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A Training Approach for the Transition of Repeatable Collaboration Processes to Practitioners

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Abstract This paper presents a training approach to support the deployment of collaboration process support according to the Collaboration Engineering approach. In Collaboration Engineering, practitioners in an organization are trained to facilitate a specific collaborative work practice on a recurring basis. To transfer the complex skill set of a facilitator to support the practitioner in guiding a specific collaboration process design, we propose a detailed training approach based on the logic of Cognitive Load Theory. The training approach focuses on transferring knowledge and skills in the form of thinkLets, i.e. repeatable facilitation techniques. Furthermore, the training contains a process simulation to practice challenges in collaboration support. The training approach was positively evaluated using a questionnaire instrument in a case study.

Keywords Facilitation · Collaboration engineering · Transfer · Cognitive load theory · GSS · Training

1 Introduction

Although collaboration has become a key practice in organizations, it is not without challenges. Such challenges include misunderstanding, lack of focus, and domination.

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Groups might not be able to overcome such challenges by themselves (Schwarz 1994; Nunamaker et al. 1997). Even if groups are able to accomplish their goals, they can often collaborate more efficiently and effectively using collaboration support (Schwarz 1994; Fjermestad and Hiltz 2001). Both industry and researchers have developed a myriad of techniques and tools to support effective and efficient collaborative work practices (Linstone and Turoff 1975; Andersen and Richardson 1997; Nunamaker et al. 1997; Schwarz 2002; Sheffield 2004; Kolfschoten and Vreede 2007). Expertise is required to help groups in using the appropriate tools and techniques. Experts in this role are called facilitators. While hiring external facilitators is often possible, especially for recurring tasks, costs will mount up. Yet, internal facilitators are difficult to sustain as their skills are also required in management functions; therefore, they are more apt to be promoted. This makes it difficult to implement sustained facilitation support in an organization (see e.g. Agres et al. 2005).

Research on Collaboration Engineering (CE) addresses approaches to design and deploy processes for repeatable collaboration. Collaboration can be defined in many different ways (Wood and Gray 1991). Common themes to definitions of collaboration include the presence of a group of interested stakeholders, a process that is followed, and the goal to solve a problem, make a decision, or act on an issue of importance (Hibbert and Huxham 2005; Wood and Gray 1991). In the context of Collaboration Engineering, we define collaboration based on etymology (Harper 2001) "as joint effort towards a goal". The focus in Collaboration Engineering research is on support for collaborative work practices. A collaborative work practice is defined as set of actions carried out jointly and repeatedly to accomplish a particular organizational goal (Briggs et al. 2006). Examples of collaborative work practices include software requirements negotiation (Boehm et al. 2001) or enterprise risk assessment (Vreede and Briggs 2005). In Collaboration Engineering, practitioners in an organization are trained to execute a specific collaborative work practice (with the use of tools and techniques for collaboration support) on a recurring basis (Vreede and Briggs 2005; Kolfschoten et al. 2006). The transition of a repeatable collaboration process presents a number of specific challenges. The transition should enable the practitioner to execute the process with similar results as a professional facilitator. This sets specific requirements to this transition. We define a collaborative work practice transition as "implementing a collaborative work practice in an organization in such a way that practitioners in the organization can support and execute the work practice by themselves, without further support of a professional in collaboration support".

This paper will focus on the requirements and best-practices for the training of practitioners–a key step in the transfer of collaborative work practices. Insight in the transition process will help us to:

- Formalize the transition approach for Collaboration Engineering.
- Gain insight in the (im-)possibilities of practitioner facilitation.
- Advance the research on Collaboration Engineering.
- Offer support for Collaboration Engineers in the field.

In this paper we will first describe the Collaboration Engineering approach in more detail. Next, we will discuss approaches for work practice transfer and collaboration support transition in literature. We will then explain the requirements to practitioner training based on these transition approaches and Cognitive Load theory, after which we will present and illustrate the resulting training approach using a case study at an international finances organization. After improving the training based on feedback from 12 respondents, we collected data from 155 respondents that followed the training to evaluate the value of the training for the transfer of collaborative work practices. The paper will conclude with an account of the challenges of practitioner facilitation and their implications on the Collaboration Engineering approach and other training methods, as well as directions for further research.

2 Background

2.1 Collaboration Engineering

Collaboration Engineering is an approach to design and deploy collaboration processes that can be transferred to practitioners in organizations to execute for themselves (Vreede and Briggs 2005; Briggs et al. 2006). Collaboration Engineering evolved as a solution to the challenges that emerged in the implementation of GSS support in organizations. Many organizations abandoned the GSS facility because:

- The champion facilitator left the facility (Munkvold and Anson 2001).
- The GSS was removed in a budget crunch as it was used for ad-hoc one-off tasks and did not contribute to a core process in the organization (Agres et al. 2005).
- The facility was not used because the knowledge on how to use it is was not transferred (Agres et al. 2005).
- The added value of the system could not be allocated as it saved costs rather than rendering profit, and it improved a situation rather than solving a problem (Briggs et al. 2003).

In the Collaboration Engineering approach, these problems are addressed by focusing on process support for *recurring high value processes*, rather than incidental ad hoc processes (see Fig. 1). This makes the business case for investment in collaboration support more convincing: If improvements are created for a recurring critical process, there will be a recurring benefit. To support recurring collaboration processes a further distinction is made between two subtasks of the facilitation task: A design task and an execution task. The design of a collaboration process is challenging (Clawson and Bostrom 1995) yet critical for its successful execution (Nunamaker et al. 1997; Vreede et al. 2003). In the Collaboration Engineering approach, the design of the collaboration process is performed by an expert that is normally external to the organization: a Collaboration Engineer. The execution of the collaboration process is the responsibility of an internal practitioner. A practitioner is a domain expert in the area of the collaboration process (e.g. requirements negotiation), but not a collaboration professional such as a facilitator. Making practitioners responsible for the execution task, allows an organization to train internal domain experts to execute a limited number of recurring critical collaboration processes rather than hire or retain collaboration experts that possess all-round design and facilitation skills. Thus, the approach requires

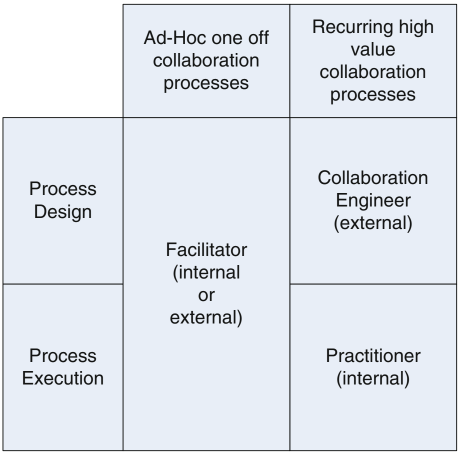

Fig. 1 The role of the facilitator is split to create sustained support for recurring high value tasks

that a Collaboration Engineer designs a predictable and transferable collaboration process, and transfers this to the practitioner, who can then execute it by himself. In this paper we will focus on the approach to transfer a designed collaboration process to practitioners through training.

