

Designing reflection tools that people want to use: Motivational aspects of supporting collaborative reflection at work

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Abstract. Based on two case studies this paper describes aspects of designing tool support for collaborative reflection that people want to use. These factors include the importance and proper application of user participation in design process, different ways of introducing collaborative reflection tools into the work of people, the importance of social procedure aligned to tool usage and features supporting the usage of reflection tools. The paper refers to case studies with an IT Consulting company and a hospital ward.

1. Introduction

Reflection is a common and decisive task in most workplaces [1, 9, 13]. During reflection, reconsider (mostly implicit) how they performed tasks, and rethink what they can do better when doing them again. This includes going back to emotions and other details of the situation. While reflection can be considered a valuable mechanism of learning at the workplace [3], it is also bound to human memory, which may fade or be incomplete in terms of details needed to reconsider past experiences. Likewise, the implicit nature of reflection often causes results from reflection not to be documented or sustained in other ways, which in turn means that they are lost or at least not successfully transferred to others.

Employees wanting to reflect can therefore be supported by tools for reflection, which enable them to complement their memory on past situations to reflect on and to sustain insights stemming from reflection [2, 8, 12, 14, 15]. However, reflection is deeply embedded and may occur in many different modes ranging from meetings to spontaneous encounters on the hallway [12]. This makes using tools difficult, as they have to fulfil constraints posed by the diverse situations reflection is likely to happen in (e.g. a tool has to be applicable for meetings and spontaneous talks) and factors such as time pressure (e.g. supporting reflection while other tasks have to be fulfilled). Therefore, besides specific questions concerning how to support reflection in special situations with tools, we need to focus on question such as how to create cor-

responding tools that fulfil these needs and how to motivate their usage. This paper investigates these issues.

The results presented in this paper draw on two case and design studies with physicians and nurses in a German hospital as well as employees of an IT-Consulting company. Based on an analysis of work done in these cases, we designed tools for the respective cases. From this, we derived insights into the design of reflection tools that people want to use and additional factors on the motivation of this usage.

In what follows, we briefly sketch some background on reflection and existing work on tools to support it (section 2). After that, we describe the cases and the tools designed in each case (section 3). Then, we analyse and present a list of factors leading to the design of reflection tools that people want to use (section 4).

2. Reflection, workplace learning and existing tools: Background and open issues on design and motivation

Reflection is a process of going back to experiences (made in the past), attending to these experiences (including emotions and insights during them), re-assessing these experiences (based on current knowledge and an ex-post perspective on the experience) and drawing conclusions for future behaviour from this process (see [1]).

Reflection obviously is not a formal way of learning, but happens rather informally and mostly implicit: it may occur while a task is carried out or after it has been completed. In a similar distinction, Schön refers to this as reflection *in action* and reflection *on action* [13]. It has been recognized for many workplaces that reflection at work happens frequently and is one of the decisive mechanism of improving work [1, 9, 13] and thus, support for reflection at work is crucial.

Learning from **reflection at work** is a process of informally improving work practice and can thus be considered **workplace learning**. This kind of learning is special in that it differs from other forms of learning such as vocational training or courses in schools and universities. According to Eraut, it happens in an unstructured and complex context that has not been adapted or created with learning means in mind: “it is usually the work that is structured and not the learning” [4]. This means that there usually is usually no dedicated, reserved space or time during the workday for workplace learning such as reflection – it often has to happen during or in parallel to work.

Reflection is mostly based on human memory, which may fade over time or may be incomplete in terms of all the necessary details that have to be known of the situation the experience stems from in order to re-assess it. Therefore, tools complementing memory, e.g. by providing additional data on a given situation or making the perspectives of others on this situation available, and supporting necessary tasks such as communication and cooperation of reflection have been discussed intensively in literature [5, 7, 10, 11, 14, 15]. However, besides insights on special purpose reflection tools (e.g. [5]) or generic tools stemming from cooperation and learning support in general (e.g. [11]), little is known on the design and application of tools supporting reflection in practice.

