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The facilitator's perspective on IT support in innovation workshops

Sabine Schön[1], Alexander Richter[2], Michael Koch[1], Gerhard Schwabe[2]

Cooperation System Center, Bundeswehr University Munich[1]
Department of Informatics, University of Zurich[2]

Abstract

Supporting collocated meetings has always been an important field for CSCW. However, whereas solutions for video conferencing and presentation have been widely adopted, IT support to mutually edit artefacts has not yet found its way into practice. To contribute to a better understanding of the situation, we investigate perceived benefits and barriers of IT support using the example of interactive phases in innovation workshops. We conducted an interview study with professional facilitators of innovation workshops and found that existing technologies are perceived as disturbing in several ways. Consequently, we identify open issues and implications for the design of future solutions.

1 Motivation

A company's strategic position in the competitive market depends upon its ability to continuously fascinate customers with novel products and services. In their endeavour to innovate, companies have to address a variety of challenges. For example, in early phases[1] it is necessary to reduce the complexity of innovative projects and to foster information exchange, as well as shared understanding (Hauschildt & Salomo 2007). Corporations employ professional facilitators to guide teams through this process. Workshops play a key role in this context and are used as a central method to unite interdisciplinary skills (Katzenbach & Smith 2003). Especially in interactive phases of these workshops, facilitators use many tools, such as posters and post-its, to reduce complexity and foster interaction (Nielsen 2012). In the 1990s, Group Support Systems (GSS) have been extensively discussed as a means to support facilitators of different kinds of workshops with an electronic moderation toolkit (e.g. Nunamaker et al. 1991). However, actual meeting support is still mostly limited to analogue tools, including post-its and pens. These tools are easy to use and their benefit is obvious (Nebe et al. 2011). If technology is used, it is mostly presentation

[1] In this paper, we understand early phases of innovation processes as activities that include problem identification, idea generation and development of new concepts like business models and service strategies.

software, such as Powerpoint. Moreover, some studies have focused on providing solutions to mutually edit digital artefacts, like post-its, in collocated meetings (e.g. Hilliges et al. 2007). They have also not yet been adopted in the vast majority of workshops. Since most studies, which identify reasons for or against the use of IT, are predominantly related to the classical use of desktop computers (e.g. Alavi 1993, Aiken et al. 1994, Mark et al. 1997), it has been postulated that due to the availability of tablets, smartphones or large screens in "Collaborative Interactive Spaces", the conditions should be re-examined (Jetter et al. 2012).

Since the facilitators are the major promoters or demoters of the use of new technology in workshops, we would like to contribute to that research by analysing the reasons facilitators use IT (or not), using innovation workshops as application domain. Thereby, we demonstrate open issues, research opportunities and implications for the design and development of IT support[2], which overcomes barriers and exploits benefits that favour the necessary value for practical use. After reviewing related work in Section 2, we first will describe our empirical approach (Section 3). We have conducted a series of 17 interviews to identify perceived benefits and barriers. We present our results in Section 4 and discuss these in Section 5. Finally, we provide a summary, outline limitations and future work in Section 6.

2 Related Work

Various studies in the 1990s, have shown how GSS support collocated meetings. Nunamaker et al. (1991) point out that the parallel and anonymous input options in electronic meeting support can encourage participants to increase participation. A structured meeting process with the help of GSS can foster focusing on key issues and avoids unproductive behaviour. The automatic documentation of cooperation subsequently allows a better understanding of the content (Nunamaker et al. 1991). In that context, Krcmar et al. (2001) stated that the linkage to previous results and their further development is easier through the reusability. Alavi (1993) showed that the verbal exchange is not replaced by GSS, but increases instead. Notwithstanding these positive assessments of the impact of GSS, there are critical voices. Aiken et al. (1994) identified that the use of GSS can impose effort and consume time, especially for less technology-savvy participants. Furthermore, according to Mark et al. (1997), structural requirements by GSS can restrict facilitators and participants in their interaction. Most early work on GSS assumed a technological determinism; that an application or feature could impose a certain effect on the group. Since the mid 1990s this was replaced by the notion that a skilled facilitator can use GSS to trigger such an effect (Schwabe 1995). A GSS does not only provide him with a set of tools, e.g. for brainstorming, but it also gives him absolute control over the participants' computer. The reliance on skilled facilitators positioned GSS in a niche, as professionally facilitated workshops are rare compared to informal group work or meetings. Nonetheless, researchers are striving to replace the facilitator by engineering a workshop practice once and then letting participants to