To create a predictable collaboration process design, a Collaboration Engineer uses thinkLets. ThinkLets are the building blocks for collaboration. A thinkLet is a set of rules, required to create a predictable pattern of collaboration (Kolfschoten et al. 2006; de Vreede et al. 2006). These rules contain instructions to the group and prescriptions on how to instantiate capabilities to support the group in executing those instructions. ThinkLets represent the best practices of experts that have been tested over time. This makes the collaboration process design more predictable. After the Collaboration Engineer has design the collaboration process it should be transferred to the practitioner to be executed. During this transition the collaboration process design plays an important role.

The Collaboration Engineer will capture all information required to transfer the collaboration process in a document that we name the CE process design. The content of this design document is developed based on the analysis of the task division described above, the thinkLet conceptualization, and experimental field studies (Vreede and Briggs 2005; Kolfschoten and Hulst 2006; Kolfschoten et al. 2006). This design documentation contains a script for each activity in the process, including both thinkLet scripts and scripts for the introduction and wrap-up of the session (Kolfschoten and Hulst 2006; Kolfschoten et al. 2007, 2008). Next, it offers an overview of the process in the shape of a Facilitation Process Model (Vreede and Briggs 2005) and a document in which the assumptions are described based on which the design is made. The latter contains a description of the group, task, logistic requirements, etc. Also, the documentation contains a set of cue cards that can be used both during training and during the first time(s) the process is executed.

Clearly, just handing over the design documents is not enough to transfer the knowledge and skills required by the practitioner to execute the design. There is a need for additional transfer of tacit knowledge and skills. Practitioners need to perform part of the task of a facilitator. Facilitation is a skill; thus, practice and copying from the expert are important (Post 1993; Ackermann 1996) to transfer the required skills and knowledge. Therefore, a training approach in which practitioners and the Collaboration Engineer meet to transfer tacit knowledge is important. Furthermore, it is important that the practitioner develops self efficacy about his role, which is difficult to transfer through a manual. Such transition, and the confirmation that there is sufficient self efficacy (confidence in one's ability to successfully execute the collaborative work practice), requires face-to-face contact between the Collaboration Engineer and the practitioner.

Finally, it is important to remember that practitioner facilitation has several risks. First, significant amounts of resources (man-hours) could be wasted in an unsuccessful collaborative effort. Second, if the first execution of the process is unsuccessful, both the confidence of the practitioner and the reputation of the collaborative approach are thwarted. It is, therefore, important that the Collaboration Engineer can check whether the practitioner learned the skills required to execute the process by himself.

2.2 Transition Methods

There are several approaches possible to support the transfer of knowledge and skills, as described by McConnell (1993):

1. Group training–involves three or more persons who participate in a common learning activity along with a facilitator.
2. Coaching–uses one-on-one training which includes demonstration, lecture, and observation.
3. Mentoring–assigns an experienced employee to a new employee. It is much more of a formal approach, but introduces the employee to the culture and environment.
4. Self-Paced Learning–allows the learner to determine the rate of speed for mastering the concepts of instruction.
5. E-learning–used to describe learning activities conducted from the user's desktop via the internet.
6. Computer-Assisted Instruction–learning based on computer instructions in which the learner's progress is tracked and used to direct the learner to appropriate learning material.
7. Distance Learning Training–describes instruction in which the trainer is geographically separated from the learner.
8. Self-Study–refers to learning activities initiated and participated in by an individual.
9. Simulations–are controlled and standardized representations of a job, activity, or situation.
10. Lectures–include structured oral presentations delivered for information transfer.
11. Job Assignments–place an individual into the actual position, limited to a period of time, for which the goal is to learn part of the process.
12. Job Rotation–includes several Job Assignments (see above) in a preplanned order or the exchange of jobs with another person.

During the first introduction of the collaboration process in an organization, mentoring, job assignment, job rotation, as well as a mentor-apprentice model

(Jordan 1987) cannot be used as there is no present experience in the organization to support these modes of knowledge transfer. The collaborative process prescription has to be transferred at a focused moment in time. In order to make the Collaboration Engineering approach more efficient than training or hiring traditional facilitators, the training and transfer of knowledge to practitioners to execute the collaboration process should be effective and efficient. Since the transfer of collaboration processes is information intensive, the cost of getting up to speed for individuals is comparatively high. They may not have the stamina, time or motivation to 'self-study'. Therefore, a training or workshop setting appears to be the most suitable basis for this transfer. In addition, gaming elements and a hand-out or manual can be used.

We need to transfer skills and experience besides the documented information in the process prescription, which requires the presence of a trainer. Lectures and self-study could be used as an augmentation to the training, but not as the exclusive means to transfer the skills and experience. Computer supported learning, e-learning, computer assisted instruction and distance learning might be possible but would require high training development costs. Since the process prescription is process specific, video or animation of the process needs to be customized to the specific situation. Such an approach would only be efficient if a very large number of practitioners are trained with the same process. In this case, videos of pilots of the process should be made to show the practitioners different skills and pitfalls. However, in many cases privacy and security will limit the possibility to make a video report about the process. Thus, the training approaches left are group training, coaching, and simulation. The training approach we have derived contains aspects of each of these approaches.