The questions stemming from this initial situation and its constraints – supporting reflection as a task deeply interwoven with work, with little time and space to perform it – are **how to design tools that help people in reflection** and **how to motivate people to use these tools** for reflection. In this paper, we investigate these questions with a focus on how to motivate reflection at the workplace, including methodological aspects of designing and adapting reflection tools, characteristics and features of such tools as well as integrating these tools work processes. This investigation draws on use cases of reflection drawn from two different organizations (healthcare, IT consulting) and on the design of two tools to support reflection in the respective organization.

3. Support reflection in practice - two design cases

The following analysis of reflection in practice is based on two case studies we conducted, including a hospital ward with focus on the physicians working there and a sales department of a IT-Consulting company. We identified different modes of collaborative reflection [3] dependent on whether reflection happens spontaneously, concurrent to work or planned within meetings. Each of this modes has different settings and also different levels of reflection [12] from discussions of concrete episodes to more abstract reflection about processes.

3.1. The hospital case

In one case, we worked with a hospital located in Germany. There, we observed and interviewed physicians and nurses on a ward that is specialized on early-stage treatment of patients that suffer from strokes. We observed one physician and one caregiver for two days each, shadowed them throughout their shift and made notes on things that happened, peoples they interacted with, artefacts they used and tasks they carried out. The notes were afterwards digitalized and categorized based on a grounded theory approach [16]. In addition, we interviewed 2 physicians and 2 nurses in semi-structured interviews about their work and reflection practice.

Based on the outcomes of this study [3, 12] we started a series of workshops to elicit topics for collaborative reflection and requirements for tools supporting the reflection on these topics. In total, we held five workshops with a differing number of physicians. It turned out early that talks with relatives would be a suitable topic for reflection: both in the workshops and our study, we found that talking to relatives is not part of the normal training for physicians, but has to be learned ‘on the job’. These talks are often emotionally challenging, as they have to convey bad news and at the same time explain complex medical situations, which require relatives to pay attention, as they may have to choose between different treatment options. To improve the own performance within such talks is therefore motivated by the individual aim to feel better and the idea that bettered informed relatives lead to better possibilities for the upcoming treatment. Thus, together with the workshop participants we decided that this would be a good topic to collaboratively reflect on.

We agreed on a basic set of requirements for a tool to support reflection on such conversations, covering the possibility to

- **document** the talks in a formal way as it is already required for patients folders,
- add additional information that help to **rebuild the context of the experience** in form of text comments as well as short self-assessments guided by questions like “how did you feel during the talk”,
- **support sharing** of those documentations with others and,
- provide means to **comment** on documentations others shared,
- support **links between documents** and articulation of outcomes in relation to multiple documentation

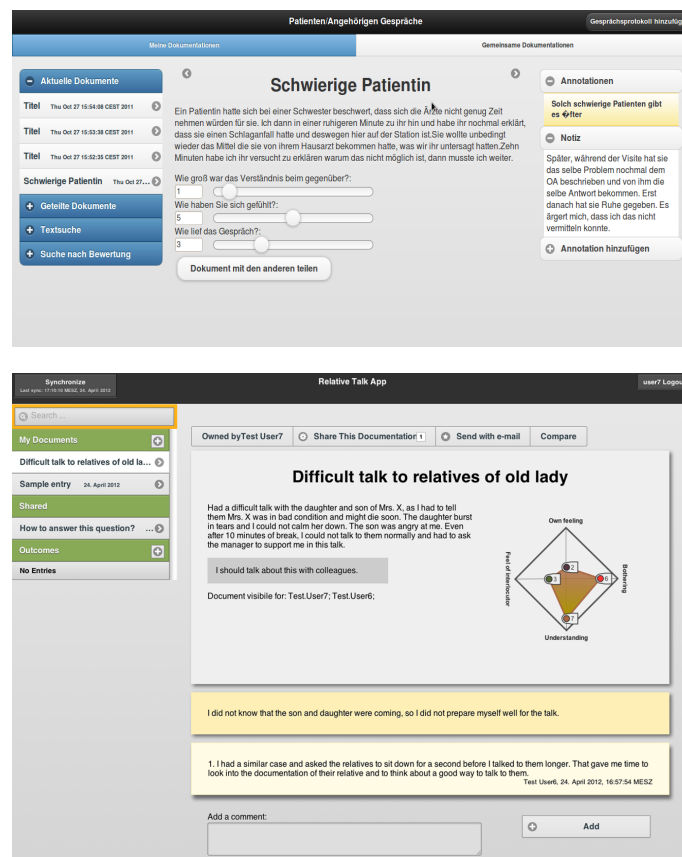


Figure 1: Two versions of the Talk Reflect App: The initial prototype presented in design workshops (top) and the current version used in a four week evaluation (bottom).