[2] In the following, we will use this general term to describe IT tools comprising software and hardware components aiming to support collocated collaborative work (e.g. creating and editing shared artefacts like post-its).

instantiate this practice themselves (Kolfschoten & Vreede 2007). However, those efforts do not explain why GSS did not find their way into practice and can be regarded as mostly forgotten in its key customer group. More recent studies assume the main reason of resistance is that the collaboration artefacts are presented inappropriately. They thus strive to improve the quality of the digital artefacts (e.g. digital post-its). Herrmann and Nolte (2010) showed that the use of large vertical, interactive projection screens helps the participants to see their contributions at a glance and put artefacts into structural relationship. The additional use of mobile devices gives participants the opportunity to contribute content in parallel and therefore support various stages of cooperation (Herrmann & Nolte 2010), such as the discussion with the facilitator as well as phases with parallel input. However, Hilliges et al. (2007) stated that using single-user systems in a collaborative setting entails the risk that the attention of the participant's decreases. Streitz et al. remarked already in 1999: the computer should stay in the background.

Whilst a few studies demonstrate the potential of IT support, there is still a lack of studies that explain why it is not used to work together in practice. The need for a better understanding of factors that prevent but also motivate use seems to be reinforced by the fact that recently a couple of new technologies have the potential to support innovation workshops in new ways. As an example, Haller et al. (2010) presented the NiCE Discussion Room, which consists of a multi-touch wall display in combination with tangible menus, laptops and paper interfaces. The authors identified that in using paper interfaces, the participants felt more inclined to contribute. Also Scott et al. (2003) advise the integration of physical objects because they allow users to apply the years of experience they have accumulated. Geyer et al. (2011) present a user interface with hybrid post-its that have both a physical and digital representation. They offered the capability to retrieve images by placing a physical note into a certain space. This was very well perceived among participants and triggered lively discussions. Although the research resulted in a stream of commercial products, they are still rarely applied in interactive phases of innovation workshops. Why? Before we discuss this in more detail, we will briefly introduce our methodology.

3 Method

By aiming to develop an innovative and purposeful artefact in a specified problem domain, in our case innovation workshops, our research approach is based on the design science paradigm (Hevner 2004). Taking into account Gregor & Hevner (2013), our goal is to improve existing artefacts and provide a solution that favours the necessary value for practical use. In this paper, we present the first activity of design science according to Peffers et al. (2007): Problem identification and motivation. In this way, we identify open issues, reveal research opportunities and implications for the design of future solutions.

To contribute to a better understanding of the current situation, we investigate perceived benefits and barriers of commercial IT support using the example of interactive phases in innovation workshops. We conducted a qualitative interview study with six female and eleven male facilitators who design and conduct international innovation workshops. Since

facilitators typically decide on the use of visual tools and have extensive knowledge about different types of workshop participants, they represent our key stakeholders. After 17 interviews, the addition of further interviewees promised no new information (Hennink 2011). The selected facilitators work as freelancers, employees or managers in Germany and Austria. 14 of the respondents work as external facilitators in consulting firms or innovation agencies and two as internal facilitators in international companies. One participant facilitates innovation workshops in the university environment. The interviewees were between 27 and 59 years old and all regularly use computers and mobile devices, except for one participant. Twelve interviews were conducted personally and five by telephone. The interviews were recorded with the consent of the participants. The time frame of an interview was between 30 and 60 minutes. The interviews have been conducted in a semi-structured way (Schultze & Avital 2011) to come close to an open discussion. An interview guide helped to maintain the structure (Bryman & Bell 2007).