Since Collaboration Engineering focuses on designing a repeatable process for a particular task, practitioners are then expected to become able to guide and execute the process for this task in different situations, with different groups and sometimes in various domains or on different platforms. Such task is called a "far transfer task" meaning that the acquired skill should be able to be applied to a different situation. This requires expertise in execution of the collaboration process design (Kirschner 2002). There are, according to Paas and van Merrienboer (1994), two approaches to transfer expertise: the *product approach* that focuses on productive task performance and the *process approach* that focuses on mimicking expert methods. The latter is most applicable in Collaboration Engineering, as practitioners are essentially to mimic expert facilitators. Furthermore, an important part of the transfer of expertise is the discussion between the trainer and the practitioner; allowing the latter the ability to raise concerns and doubts. Therefore, our approach will focus on the training of expert methods and guidance in the appropriate execution of those methods like in group training, coaching, and simulation.

2.3 Cognitive Load Theory

In Cognitive Load Theory it is assumed that the performance of the practitioner depends on the cognitive load of his task; both the "learning task" and the "execution task". This cognitive load consists of several components. Cognitive load can be defined as *the mental effort made by the practitioner to understand and perform his task*. Cognitive Load Theory is based on the assumption that our short-term or working memory is limited to seven plus or minus two information elements (Miller 1956). This is the information that we can process at a certain moment. Other information is stored in our long-term memory, in so called schema (Bjork-Ligon and Bjork 1996). Cognitive Load Theory explains how we use the limited working memory capacity to build and automate schema, called chunking (Miller 1956; Simon 1974). Cognitive load is the extent to which the cognitive capacity in the working memory of the practitioner is used. There are 3 types of cognitive load (Sweller 1988):

- Intrinsic cognitive load, the cognitive load that is inherent to the task. This is defined by the task complexity.
- Extraneous cognitive load, the cognitive load caused by the presentation and transition method of the information.
- Germane cognitive load, the cognitive load of cognitive processes instrumental to making the schema in the long term memory.

For a complex task that requires full use of this capacity, an increase in one type of cognitive load will result in a decrease of another type. Intrinsic cognitive load is inherent to the complexity of the task, but we can reduce this load by splitting the task into smaller sub-tasks. Extraneous cognitive load is the load from the presentation of the task-information in the design documentation and training and can be reduced in a variety of ways, mostly aimed at reducing redundancy and split attention between multiple information sources (Sweller et al. 1998). Germane cognitive load is the use of cognitive capacity to improve the construction and automation of schema. To learn efficiently, the intrinsic and extraneous cognitive load should be reduced to free mental capacity for germane cognitive load.

While we do not expect practitioners to become master facilitators, they need to become experts in the execution of the collaboration process design. An expert, compared to a novice has better, larger schema that are more automated (Sweller 1988), better indexed (Simon 1974) and therefore more accessible through a better categorization and association with other schema. It is the aim of this training approach to offer practitioners highly integrated and automated knowledge on the collaboration process design. Practitioners are trained to execute a recurring, predictable work practice. However, as such a work practice is a task involving human effort; it is only predictable to a certain extent. For instance, risk managers can be trained to run risk management workshops in the same way for each department of the organization. However, some group dynamics will be different when a particular department just went though a reorganization of tasks and roles. The practitioner requires extensive schema of the collaboration process in order to apply them to the different instances of the recurring collaboration process (far transfer) (van Merrienboer et al. 2002). Additionally, the execution task requires the practitioner to deal with the dynamic changes that can occur due to new information or a change in the situation. When the practitioner has to adjust the process, to accommodate characteristics of the specific instantiation of the process, schema should be adjusted, and additional cognitive load is created. The collaboration process is a human process and not all aspects are predictable; thus, it is likely that adjustments are required. This requires some flexibility of the practitioner: he needs to monitor the output and the signals from the group, compare these to the required results and patterns of collaboration, and if needed, intervene if they become

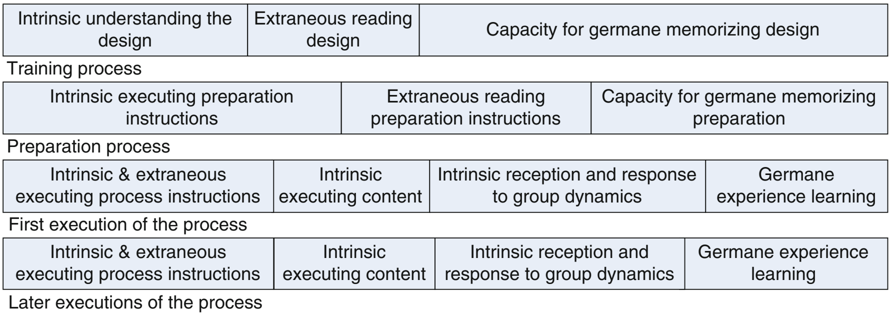

Fig. 2 Cognitive load of different mental tasks during the different phase of the practitioner task

too misaligned. Therefore, the cognitive load of the "execution task" should constitute a low intrinsic and extraneous cognitive load, which allows the practitioner to build and adjust his schema of the process, and to make the required interventions with the free cognitive capacity. This is a key factor in the design's transferability.

3 A Training Approach for Collaboration Engineering

To develop the training approach for the transfer of collaborative work practices according to the Collaboration Engineering approach, we combined the insights on the practitioner task, the cognitive load involved in this task, and the training methods appropriate for the efficient transfer of skills in collaboration.

3.1 The Cognitive Load of the Practitioner Task

A low cognitive load is of particular importance during the execution of the task. Unpredictability and the cognitive load (intrinsic and extraneous) of executing the design will leave very limited cognitive capacity to learn and construct schema. Learning by doing is often not feasible as the practitioner has to be equipped to perform well the first time he executes the process. In the training and preparation of the process, the practitioner can take time to learn, understand, apply the instructions of the design (intrinsic and extraneous load), and memorize it constructing schema (germane cognitive load). However, during the execution his mental capacity is mostly occupied with the execution of the process, dealing with content (the practitioner is also a domain expert and will have to present information to the group), and with being receptive and responsive to unpredictable events that require intervention (which will add significantly to the intrinsic cognitive load), leaving limited capacity to learn from the experience of the execution (which requires germane cognitive load). Over time, the instructions task will be automated and more capacity will be available to learn from each experience, thus increasing the mental capacity dedicated to germane cognitive load and learning. This is summarized in Fig. 2.

