++				o	o		++
	Shared File Repository			o							o
	Search										
Mixed Motive	Conversation		o	++					o		++
	Audio Conferencing		o	o			o		o		+++
	Shared File Repository			o							
	Search										
Competitive	Conversation		o	+++				o	o		++
	Audio Conferencing		o								o
	Shared File Repository			o							o
	Search										
Performance	Conversation			o		o		o	++		+++
	Audio Conferencing			o		o		o	o		++
	Shared File Repository			++		+++		++	++		o
	Search										

+++ 1st rank
++ 2nd rank
+ 3rd rank
o rank or no. mentions is below 3

Figure 2: Identified task-functionality-impact relations in rank order

Intellective task: In intellective tasks, when using conversation tools, higher time saving and higher quality of work are the most commonly perceived impacts. Regarding higher time saving two main reasons were given. Firstly, conversation functionality was considered an easy and fast way to reach team members. Secondly, the problem to solve had to be written down before it could be discussed and split into sub-tasks. The link to higher quality of work was explained in several ways: team leaders argued that written content gave everyone a reference point for discussion and the content of a shared file repository can be discussed and enhanced by using conversation functionality. Another impact perceived in this context was the higher parallelization of work. Conversation functionality provided by tools like e-mail or chat seemed to be the easiest way to share problem descriptions, status updates and sub-tasks. For intellective tasks, audio conferencing functionality has been linked to higher parallelization of work and higher time savings. Higher parallelization of work has been explained by the ability of audio conferencing to connect people irrespective where they are located. Search functionality is regarded to have impacts only for intellective tasks, namely higher time saving. Team leaders explained that this was because solutions for previously solved problems could easily be retrieved and re-used. In summary, for intellective tasks the most important functionalities are

conversation, audio conferencing and search, which lead to higher parallelization of work, higher time saving and higher quality of work.

Decision-making task: If conversation functionality is adopted in decision-making tasks, it leads to higher transparency of work (highest rank) and higher effectiveness. Conversation functionality enables involved persons to retrace how the decision has been made. The relation to efficiency was explained by the ability of conversation tools to broadcast a decision to multiple team members at once as well by their ability to inform the responsible persons early, which may then react immediately. Audio conferencing leads to the same impacts, except for the relation between audio conferencing and higher transparency of work, which has a lower rank. However, participants still thought it to be an important functionality, as decision-making required discussions in which the perception of the emotions in a person's voice played a major role. Some of our participants explained the higher effectiveness of audio conferencing by its ability to make joint decisions more readily, since all team members may be part of the (synchronous) discussion which may result in less questioning of the discussion's outcome. Shared File repository functionality lead to higher transparency of work, as the decisions and alternatives can be documented, which provides a better basis for decision-making.

Cognitive conflict task: When solving cognitive conflict tasks, audio conferencing leads to the highest rated impacts, namely higher group cohesiveness, higher transparency of work and higher effectiveness. The highest impact is higher transparency of work. Participants explained that audio conferencing is very personal and suggests a high degree of commitment to solve the cognitive conflict. The team leaders also related higher group cohesiveness to this functionality. Participants who supported this relation pointed out that human interaction and synchronous conversations were important to solve cognitive conflicts. Some respondents considered synchronous communication the best and fastest way to get a shared understanding and argued that it therefore results higher effectiveness. Conversation functionality in this context, solely leads to higher transparency of work. One team leader explained that it was used to secure evidence.

Mixed-motive task: The most commonly mentioned relation when solving mixed motive tasks was between audio conferencing and higher effectiveness for its support of clarification and agreement. Others mentioned that it was important to talk with team members to find out each other's backgrounds and interests. Conversation functionality, on the other hand, was described to constrain each member to formulate their arguments constructively, which would lead to solutions more quickly, thereby justifying the link to higher effectiveness. Conversation functionality also is perceived to lead to higher transparency of work, as it can easily be used to document conversations.

Competitive task: According to the respondents, for competitive tasks only conversation functionality leads to some impacts, namely higher transparency of work and higher effectiveness: every involved person can be reached and added to the conversation, which facilitates the traceability and therefore leads to higher transparency. The arguments for higher effectiveness were connected to conversation functionality's communication speed and the easiness to bring forward an argument.

Performance task: Looking at the performance task, the picture is very heterogeneous. Arguments brought forward for the link between conversation functionality and higher effectiveness were the possibility of broadcasting status very easily (goal achieved or not achieved) and the ease with which a last vote could be taken before a milestone is reached. The impact of higher work quality also was related to conversation functionality. The participants perceived that the functionality allowed every team member to refer to the same information. Audio conferencing was solely related to higher effectiveness, as it was an easy way to conduct quick (and regular) status meetings, without the need of team members to leave their offices. Shared file repository was related to four impacts: higher transparency of work, higher parallelization (highest rank), higher time savings and higher quality of work. The respondents drew these relations because this functionality allowed tracking changes and thereby lead to higher transparency and facilitating higher quality of work. The perception of higher parallelization was motivated by the functionality's allowance for team members to work on a document at the same time and enabling fast access to shared and up-to-date resources.