We implemented these requirements in the “Talk Reflection App” (see Figure 1), which was designed for mobile devices to support the different modes of collaborative reflection mentioned above, like reflecting ‘spontaneous’ independent from a

workstation computer. We used a prototyping approach throughout the five workshops, in which the prototypes were improved iteratively between workshops (Figure 1 shows an early version and the current version of the app to demonstrate this). This was done to give the physicians, who were not much tech-savvy, an early impression what an app could do for them and to provoke concrete feedback for design.

In the workshops, the physicians tested the prototypes, e.g. by documenting recent conversations and talking about them afterwards, and developed ideas for new features. This helped participants to get a common idea of the application and the way it can be used during work. As one result, it turned out that the largest constraint of physicians towards using a reflection support tool is time: Often there is a large timespan between the conversation and the moment they are able to document or even reflect on it, as they always have to immediately respond to emergencies and therefore only have a loose daily structure. Therefore, we added a feature to export documentation done with the Talk Reflection App to the hospital information system, in which the physicians have to document conversations with relatives as well, in order to save time by avoiding redundant tasks. Furthermore, using the prototypes led to the idea of an additional section within the app, in which outcomes of reflection can be noted down and related to specific tasks – the physicians insisted on having such a feature present e.g. in meetings not to lose insights from reflection. This, according to the physicians, helps sustain reflection results as general outcomes that can also be shared with and understood by other physicians. In one workshop, we also discussed the necessity to capture emotions during the documented conversations. The physicians proposed to have short questions like “How likely is it that I will take this talk home?” that they could answer while creating documentations without much effort, but as a casual part of the documentation work. This was implemented early on with simple sliders to assess emotions (Figure 1, top) and later complemented a spider graph representing the emotions for talk (Figure 1, bottom), thus supporting quick comparison between documentations.

Another interesting, non-technical outcome of the workshops was that the physicians wanted the usage of the Talk Reflection app to be closely linked to meetings or supervision, in which the documented conversations should be discussed among them. We soon realized that they perceived this as a main motivating factor and would more likely use the app if they knew that there was an event in which they could reflect on documentations together.

The development was concluded by a four weeks test of the application on iPad devices during daily work to evaluate the utility and impact of the app. The evaluation brought up additional requirements, but also showed proofed the applicability of the general concept. Although physicians did not use the application as frequently as we had intended, they agreed that the app raised awareness for and triggered reflection on difficult conversations with relatives. For example, in one of the workshops conducted during the evaluation, we observed how a discussion of documented conversations led to plans for improving the situation in which those conversations take place. Suggestions included using a separate room for off the ward to have a more private environment as well as regularly have a supervisor to answer general questions about how

one could behave. In the end, the physicians agreed on freeing space for a dedicated room to be used for such conversations.

3.2. The Consulting Case

Our second case is an IT consulting company also based in Germany. Here we worked with people from the sales department, who form a group consisting of about 20 people, of whom only a small part (about six) is working in the headquarters, while the others are distributed throughout the country working closely with (possible) customers. The whole group only gathers in a monthly meeting, in which general topics like fairs, new developments of the product set or large pitches are discussed. Similar to the approach at the hospital described above, we shadowed and observed two of the sales consulting in the headquarters for two days and conducted three interviews.