An assumption in Collaboration Engineering is that the practitioner has no facilitation skills or experience. In reality, practitioners have different experiences and skills in facilitation or in other domains that require group support. However, in order to build a complete training, we assume that there are no schemas of the collaboration process available and that the intrinsic cognitive load of the learning task will be high. With this assumption, we risk that (part of) the training approach will not be useful for more experienced practitioners due to the expertise reversal effect: methods to reduce cognitive load can increase cognitive load when schema are already available, (Kalyuga et al. 2003). This limitation will be addressed further in the conclusions portion of this paper.

Based on Cognitive Load Theory we will now determine the methods that we use to reduce the intrinsic and extraneous cognitive load and increase the germane cognitive load. Using this analysis we will determine the order and moment in which information is offered and the training method.

3.2 Reducing the Cognitive Load of the Training

One technique we can use to reduce the cognitive load of the training is the isolated interacting elements approach (Pollock et al. 2002) which spreads the intrinsic cognitive load over different steps during the training. First, this means that isolated elements are explained–that is explaining activities of the process without addressing the implications on the group process and the practitioner task for that activity. Next, the details of each activity and their effects are explained. This phased introduction of the information will allow the practitioner to first build an initial schema of the process and then capture the more detailed information by adding it to the schema. For this process overview we can add an interactive training method. When students construct the process overview themselves, and get feedback on it (after completion), they will gain deeper understanding of the process (Moreno and Valdez 2005).

An additional method for managing intrinsic cognitive load is by dividing it into recurrent and non recurrent constituent skills (van Merriënboer 1997). Non recurring skills require interpretation of cognitive schemata to adapt the execution of the skill to each variance in the instantiations of the collaboration process. Recurrent skills, however, require applying rules that are captured in automated schema. In order to master non recurring skills, the practitioner needs to understand the theory and explanation behind each of the activities in the process (van Gog et al. 2004,?). In Collaboration Engineering this is the mechanism that gives rise to the effect of the thinkLet and its contribution to the overall objective of the collaboration process. The information for recurrent skills is procedural information, e.g. the thinkLet script and the complete process overview. The cognitive load of the thinkLet script is, by nature, significantly lower than the cognitive load of understanding its effect. Therefore, several authors suggest focusing the training on explaining the theory and the effects of the collaboration process, while a just-in-time support method can be used to offer procedural information during the first exercise(s) with the process (van Merrienboer et al. 2003; Kester et al. 2006). It is important that this procedural information does not evoke temporal or special split attention, i.e. the need to combine different sources of information in order to understand concepts. Each element of instruction should be comprehensible by itself.

Because there is very limited or no possibility to practice, we cannot offer the procedural information for the first time when the process is executed. However, we can prevent that practitioners have to rote-learn this information and instead support them with cue cards in the execution of the collaboration process. Such cue cards will, after several iterations of the task, become redundant and should then be removed (Sweller 2004).

To successfully execute procedures in various instances of the collaboration process, conceptual understanding is required. According to (van Gog et al. 2004), conceptual understanding means that the practitioner should understand why the activities in the process are relevant to goal attainment and why they are performed in the particular order of the design. It also means that they need to understand specific challenges that can occur and the associated solutions. In order to learn this information and to build schema of it, practitioners should self-explain this information (Renkl and Atkinson 2003), meaning that they should actively explore implications and consequences of what they learned. Practitioners should be stimulated not only to self-study this information but also to experience or imagine what they would do in different circumstances, and whether this corresponds with the solutions offered in the design.

In order to accomplish this, two additions are required. First, once the thinkLets are introduced, the practitioners should do an exercise in which they make a first attempt to self-construct the process. In this way, a discussion can be held, to gain understanding on the order of activities prescribed. This information is required to enable the practitioner to explain the process and the added value of each activity to the group. If the practitioner is not comfortable explaining the process, he can fall in the trap of "putting the agenda on the agenda" (Vreede et al. 2003).

The second addition is the imagination of challenges that can occur through simulation of the critical process activities. Challenges (known pitfalls) are documented for each thinkLet based on experience and observation of novices. They can be discussed during the training by providing mini-simulation cases or scenarios in which the practitioner is asked "what would you do if this challenge/pitfall occurs?" Once high quality schema of the process and its individual activities are built, we can support schema automation through the stimulation of imagining the process. This will increase the automation of schema. A condition is that first sufficient high quality schemas are built. This would therefore be one of the last steps in the training (Cooper et al. 2001). One way of stimulating this can be to ask practitioners to imagine things that could go wrong. This will stimulate them to rehearse the process and identify the elements they feel uncertain about.

Practice of the practitioner task is not always possible. When there is an opportunity to exercise the collaboration process in a pilot it should preferably be arranged in a way that it allows the practitioner to make the critical non-recurring errors that he should be able to solve during the process (Rikers et al. 2004). This also allows the Collaboration Engineer to give explanatory feedback, which will further support the construction of the schema that contain the theory behind the procedural information (Moreno 2004). To facilitate having the practitioner work through these challenges during a pilot session a simulation setting can be set-up, where roles are played and scripted to let the challenges occur.

3.3 Structure of the Collaboration Engineering Training Approach

Based on the above, we argue that a training to transfer a collaborative work practice design to practitioners should meet the following requirements:

- Focus on offering a basis for the schema construction by first explaining isolated elements of the process and the process overview (thinkLet blocks), followed by the explanatory interacting elements (thinkLet scripts).
- Introduce the procedural information and let practitioner self-construct to enhance deeper understanding.
- Offer procedural support during execution.
- Enable schema building and self-explanation of the theoretical basis of each activity.
- Support rehearsal and the imagination of what will happen when it is executed to automate schema after sufficient initial schema construction.
- Offer practice with feedback, especially in the non-recurring tasks.