Though some respondents perceived the impacts of better work practice, higher interruption and higher cost savings, they did not turn out to be important impacts in general.

6 DISCUSSION

It is rather unsurprising that teams in organizations only use a small set of basic functionalities to achieve their tasks. They mainly use CIT functionalities, which have been known for decades. The most used functionalities – conversation (e.g., e-mail, chat), audio conferencing, shared file repositories and search – have existed in companies even before CITs pervaded private collaboration. Consequently, the respondents of our study attributed significant impacts to these functionalities. Looking at newer functionalities, such as polling, video conferencing and desktop/application sharing, we observe a very low usage – teams are either not aware of these functionalities or do not need them. We could not find any support that CIT functionalities are selected according to the task's specific characteristics. Analyzing the distribution of functionalities in specific tasks, it seems more likely that individuals in teams are using the same functionalities for different purposes. They obviously have extended the original application domain of the tools through their appropriation of the functionality, as suggested by channel expansion theory (Carlson et al. 1999).

While the task does not seem to have an influence on what functionality is used, the impacts differ for the same functionalities. Conversation functionality, for example, is used for all tasks but is related with varying impacts. Whereas higher transparency is perceived as an impact in the context of several tasks – namely planning, decision-making, cognitive conflict, mixed motive and competitive tasks –, for creativity tasks the perceived impacts are completely different. The same applies to intellective and performance tasks. Audio conferencing also shows a very heterogeneous usage regarding tasks and impacts. The impact mostly attributed is higher effectiveness, for decision-making, cognitive conflict, mixed motive and performance tasks. However, for planning, creativity and intellective tasks the participants perceived different impacts. Shared file repositories are consistently related to higher transparency, which probably is due to its ability to share content that is always up-to-date. When using shared file repositories for performance tasks, the participants also perceived the impacts of higher parallelization, higher time saving and higher quality of work. These varying impacts depending on the tasks support our preposition that the task needs to be taken into account, if impacts of CIT are surveyed.

A closer look at the results reveals that the overall perceived impacts seem to fit the task characteristics. While the perceived impacts for planning tasks are higher transparency and higher time savings, for creativity tasks CIT functionality was consistently related to higher group cohesiveness and increased creativity. Intellective tasks (solving a problem with correct answers) generally can be divided in sub-tasks and need to be on a high quality-level, as they are rather complex and often need expert knowledge. The perceived impacts are higher parallelization, higher time savings and higher quality of work. If decisions have to be made, transparency is very important, as the traceability of the decision process is important for both the team and the company. Transparency and effectiveness is very important for conflict solving tasks, such as cognitive conflict, mixed motives or competition tasks. This is mirrored in the participant's perceived impacts. Performance tasks are goal and milestone oriented, therefore transparency within the group, division in sub-tasks, time, quality and effectiveness are major requirements. This explains the broad impact coverage in this task. Overall, the results reveal users that are task-oriented and rather opportunistic. Rather than using sophisticated functionalities (such as video conferencing or group dynamics) they choose to stay with a set of established functionalities (conversation, audio conferencing and shared file repository), which have already proven to be helpful in their working contexts. Hence, the opportunistic user seems to rather apply established functionalities for different purposes than substituting functionalities or tools and therefore his habit, even though new tools and their functionalities might better suit a task at hand.

7 CONCLUSION

Our approach of focusing on CIT functionalities and abstracting from specific tools allows comparing CIT usage between different teams. When investigating impacts of CIT use, it is important to also inquire the context CIT is used in, namely the task and the specific functionality. As our results have shown, the perceived impacts of functionalities seem to be highly dependent on the task. Hence,

asking teams to relate CIT tools (rather than their functionality) to perceived impacts is not apt to reveal the rationales of an individual's choice of CIT. For that reason, we recommend following a task- and function-centric approach. The usage profile and analysis of the task-functionality-impact relations reveal an opportunistic and task-oriented user; teams tend to ignore new functionalities, known to be highly embedded in Web 2.0 tools (e.g., polling, video conferencing, application sharing), and principally only use a small set of functionalities – namely conversation, audio conferencing, shared file repository and search. Practitioners responsible for providing CIT in organizations might have to reassess their strategy, as investments in expensive CIT tools will only pay out if they include these functionalities.

8 LIMITATIONS

The impacts related to the functionalities and tasks are solely based on the perception of team leaders, which are not necessarily the best representatives for a team's perception. For example, she might not be able to make statements about group cohesiveness or higher interruption of work. We therefore suggest that further research should include the perceptions of team members using CIT.

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