In the first part of the interviews, respondents were asked to report on their last typical innovation workshop. Thus, we gained insights into the working practices and the examples acted as specific application reference for further questions. Using the guidelines ensured that certain characteristics, such as structure, objectives, tools, location, duration, preparation and follow-up, were discussed. This allowed us to determine whether commercial IT support was already in use in interactive phases. This was the case with two respondents, while several reported that they had tried such tools for this application. Following the approach of Stacey and Vincent (2011), we enriched our interviews with multimedia data to get in-depth answers. We introduced web-based, real-time collaboration software, which was specially developed for the support of innovative processes[3]. Thus, the facilitators received an exemplary impression of software that could be used in interactive phases. Following this, the facilitators were asked which added value they see in the use of such software. To collect data, whether and how new (touch-based) user interfaces affect the usage decision, the facilitators were presented three videos, each showing alternative control concepts for the use of real-time collaboration software to mutually edit digital post-its[4]. After each video, the facilitators were asked if and why they would or would not use it in their workshops. At the beginning or after the survey, metadata such as age, work experience, use of digital devices, company, company size and position were collected. The interviews were transcribed and coded sentence by sentence according to the open coding scheme of Corbin and Strauss (2008). Afterwards axial coding (Corbin & Strauss 2008) helped us to group categories to more high-level ones. Next we will present our results based on these generated categories.

[3] Rapid Modeler is a team software for business design that allows participants to mutually edit digital post-its on a shared workspace to design, e.g. business models or service strategies (www.rapidmodeler.de).

[4] (a) Laptop per person with one joint projection, (b) one joint interactive tabletop and tablet per person, (c) one interactive wall-mounted screen and mobile device (laptop, tablet or smartphone) per person

4 Results

We begin by describing perceived benefits of use, as indicated by facilitators. As we learned from the interviews, the documentation of innovation workshops is complicated for facilitators. Results produced with tools like post-its must be digitized. An IT tool that helps to automatically document results as well as the development process was considered as beneficial by the facilitators. Compared to working with paper tools, IT support offers the possibility to include external content, such as images and videos, which can serve as a source of inspiration. Moreover, different dimensions can be imaged, as there are more ways to store and link information. The interviewed facilitators were eager to improve the interaction among the participants, to stimulate them to contribute or discuss more. Furthermore, the fact that the use of IT allows supporting innovation processes without media change in synchronous and asynchronous collocated or remote collaboration is seen as beneficial. Although most of the interviewed facilitators perceived these benefits, barriers of use nonetheless outweigh them and led to a negative usage decision. In the following, we describe the barriers stated by the facilitators. All of them allude to the fear that the IT support used disturbs their workshops, due to (a) external influences, (b) complexity and (c) parallelism. Additionally, facilitators fear to change their (d) way of designing workshops.

a) Most interviewees reported the predominant fear that their participants might be distracted by *external influences* and lose focus. If personal mobile devices are used, private and business applications like email or instant messaging might disturb the workshops. Since they cannot control this, the facilitators sometimes even require turning off all digital devices during the course of a workshop[5]. It is the only way to ensure the full and undisturbed concentration as well as the development of group dynamics. Since most workshops take place at external facilities such as hotels, often only a projector is available. Thus, many facilitators mentioned the problem of transporting all tools.

b) Many facilitators explained that they were concerned that the attention of participants may be deflected by the use of IT due to *complexity*. The coexistence of shared and private working areas, such as large interactive screens and mobile devices, represents a barrier for interaction, since attention is away from the shared workspace. This influence on their attention occurs also when writing on post-its, but this activity is considered faster and easier, since no additional editing options (e.g. colour) are provided. It is feared that once attention is directed to the input device, the content of the workshop is moved into the background[6]. The facilitators believe that "pen and paper" is a pure tool because the usage is not only simple but also boring. Moreover, facilitators fear a loss of focus due to malfunctions and usability complications. The risk remains high that less technology-savvy participants would be excluded. For facilitators however, the balanced participation and equality of the participants is essential. Not only may the loss of focus of the participants

[5] "But just on the other hand, it is more my motto, when people come to workshops, then I do not need them to sit in front of a screen, that's what they already do the whole week, right?"(I5)

[6] "I'd currently be concerned that the technology is in the foreground too much and is not a pure tool [...] it must then be a tool, a tool, and without a big wow effect or gimmick." (I2)

cause concern, but also the risk of complications during setup. Compared with handing out paper and pens, the initial setup of an IT tool presents a challenge[7].