In light of these requirements, we propose the following structure for a training program to transfer a collaborative work practice. We will illustrate each element of the training program in an illustrative case study below:

1. *Lecture: Short introduction on Collaboration, the process, the role of the practitioner, and if applicable, the technology used.*
   A practitioner should be able to explain to the participants in the collaboration process why a collaborative approach is used. For this to occur a basic understanding of ‘what is collaboration’ and ‘why collaboration support is useful’ is required. This information can be presented by the trainer in a short lecture, and can be re-addressed in self-study.
2. *Group training: Self-construction of the process in exercise.*
   In this step the practitioners are encouraged to think about the sequence of activities, focusing on <u>what</u> the group should do (‘how’ the group should do this is addressed in the thinkLets used for each activity). This will increase the understanding of the role of each activity, the contribution and the order of activities. In an interactive group setting the sequence can be built and adjusted to gain understanding in the process and the rationale behind the sequence of activities.
3. *Lecture: Process overview with reference to the process activities that are filled in with the interacting components.*
   The final process overview is presented with reference to the process activities that are filled in with the interacting components.
4. *Lecture: Explanation of the component conceptualization (thinkLet concept).*
   The collaboration process prescription consists of thinkLets. Before these thinkLets are explained, a brief introduction to the thinkLet concept and the elements and representations of the thinkLet is required in a short lecture.
5. *A sequence for each component existing of:*
   - *Lecture: (explanation): Further explanation of the interacting components (techniques to accomplish each of the process activities and elaboration on the rationale behind each activity).*

- *Simulation & coaching: to practice the challenges with feedback.*
- *Group training: Discussion to invoke imagination of challenges.*

Once the full process is understood, the details of the thinkLets can be transferred. The thinkLet script is discussed and the purpose of each rule and instruction is explained. To practice the key challenges and pitfalls, the process is simulated during the training using mini-simulation cases or scenarios. Once the thinkLets are discussed, it is important that the practitioner can imagine himself executing the thinkLet. To establish this, we can ask the practitioner to try and think about what can go wrong when the thinkLet is executed and what seems difficult. Known challenges and questions can then be discussed and suggestions and guidelines for solutions can be offered. For this step we use a group training setting.

6. *Self study: Re-processing the information from the training*.
   To refresh the knowledge and to prepare the execution of the collaboration process design the practitioner can re-read the documentation of the training. This will help the practitioner to further construct his memory.
7. *Execution support with cue cards and process overview, when possible with coaching*.
   When it is possible to practice the process in a pilot this can be useful. However, in most organizations, there is only one opportunity to make a first impression, especially with the introduction of a new role and a new approach. When practice is possible, it would be best to practice the non-recurring elements of the task, especially how to deal with challenges and questions. An alternative is to observe a peer-practitioner and to discuss among practitioners how to solve difficulties. To support the execution, the procedural information and the challenges and solutions should be available on cue cards. It is not likely that after the training and short practice (if any) all challenges and solutions are captured in schema. Since this information is very important, it should also be available during the execution. When possible, the practitioner should be supported during the first execution by a coach, being the Collaboration Engineer or a more experienced practitioner.

4 An Evaluation Framework for the Training Approach

In order to test the training approach we created a set of evaluation criteria. In cognitive load literature the training or learning efficiency is assessed by comparing the mental effort required with the quality of the results in a test (Paas et al. 2003). Unfortunately, we did not have access to data that indicates the quality of the practitioner's effort in this case study. Therefore, we measured only perceptions on the mental effort based on various dimensions to get a subjective indication of our ability to minimize the intrinsic and extraneous cognitive load and to support the building of schema. In addition, we queried whether practitioners felt equipped to run the collaborative work practice after receiving the training. This is a measure of self-efficacy, which is an important predictor for future performance (Locke and Latham 1990).

The perceptions on mental effort and self-efficacy were collected using a questionnaire. The different parts of the questionnaire were directly derived from the logic of Cognitive Load Theory. First, we addressed if we succeeded in creating an acceptable cognitive load of the training. As defined above, the cognitive load should not be too high, as this indicates information overload and makes efficient transfer difficult. If the training is not cognitively challenging (cognitive load is too low), it is unlikely that the complexity of the skills and tasks of a practitioner are understood.

To relate the cognitive load to learning we needed to evaluate if the training offers all information required and no superfluous information(which would cause excessive cognitive load that could reduce mental capacity available for learning), and if the different training steps and information elements were useful. Even when all elements of the training were useful this does not yet give us an indication of the usefulness and completeness of the training. Evaluating usefulness and completeness will give an indication of whether we succeeded to reduce the intrinsic and extraneous cognitive load, while offering a complete training. If elements of the training or documentation are not useful or superfluous, the training efficiency can be increased. In this way we can assess if we offer the information to execute the task in a parsimonious way, ensuring optimal use of the cognitive capacity of the practitioners. As described, it is important that practitioners understand why they need to use certain skills and knowledge, and in which occasions.

To further measure perceived mental effort we also asked whether the training was perceived difficult or tiring. If results on these constructs differ from the perceived mental effort, this could indicate that the training is too abstract (difficult) or not interesting (tiring). The combination of these dimensions provides a first indication that the training supports efficient knowledge transfer.

Next, to determine if sufficient quality schemas are made and if they are automated we asked practitioners if they feel equipped for the task (if they did not yet run a session) or if they were equipped for the task if they did run a session. Another indicator of this can be the need for additional preparation for the task (besides logistics and content preparation). Further, the actual use of the process is an indicator that the training supports the building of schema. Satisfaction and meeting the expectations of the practitioners are indicators that the training achieved the intended effect. These dimensions will provide insight into the quality of the training as judged by the practitioners. While we cannot directly measure the practitioners' performance, these perceptions will give us insight in key predictors of performance (Locke and Latham 1990).

Table 1 provides an overview of the constructs and dimensions. It also shows which questions correspond to the various dimensions. The complete questionnaire is provided in Appendix A.