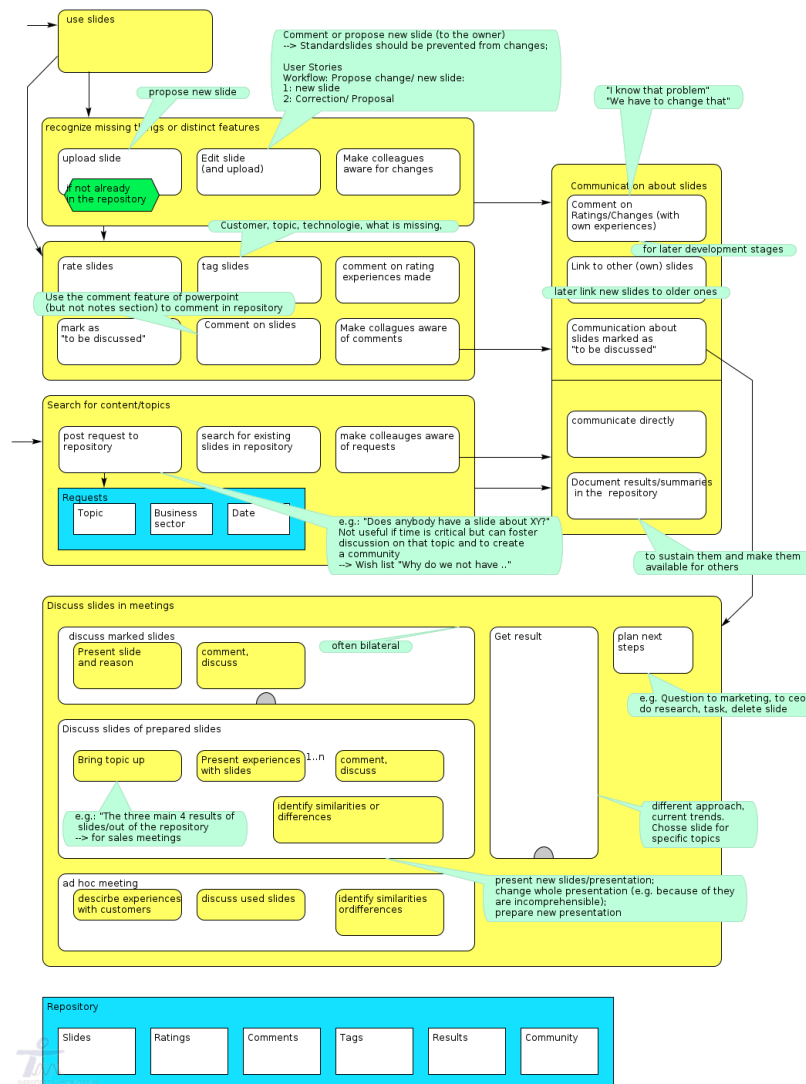


Figure 2: A SeeMe-Model after the walkthrough with comments added.

The main motivation for reflection at this case is closely related to the general goal of the work of a sales consultant: Sales consultants want to convince customers to choose their products over competitors. In our study, we found out that the main artefacts used for this are (sets of) presentation slides, which guide discussions with customers. Typical situations in which we found them reflect include the preparation of a new presentation for a possible customer (sales pitches) e.g. by combining slides already they had good individual experiences with or talking to colleagues about presentations that did not went well. Often they refer to slides or make notes on them. We also found that there are individual experiences connected to each slide and that the consultants reflected on these experiences by collecting, discussing and aggregating experiences, e.g. when it was mentioned several times that there is a lack of slides about a certain topic or that a certain slide Y in the general product presentation could not be explained properly to customers. We therefore decided to connect our collaborative reflection support tool to the problem of discussion and reflection on slides.

Since the development of a slide repository to support exchange and combination of slides was already planned as an internal project, we decided to hook on this development process and add features to support collaborative reflection to what was called internally the “DoWeKnow App”. We therefore conducted a series of workshops, for which we developed a process of reflection supporting and enhancing the work of consultants around the slide repository, aiming at reflection on (the content of) slides. This approach suited the consultants well, as they where used to think about their work with a process in mind and also used models in their work with customers.

Using the model we created, we conducted a *process walkthrough* [6] in the workshop and derived requirements from discussions of certain model elements. Figure 2 shows the process model used for this walkthrough, which contains activity steps for reflection tasks supporting the capturing of experiences with slides (yellow rectangles with round edges), the reflection of slide content and the sustainment of results from reflection (e.g. changing the content of a slide). The result this workshop was a process model that was extended by comments (light green bubbles) containing the key points of the discussion in the workshop.