c) By offering next to the analogue communication channel a second digital channel, the facilitators fear that once the attention is *directed to the digital channel*, the parallel activities in the group are no longer perceived. So it can happen that discussions fail because the contributions of others will not be noticed. In these terms, the biggest concern is that, finally, the personal interaction is replaced by the digital. However, in the perception of the facilitators the bundling of attention of all participants is an important prerequisite for successful workshops. The facilitators fear they could lose track and contributions would remain unnoticed[8]. In this case, the fundamental rules for cooperation would have to be communicated in advance, which constitutes an additional effort for facilitators.

d) Several facilitators mentioned that they cannot imagine the use of IT, because the tools are too inflexible for use in their *own facilitation methods*. They criticize that the experience of the common result processing is restricted to a limited number of screens and loses its presence in the room. Many facilitators use all walls in the room to hang up results achieved so far. This serves on the one hand as an overview and on the other acts as input for following exercises. This overview is lost in control concepts that offer just one big screen. The issue is strengthened in small group work. Assuming a large projection is available for the entire group, but not for every small group, the achieved results of each small group are not present in the room, but hidden in the IT tool. The presence of each individual contribution to a large and common visual workspace is very important for the facilitators, as it promotes interaction and involves participants. In addition, the physical action of the participants, which is desired by facilitators, is reduced when using digital devices to place a contribution. Moreover, facilitators fear that haptic perception, e.g. fixing and removing a post-it, is lost. As well, concerns are expressed regarding the structural requirements through digital letters. Within innovation workshops, especially in the early stages, contributions should emit no finality, but rather symbolize that they are not yet ready. Digital characters are perceived as mature compared to hand-written and are therefore only required in workshops that deal with concrete tasks at later stages of innovation processes.

5 Discussion

In this section we discuss our findings with respect to those in the literature and demonstrate open issues and implications for the design and development of solutions that favor the necessary value for practical use in interactive phases of innovation workshops.

[7] "[...] we are often at the customer's office and can not install such a thing and first calibrate it and we are there one and a half days in advance to prepare that everything runs and [...] have to drill holes in the wall [...]."(I3)

[8] "[...] you should watch out that it does not get out of hand, so let's say, that [...] it still retains the structure and that the facilitator [...] still has an overview of who does what and when [...]."(I17)

In the last years, research has made huge steps concerning the availability of new user interfaces, which provide workshop participants with much more than a desktop computer. Multiple users can edit shared artefacts on multiple devices in very natural ways, like touch or pen-based interactions. Furthermore, digital representations of real world artefacts (e.g. post-its) become more and more realistic. However, the comments of the facilitators indicate that some design principles of GSS (e.g. GroupSystem's) are still valid. The facilitators want to stay in control. Just sharing an artefact may work for small informal groups, but it does not work for facilitating larger groups. Facilitators fear that contributions stay unnoticed and participants fail in trying to cope with the complexity of the IT tool. They may spend too much time on choosing the right colour and size for their contribution. The facilitators also point to a new control challenge: while in prior times physical presence assured focus on a shared outcome, connected personal devices offer participant distraction any time during the workshops. As the bundling of attention of all participants is a central issue, there is still the need for a solution, which (1) fits unobtrusively into the workshop situation. It remains an interesting challenge how to provide computer based tools and at the same time (2) shut away distractions. Our results are in line with several studies showing, e.g. that the use of single-user systems negatively influences collaboration (Hilliges et al. 2007, Streitz et al. 1999). Therefore, the IT support should (3) encourage interaction on one or several common workspace(s) and allow the work on single-user systems only when needed, like consciously used parallel phases. Within parallel phases, the IT support should (4) provide the facilitator control options to prevent that contributions are not considered and avoid foreign activities.