5 Case Description

To test the training approach we evaluated the different steps in the training and their effect on cognitive load during an existing case study at ING Group (Vreede and Briggs 2005). ING Group is a large international financial services organization headquartered in the Netherlands. Following requirements from regulatory bodies, such

Table 1 Evaluation dimensions

Construct	Dimension	Question
Cognitive load reduction		
Usefulness	Training steps (per step)	2a–d
	Documentation elements (per element)	4a–c
	Order of training elements	10b
Completeness	Need for additional training	3
	Need for additional information	1, 5
	Superfluous information	6
	Usefulness facilitation techniques	7b
	Usefulness compared to other trainings	13b
Quality training	Feeling equipped	7c
	Additional preparation activities	8
	Intention to use trained techniques	7a
	Satisfaction with training	14b
	Satisfaction compared to other trainings	13c
	Training meets expectations	14a
Cognitive load of training		
	Mental effort	10c
	Difficulty	10d
	Difficulty compared to other trainings	13a
	Tiring	10e

as the Basle committee, ING was faced with the challenge to perform hundreds of operational risk management (ORM) workshops. They commissioned the development of a repeatable collaborative ORM process that operational risk managers could execute themselves. Based on the experiences and the requirements from the ORM domain experts, Collaboration Engineers developed a first prototype of a paper-based repeatable collaborative ORM process, the Risk & Control Self Assessment (R&CSA) process. The R&CSA process consisted of a sequence of activities in which departments identified risks, assessed their impact, and came up with strategies to mitigate the risks. The process was initially paper-based. Later some practitioners developed a spreadsheet application to support the risk assessment phase.

The process was evaluated in a pilot project within a particular business unit, leading to a number of modifications to the definition of the overall process in terms of collaborative activities, their interdependencies, and the thinkLets used. The resulting design documentation of the R&CSA process was used as the basis for a training program and materials to transfer the collaborative work practice to support risk managers in running risk assessment workshops throughout the organization. (For further details regarding the structure and content of the work practice design documentation see (Kolfschoten and Hulst 2006; Kolfschoten et al. 2007, 2008).) The first design of the training was evaluated in a group of 12 ORM experts. Based on their discussion and feedback, the training design was improved and finalized. In the period that followed, over 300 ORM practitioners were trained to execute this process. To date, the trained ORM practitioners have moderated hundreds of workshops where business participants identify, assess, and mitigate operational risks. Below we detail the ING R&CSA training program following the structure presented in the previous section.

1. *Lecture: Short introduction on Collaboration, the process, the role of the practitioner, and, if applicable the technology used.*
   At ING, the introductory part of the training includes a discussion part with the trainees about the value of collaborative approaches to risk & control assessment compared to more traditional approaches, such as questionnaires or one-on-one interviews. Further, the collaborative R&CSA approach is presented as one of the elements of the organization's portfolio of operational risk management tools & techniques.
2. *Group training: Self-construction of the process in exercise.*
3. *Lecture: Introduction of the process overview.*
   At ING, these two steps were combined into one activity by forming subgroups of 2–4 trainees. Each subgroup would get a set of 'cut' activities printed on foil that they could move around on a table to organize them in what they felt was the correct sequence. Each subgroup would present their results in a plenary session during which time discussions would be held about differences between the subgroups. After each subgroup had presented, the actual 'correct' sequence would be introduced and discussed.
4. *Lecture: Explanation of the component conceptualization (thinkLet concept).*
   At ING, the thinkLet concept is introduced in two steps. First the key patterns of collaboration in group work are introduced and illustrated: divergence, convergence, organization, evaluation, and consensus building (Vreede and Briggs 2005). Second, thinkLets are introduced as facilitation techniques to consciously create a particular pattern of collaboration. The thinkLet concept is explained and anecdotes are provided to illustrate. This step was performed before the process sequence was created.
5. *A sequence for each component existing of:*
   - *Lecture: (explanation): Further explanation of the interacting components (techniques to accomplish each of the process activities and elaboration on the rationale behind each activity).*
   - *Simulation & coaching: to practice the challenges with feedback.*
   - *Group training: Discussion to invoke imagination of challenges.*

   At ING, the introduction and explanation of the thinkLets was chunked: A maximum of three thinkLets was introduced at a time before trainees would practice them. This part of the training made use of a practice case based on a fictitious insurance company. The explanation of each thinkLet was done in two phases. First, the actual execution of the thinkLet was explained. During this phase, most attention was paid to explaining the flow of the thinkLet script. The trainer would normally act the thinkLet out in front of the group. Second, the rationale behind the thinkLet would be discussed. To this end, the trainer would ask the trainees to argue about the reasons behind certain execution aspects of the thinkLet. For example, in the DirectedBrainstorm thinkLet, participants in a workshop can see and work on only one of several available brainstorm pages at a time. To practice each activity, each trainee would in turn facilitate a part of the R&CSA process while his or her colleagues would act as participants. The simulation case was designed to be general enough for all trainees to be doable, yet specific enough to provide some real basis for discussion and realistic group behavior. The case also included a number of specifically designed ‘worst practices’ so that the trainees would have a chance to experience the importance of certain parts of a thinkLet script, or the importance of making the right decisions during the preparation of an R&CSA workshop. The trainer would then ask the trainee who executed the thinkLet to first reflect him or herself. Then the other trainees, who acted as participants for the trainee executing the thinkLet, would be asked to share their thoughts and experiences. Finally, the trainer would address any relevant issues and best practices that would not have been discussed up to that point.

6. *Self study: Re-processing the information from the training.*
   At ING, the self study step was not a formal part of the training program. However, each trainee received various background materials before and after the training for further reading. These materials included articles on facilitation and operational risk management practices.
7. *Execution support with cue cards and process overview, when possible with coaching.*
   At ING, the execution step was not part of the formal training program. However, the execution step was supported in three ways. First, after taking the R&CSA facilitation training, many trainees sought out experienced R&CSA practitioners to observe a real R&CSA workshop and/or run such a workshop as a team. Second, all trainees received a set of cue cards and an overview of the R&CSA process flow on a single sheet. The trainees could already use the cue cards during the training practice. Finally, some participants attended an advanced R&CSA facilitation training that focused especially on knowledge sharing among the trainees concerning ‘best R&CSA practices’. The advanced training also introduced the trainees to a number of new thinkLets to execute parts of the R&CSA process and paid in-depth attention to ‘soft facilitation skills’, e.g. how to deal with ‘difficult participants’ in a workshop.

6 Results

To measure the trainees’ perception on the value and cognitive load of the training, we handed out the questionnaire described in Sect. 4. We collected questionnaires from 155 respondents. The results are presented below.