Figure 3 shows activity “recognize missing things or distinct features”, which is part of the general process shown in Figure 2. The activity consists of the activities to upload a slide, edit an existing slide and make colleagues aware of the change. During the discussion of this step one of the consultants came up with the point that not everybody should be allowed to edit or upload a slide. The participants proposed that a separate role, the owner of a slide, should be responsible for this and take care of “standard slides”, that is, those that give general information about the company. Those slides should not be editable, instead everyone can propose new slides or changes that than have to be approved by the owner. The big comment in Figure 3 shows how this was documented during the walkthrough.

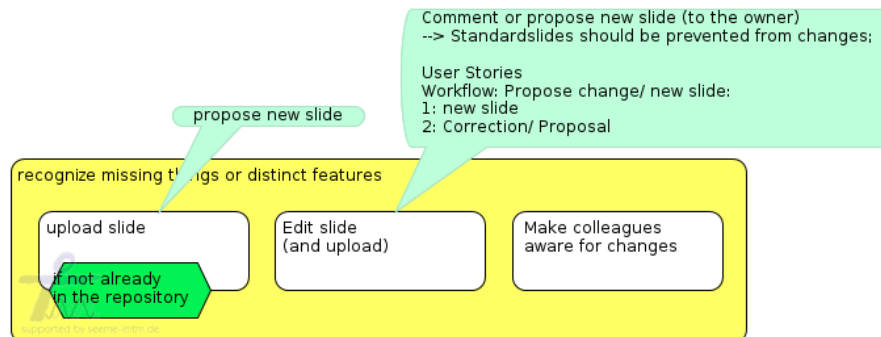


Figure 3: Detail of a process step annotated with comments from a workshop. The comments (green bubbles) have been added in a design workshop.

An interesting outcome of this workshop is that the system will not provide enhanced communication support, as we were told that consultants are much more used to discussing topics face-to-face or via phone than using forums or discussions threads. Instead, articulation support will prompt only for short comments for example after a user rated a slide, asking for a short reflection about experiences that resulted to the voting. In addition, the consultants urged us to include mechanisms to trigger actions from their activity in the repository such as informing the author of a slide when changes are requested – they perceived such mechanisms as a prerequisite to actively used reflection features in order to ensure that their contribution is recognized, which was the main benefit in their eyes. Thus, we put more effort on notification and awareness for changes within the repository such as new slides added. Such notifications are also used when comments trigger a follow-up process not part of the app such as e.g. new slides or a large number of comments about missing information, which could result in an agenda topic about this slides in the next sales meeting.

The process driven approach in the case of the consultants lead to a large set of requirements for the internal project that is developing a slide-repository. Besides features that will foster individual reflection we also derived an organizational process that will lead to collaborative reflection based on information, ratings and comments made within the repository.

4. Creating and establishing reflection tools that people want to use: Motivational factors

The cases described above contain various insights on the creation of tools supporting reflection at work and the motivation of their usage. This includes aspects of how to design these tools, how to integrate them into the work of potential users and which how to equip them with features and qualities that motivate usage. Below, we analyze these insights as an answer to the questions raised in the introduction of this paper.

Concerning the design of reflection tools, we regard **participatory design** to be a success factor for the creation of reflection tools that people want to use. Examples

such as the need for documenting outcomes of discussion immediately as reported by the physicians in case 1 and the emphasis that consultants put on notification mechanisms for the reflection in case 2 show how important it was to integrate the potential users of the tools early on in order to design the tools according to their needs. However, **choosing the right approach and artifacts for participatory design** also turned out to be a critical factor needed to tailor participatory design to the respective situations: While in case 2, consultants were used to modeling tools and we could conduct a model walkthrough with them, for case 1 we found it suitable to be more concrete and align the design process to prototypes that potential users could try and give feedback to in an early stage of development.

The two cases show two different ways of **integrating reflection** into daily work and tools used for it. In case 1, **we combined reflection with a mandatory task** (documentation of talks) and added additional features (e.g. the self-assessment of emotions during conversations). In case 2, we **added reflection features to an existing tool** to improve the tool and its content by reflection. Both ways integrate reflection into existing work, thus making it easy to use, and show the benefit of reflecting and using reflection tools or features to people by supporting their needs (improving conversations or presentations, respectively). Thus, we suggest that in order to motivate the usage of reflective learning tools, designers should integrate them into the work of people rather than creating standalone tools only serving reflection purposes.