If GSS had been a complete solution for the facilitators' needs, it would be widely adopted by now. Without directly pointing at GSS, the facilitators clearly indicate their preference for physical artefacts. They are widely available, have a different haptic quality and allow using the whole room as a collaboration arena. Taking into account Mark et al. (1997), who stated that IT support can limit facilitators, our results show that our interviewees also perceive this. The reason is that if the visualization of contributions is limited to one shared display, interim results lose their presence in the room and small group work is not supported by a large common workspace. The development of a technical solution, which (5) exploits the flexibility of the spatial conditions for visualization of the contributions as well as (6) supports each small group with a large common workspace, continues to be a challenge. This challenge is reinforced by the fact that in many cases workshops take place in unknown facilities. Therefore, we suggest that the IT support must (7) be portable and be independent from the technical infrastructure. Since the facilitators described the concern that usage complications might during the use and the initial setup of the system, it is inevitable that the IT tool (8) is reliable, does not require any prior knowledge and requires low setup time.

Similarly as approached by Haller et al. (2010) and Geyer et al. (2011) as well as advised by Scott et al. (2003) the facilitators wish their participants to experience haptic perception. Handwritten workshop contributions have personal touch and the appropriate level of "unfinishedness". Moreover, facilitators want their participants to be physically active during the workshops. While a digital participant is largely tied to the device and thus reduced to "eyes and hands", the analogue participant can freely roam around the room. This physical movement introduces a degree of serendipity into the analogue workshops that digital workshops lack. We suggest that (9) physical movements and haptic perception (including

handwritten contributions) should be promoted by the IT support. For example, Streitz et al. (2001) presented a solution where participants can carry around digital information via physical representatives. It is an unintended contribution of research on the IT-support of collocated collaboration that its use has opened the eyes of researchers on qualities of physical artefacts. At this point, the question can be brought up if the real world should be integrated into the digital or vice versa. New studies present approaches that bring the digital world to the physical. Harboe et al. (2012) found out that despite the availability of digital solutions design teams still rely on post-its. Therefore, they suggest an augmented reality interface on a tablet computer to search through and identify paper notes immediately. In that way, they combine the benefits of a technical solution with the ones of physical notes. In our study, the facilitators stated that they appreciate the possibility of IT to (10) define contributions in different dimensions and planes as well as (11) integrate multimedia data to inspire participants. These benefits should be exploited since they constitute a significant advantage compared to the pure use of paper and pen. According to the benefits of IT support stated by Nunamaker et al. (1991) and Krcmar et al. (2001), the common work must (12) be documented and versioned automatically and (13) allow synchronous or asynchronous processing before and after the workshop.

6 Conclusion

Drawing from a series of interviews with 17 facilitators of innovation workshops we have presented a study of perceived benefits and barriers to the use of IT in interactive phases of innovation workshops. We discussed research that influences the design of new solutions. The results of our study show that currently the risks to disturb the workshops are perceived as too high by the facilitators. We identified that researchers in different fields already addressed several barriers of use, including control options for facilitators in GSS, the promotion of physical movements, as well as tangible user interfaces. Researchers are also starting to exploit benefits when designing IT-support, e.g. by the help of augmented reality interfaces. The combination of all these partial approaches to an integrated solution is tough. However, there is the chance to combine them step by step to finally provide solutions that favour the necessary value for practical use in interactive phases of innovation workshops.

Since we interviewed facilitators of innovation workshops, it requires caution when transferring our findings to other application areas. However, we believe that other types of workshops may have similar issues. A further limitation of our study is that we only highlight perceived benefits and barriers by facilitators of innovation workshops and most of them have not used a collaboration system within their workshops before. However, they represent key stakeholders in practice and decide on the use of IT. Since we do not aim to identify design principles within this paper, benefits and barriers we identified cannot exclusively act as a basis for the development of a solution. Our study aims to contribute to the understanding of concerns on the facilitator’s side, influencing currently made usage decisions. Therefore, we reveal outstanding issues, show research opportunities and outline implications for the design and development of solutions.

In the aftermath, we derive design principles and concrete requirements on the basis of which we develop a prototype (Peffers et al. 2007), which addresses presented barriers and exploits benefits. Against this background, touch screens or projections in combination with voice input and tangible user interfaces will be investigated to see whether they can, e.g. maintain the level of attention. Additionally, augmented reality interfaces that blend the work with currently used tools, like approached by Harboe et al. (2012), will be taken into account. To ensure that the solution addresses the identified barriers, creates an added value and is accepted by users, the prototype will be evaluated in innovation workshops in practice.

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