6.1 Usefulness

We examined the self-construction of the process (step 2), the usefulness of the process overview (step 3), the thinkLet concept introduction (step 4), the thinkLet explanation and simulation (step 6 and 7), and the discussion of challenges (step 8). We measured usefulness on a 7 point scale, 1 = not at all useful, 4 = neutral, 7 = very useful. The results are listed in Table 2.

Besides the usefulness of the training steps, we asked participants about the usefulness of the training materials (Table 3) in terms of the background material (slides), the process overview, and the thinkLet cue cards. Finally, we asked if the material was presented in a logical order (Table 4). The scale used is a 7 point scale, 1 = very much disagree, 4 = neutral, 7 = very much agree.

Table 2 Usefulness of the training steps

Aspect	Usefulness	SD
Usefulness self-construction of the process (step 2)	6.16	0.83
Usefulness process overview (step3)	5.68	1.06
Usefulness thinkLet concept (step 4)	6.05	0.92
Usefulness thinkLet explanation and simulation (step 6 and 7)	6.13	1.01
Usefulness discussion of challenges (step 8)	5.84	0.92

Table 3 Usefulness of the training materials

Aspect	Usefulness	SD
Background material	5.68	1.03
Process overview	6.09	0.96
ThinkLet cards	6.15	0.95

Table 4 Order of presentation training material

Aspect	Agreement	SD
Logic order of presentation training material	5.99	0.89

Table 5 Completeness of the training and material

Aspect	Percentage “yes” (%)
Received sufficient material before the training	89.03
Needed no additional training	41.94
Training materials were complete	85.16
No training material was superfluous	91.61

6.2 Completeness

We asked the trainees whether they wanted any additional training materials in advance, whether they wanted any additional training, whether the training materials were complete, and whether there was no superfluous material (Table 5).

Additional training requests primarily focused on further background on being a devil’s advocate (this was another role some of the risk managers were required to perform in R&CSA workshops), the use of a more realistic case, or a demonstration/video to gain more realistic experience and background on a ‘high level version’ (i.e. a shorter version of the R&CSA process focused on top management). Practice with the tools used and an advanced course or community of practice were indicated several times. Only a few practitioners wanted to get more training on dealing with emotion and conflict or other advanced facilitation skills. One practitioner wanted coaching. Most trainees indicated that the training materials were complete and that there were no superfluous training materials. Finally, we asked the participants about the usefulness of the facilitation techniques and the usefulness of the training compared to other trainings (see Table 6). The results show that the techniques were considered useful and the training was more useful compared to other trainings.

Table 6 Usefulness of training and facilitation techniques

Aspect	Agreement	SD
Usefulness facilitation techniques	6.15	0.82
Usefulness training compared to other trainings	5.12	1.13

Table 7 Training quality

Aspect	Agreement	SD
Feeling equipped	5.49	0.94
Intention of use	6.03	1.01
Satisfied with the training in general	6.11	0.76
Satisfied in comparison with other professional training	5.22	1.13
Training met expectations	5.92	0.85

Table 8 Mental effort

Aspect	Agreement	SD
I found that the training required a lot of mental effort	4.80	1.37
I found the training difficult	3.34	1.48
I found the training difficult in comparison with other professional training	4.02	1.30
I found the training tiring	3.12	1.48

6.3 Training Quality

To assess the training quality we asked participants whether they felt equipped to facilitate the process, what they would do for additional preparation, whether they intended to use the techniques learned, whether they were satisfied with the training (both in general and in comparison with other trainings), and whether the training met their expectations. The overall positive results are displayed in Table 7. The scale used is a 7 point scale, 1 = very much disagree, 4 = neutral, 7 = very much agree.

To prepare for their first session most practitioners indicated they would read through the materials and many would make a customized process agenda. A few would ask support from an experienced practitioner, while several wanted to practice in a safe environment. On an open question as to whether they would attend a workshop before running it themselves, many answered "*I would like to, but I'm not sure I can*", several answered that they can not, some answered they would, while some answered they did not need to because the training was sufficient.

6.4 Mental Effort of the Training

To assess the cognitive load of the training we asked participants to indicate if they found the training required a lot of mental effort, was difficult, was tiring, and whether it was more or less difficult that other professional trainings (Table 8). The scale used is a 7 point scale, 1 = very much disagree, 4 = neutral, 7 = very much agree.

Mental effort was not neutral, but not high either. Difficulty was rated lower than neutral as was the perception of the training being tiring. Participants indicated that the training was equally difficult compared to other professional trainings they received.

6.5 Practitioner Feedback

We had the opportunity to receive feedback from four practitioners who had facilitated several collaborative risk assessments using the R&CSA process. Their overall perceptions regarding the effectiveness and usefulness of the process were positive. Said one practitioner: "*We ran a very successful session. I was really satisfied with it. I got a satisfaction score of 7.8 average (on a scale from 1–10, 10 being highest).*" The practitioners indicated that they were able to successfully run the process, although some felt that the practitioners' personality at times can be as critical as training the process techniques themselves: "*(As a practitioner) you need to dare to address a group, and you need to pay attention to many things at the same time. It is hard work; you need people capable for that. In our group some are, others don't fit the task given their personality, they have difficulty to address a group or to achieve consensus, it depends on the person, I'm not sure if you can train that.*" Still the practitioners felt that the training offered them useful experiences: "*It is good that we exercised in the training what to do with people that don't want to cooperate, and what you do in that situation.*" Although the number of respondents is too limited to draw any structural conclusions, the practitioners' feedback was encouraging and further supports the positive results that were collected through the questionnaires.

7 Discussion and Conclusions

This paper provides a structure and blue print for the transition of collaborative work practices in organizations through a training program. The training approach is focused on the transition of a single work practice in a short efficient training in which the cognitive capacity of the practitioner is optimally used to focus them on learning only the skills and knowledge essential to execute their task. With this training, practitioners at ING now perform the required risk assessment workshops as a standard work practice. The training of a single recurring task for collaboration support offered an affordable way to implement collaboration support for a recurring critical task in the organization.

The training was developed based on an evaluation of suitable training approaches, a set of techniques based on Cognitive Load Theory, and an analysis of the task of a practitioner in the context of the Collaboration Engineering approach. The training developed in this way was first evaluated in a pilot. Next, over 300 practitioners were trained. Finally, we collected feedback from 155 practitioners using a questionnaire in which we measured mental effort, completeness and usefulness of the training and whether the training prepared them for their task.