Regarding the **design of features of reflection tools**, we found **casual usage of reflection features** to be an enabling factor of using reflection tools. In case 1, we made the self-assessment of emotions during conversations as casual as possible, as physicians had stated they would not take a lot of effort for this. In case 2, we made the comment input field appear when consultants rate slides in order to make comments causal (and thus, more likely). We regard casual features to be a key factor in motivating the necessary steps of documentation and articulation in reflection, which might not always show their benefit to users directly.

Reflection tools must not be created without regarding the social system they are embedded in. In contrast, there is a need to provide reflection tools with the careful **design of social processes** that surround and support the usage of the tools. In case 1, the physicians insisted of establishing regular meetings in which the documentation and comments made with the Talk Reflection App would be used for reflection. Likewise, in case 2, the sales consultants wanted to add notification mechanisms to the DoWeKnow app in order to make sure that changes and comments were recognized by responsible people and that their action would trigger a follow-up process. Given these examples, we consider the anchoring of reflection and tools to support it in organization (social) processes to be another factor influencing the uptake and regular conduction of reflective learning at the workplace.

Although this list is not exhaustive, it already informs designers how to create reflection tools that users are motivated to use. However, we regard it as a starting point for further work and invite interested researchers to join this work.

5. References

- [1] Boud, D. 1985. Reflection: Turning experience into learning. Kogan Page.
- [2] Daudelin, M.W. 1996. Learning from experience through reflection. *Organizational Dynamics*. 24, 3 (1996), 36–48.
- [3] Degeling, M. and Prilla, M. 2011. Modes of collaborative reflection. Workshop “Augmenting the Learning Experience with Collaborative Reflection” at EC-TEL 2011.
- [4] Eraut, M. 2004. Informal learning in the workplace. *Studies in continuing education*. 26, 2 (2004), 247–273.
- [5] Fleck, R. and Fitzpatrick, G. 2009. Teachers’ and tutors’ social reflection around SenseCam images. *International Journal of Human-Computer Studies*. 67, 12 (Dec. 2009), 1024–1036.
- [6] Herrmann, T. 2009. Systems Design with the Socio-Technical Walkthrough. *Handbook of Research on Socio-Technical Design and Social Networking Systems* (Mar. 2009).
- [7] Kim, D. and Lee, S. 2002. Designing collaborative reflection supporting tools in e-project-based learning environments. *Journal of Interactive Learning Research*. 13, 4 (2002), 375–392.
- [8] Knipfer, K. et al. 2011. Computer Support for Collaborative Reflection on Captured Teamwork Data. *Proceedings of the 9th International Conference on Computer Supported Collaborative Learning* (2011), 938–939.
- [9] Kolb, D.A. and Fry, R. 1975. Towards an applied theory of experiential learning. *Theories of Group Processes* (London, 1975), 33–58.
- [10] Li, I. et al. 2011. Understanding my data, myself: supporting self-reflection with ubicomp technologies. *Proceedings of the 13th international conference on Ubiquitous computing* (New York, NY, USA, 2011), 405–414.
- [11] Lin, X. et al. 1999. Designing technology to support reflection. *Educational Technology Research and Development*. 47, 3 (1999), 43–62.
- [12] Prilla, M. et al. 2012. Collaborative Reflection at Work: Supporting Informal Learning at a Healthcare Workplace. *Proceedings of the ACM International Conference on Supporting Group (GROUP 2012)* (2012).
- [13] Schön, D.A. 1983. *The reflective practitioner*. Basic books New York.
- [14] Scott, S.G. 2010. Enhancing Reflection Skills Through Learning Portfolios: An Empirical Test. *Journal of Management Education*. 34, 3 (2010), 430–457.
- [15] Siewiorek, N. et al. 2010. Reflection tools in modeling activities. *Proceedings of the 9th International Conference of the Learning Sciences - Volume 2* (2010), 413–414.
- [16] Strauss, A.L. and Corbin, J.M. 1998. *Basics of qualitative research: Techniques and procedures for developing grounded theory*. Sage Publications.