The results from the questionnaire are encouraging. It seems that the cognitive load of the training is not exceptionally high or low and the material and training seem to be complete and useful. This suggests that the training is efficient in transferring the required information. Further, we found that practitioners feel equipped to execute the process and were satisfied with the training. Their intentions for preparation are to revise the training material and only a few want more practice or support from more experienced practitioners. As we expected many of the practitioners were not sure they would have a chance to observe or co-facilitate a session with another practitioner, and several indicated that they were sure that that was not possible. Our assertion that the training should and could equip practitioners sufficiently to run a process as complex as ‘risk self-assessment’ by themselves is supported by feedback from ING’s management that reported worldwide successful applications of the R&CSA process.

There are a number of limitations concerning this study. The approach we used to evaluate the training is highly subjective as practitioners have no frame of reference to assess their skills. While feeling equipped to execute a task is a high predictor of performance, further research is required to observe and evaluate practitioner performance both from a facilitator perspective and from a participant perspective. While participants do not have a frame of reference for the quality of process support, they can indicate quality of the results and satisfaction with both results and process. Facilitators can judge the quality of the interventions made by a practitioner but it will be challenging to distill an evaluation of the practitioners from an evaluation of the process design. Another limitation is our use of cognitive load and training approaches as design assumptions for the training structure. In future research other learning theories can be used and compared that might lead to different training/transfer approaches. Finally, the questionnaire instrument needs further evaluation and the training approach should be used in other case studies. Some first advances in this direction are made in (Kolfschoten et al. 2008, 2009).

In order to further validate and optimize the training approach, it should be tested in more cases with an in-depth analysis of the participant’s perspectives on the strengths and weaknesses of the training program. Such an analysis could also take into account the success of the trainees in the field. Furthermore, such analysis should investigate the perceived added value of each of the steps in the training approach in more detail. Additionally, the training should be further compared with other approaches to offer comparative insights in the merits of the approach. Finally, the need and request for a second, advanced training at ING indicates that some background information and challenges might become apparent only once the practitioner has some experience. Initial interviews with practitioners showed that in practice, practitioners are sometimes forced to alter the process in different ways. This requires additional background and understanding of the process as well. Further research is required to understand the flexibility of a practitioner that is required to successfully apply the process in different instance of the task. We need to create an approach to analyze this need for flexibility and methods to support it with the design and to incorporate it in the training. Another line of research is the use of this training approach as a modular way of facilitation training. When practitioners are gradually trained to run different workshops, a new ‘on the job’ training approach to transfer facilitation skills can be developed. Finally, it is important to gain understanding in the effect of (organizational) culture and ‘talent’ or ‘personality’ of the practitioner on the success of the transfer.

Appendix A Questionnaire

EVALUATION TRAINING R&CSA FACITILITATION TECHNIQUES

TRAINING CONTENT

1. Did you receive sufficient information before the training?

□ Yes

□ No, I also needed…………………………………………………………………

2. How do you rate the usefulness of the following parts of the training? (1 = not at all useful, 4 = neutral, 7 = very useful)

Training parts	**1**	**2**	**3**	**4**	**5**	**6**	**7**
a. Explanation of patterns of collaboration (diverge, converge, organize, evaluation, and build consensus) and thinkLet structure (tool, configuration, script)							
b. Exercise and explanation of R&CSA process (constructing the process models for Identification and Assessment in subgroups)							
c. ThinkLets explanation and practice with case							
d. Facilitation do's and don'ts, pitfalls, general guidelines							

3. What kind of additional (interactive) training would you like to have?
   - □ None
   - □ I would like to have the following: ………………………………………………………………

4. How do you rate the usefulness of the following training materials? (1 = not at all useful, 4 = neutral, 7 = very useful)

Training materials	**1**	**2**	**3**	**4**	**5**	**6**	**7**
a. Binder with presentation slides							
b. Overview picture of complete R&CSA process (red-yellow-green diagram)							
c. ThinkLet cards							

5. Where the training materials complete?

□ Yes

□ No, I also needed ………………………………………………

6. Are there elements in the training materials that you think are unnecessary?

□ None

□ Yes, the following: ………………..…………………………………………………………

Training Results

7. Please state your opinion regarding the following statements. (1 = very much disagree, 4 = neutral, 7 = very much agree)

Statement	1	2	3	4	5	6	7
a. I will use the R&CSA facilitation techniques.							
b. The R&CSA facilitation techniques are useful for me.							
c. After the training, I felt equipped to facilitate an R&CSA workshop.							

8. What will you do to prepare yourself for your first R&CSA workshop?

……………………………………………………………………………………………

9. Will you attend a workshop performed by another R&CSA facilitator before running your own first session?

……………………………………………………………………………………………

Training Delivery

10. Please state your opinion regarding the following statements. (1 = very much disagree, 4 = neutral, 7 = very much agree)

Statement	1	2	3	4	5	6	7
a. The training materials were well introduced and explained.							
b. The training materials were presented in a logical order.							
c. I found that the training required a lot of mental effort.							
d. I found the training difficult.							
e. I found the training tiring.							

11. Was the training too long or too short?

□ No, it was just right.

□ Yes, it was too …………………………………….…………………………………

12. Was the group size effective?

□ Yes

□ No, because…………………………………………………………………………

13. Please state your opinion regarding the following statements. (1 = very much less, 4 = about the same, 7 = very much more)

Statement	1	2	3	4	5	6	7
a. The R&CSA facilitation training was (less/more) difficult compared to other trainings I had in my professional career.							
b. The R&CSA facilitation training was (less/more) useful compared to other trainings I had in my professional career.							
c. I am (less/more) satisfied with the R&CSA facilitation training compared to other trainings I had in my professional career.							

CONCLUSION

14. Please state your opinion regarding the following statements. (1 = very much disagree, 4 = neutral, 7 = very much agree)

Statement	1	2	3	4	5	6	7
a. Overall, the training met my expectations.							
b. Overall, I am satisfied with the training.							

15. Other comments and suggestions:

....

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