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RESEARCH PAPER

Conquering the Challenge of Continuous Business Model Improvement

Design of a Repeatable Process

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Abstract In an atmosphere of rapidly changing business environments and intense competition, adequate and timely business models are crucial for companies. Current research mainly focuses on business model development that often neglects the legacy of established companies. The paper at hand addresses this research gap by a process design which allows established companies to rethink, improve, and continually innovate their business models. Following a design science research approach, requirements for improving business models are identified by the analysis of existing literature and by expert interviews. Collaboration Engineering and a multilevel evaluation are applied to create a continuous and implementable process design for business model improvement – including specific activities, instructions, and tools. The process design represents a nascent design theory in form of an "invention" type of knowledge contribution. Moreover, going beyond existing literature, the importance of collaboration between participants in a business model improvement project is highlighted. From a practical perspective, the developed process design enables companies for continuous and recurring business model improvement without the ongoing support of professional moderators or consultants.

Keywords Business model improvement · Collaboration engineering · Collaboration process design approach · Facilitation process model · Systematic process design · Established companies

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1 Introduction

Due to frequent and permanent changes in their business environment, companies must constantly contend with new challenges. Globalization and the corresponding development of the global economy bring increased transparency to the markets by using new and innovative technologies. Customers have more options than ever to choose the right offer for themselves. These developments, in conjunction with increasingly homogenous products and services, result in constantly increasing competition. Consequently, a major task for companies is to distinguish themselves from their competitors (Lee et al. 2011; Giesen et al. 2010; Gassmann et al. 2014; Jetter et al. 2009; Teece 2010).

Business models can help organizations achieve this differentiation (Zott et al. 2011). Well-designed business models can be an important factor in ensuring competitiveness (Lee et al. 2011; Veit et al. 2014) by helping to commercialize relevant products and services (Chesbrough 2010). Well-functioning business models can be the underlying structure for the desired economic success of ideas, products, and services (Teece 2010; Veit et al. 2014; Roelens and Poels 2015).

Generating innovative and sustainable business models is one of today's most challenging tasks for companies (Chesbrough 2006), and at the same time continuing business model innovation is a key source of competitive advantage (Mitchell and Coles 2003). In this vein, companies increasingly consider different approaches towards business model innovation to develop new business opportunities within their economic environment.

When innovating these new business opportunities, companies can build new business models from scratch. Literature often refers to this as business model development (Osterwalder and Pigneur 2010; Palo and Tähtinen 2013). In the course of such a business model development, the company's environment is analyzed, and new business models are developed that aim at generating completely new business opportunities for the company (Peters et al. 2015). An example for this kind of business model development would be the creation of a new product or service that results in a completely new value proposition that the company can offer to its customers. Based on this new value proposition, the company has to develop all other aspects of the corresponding business model from scratch in order to commercialize this new product or service.

For established companies, another approach towards business model innovation is to improve their existing business models. Within this stream of research, the process of business model innovation is perceived as a continuous reaction to changes in a company's environment (Demil and Lecocq 2010) or as an on-going learning process (Chanal and Caron-Fasan 2010; McGrath 2010; Sosna et al. 2010) which requires an ongoing discovery-driven process (McGrath 2010; Smith et al. 2010; Sosna et al. 2010). When improving their business models, one option for companies is the complete revision of their business model. We will refer to this as radical improvement. An example of such radical improvement is the decision of a company to extend their business to new market segments that it has not addressed before. As a consequence of such a decision, the company has to define new customer segments, the types of relationships that it will be established with these customers, and the channels it will use to interact with them. In addition, it might also be necessary to align its internal activities and resources towards that new way of value creation.

Another option is to revise only parts of the business model. We will refer to this as incremental improvement. An example of incremental improvement is the generation of a new revenue generation mechanism for an existing product or service.

In recent years, there has been increased interest in academic literature regarding how companies can continuously improve business models while maintaining their high quality (Chatterjee 2013). Existing literature shows that the number of approaches to developing business models has increased in recent years (Zott et al. 2011). Good examples in this context are the common approaches for business model development of Osterwalder and Pigneur (2010), Gassmann et al. (2014), Grasl (2009) and Wirtz (2011).

Despite these approaches and their description of methods and tools in the field of business model development (Ebel et al. 2016), the research area of tool and method support in business model improvement has not been addressed in a sufficient manner (Zott and Amit 2010; Osterwalder and Pigneur 2013; Giessmann and Legner 2016). Detailed instructions and systematic process models are largely neglected, thus hindering an autonomous and sustainable implementation of the tools and methods by companies. In this paper, we contribute to this research gap by building and evaluating a systematic process design for business model improvement that considers the legacy of established companies in a continuous manner.

If such a process for business model improvement can be easily set up in-house, the continuous improvement of the business model to address changing environmental requirements using their own resources can become increasingly plausible and important for many established companies.

Therefore, the development of a systematic process design for the autonomous rethinking and improvement of business models can be seen as the logical next step in the strategic handling of companies' business models (Osterwalder and Pigneur 2013).

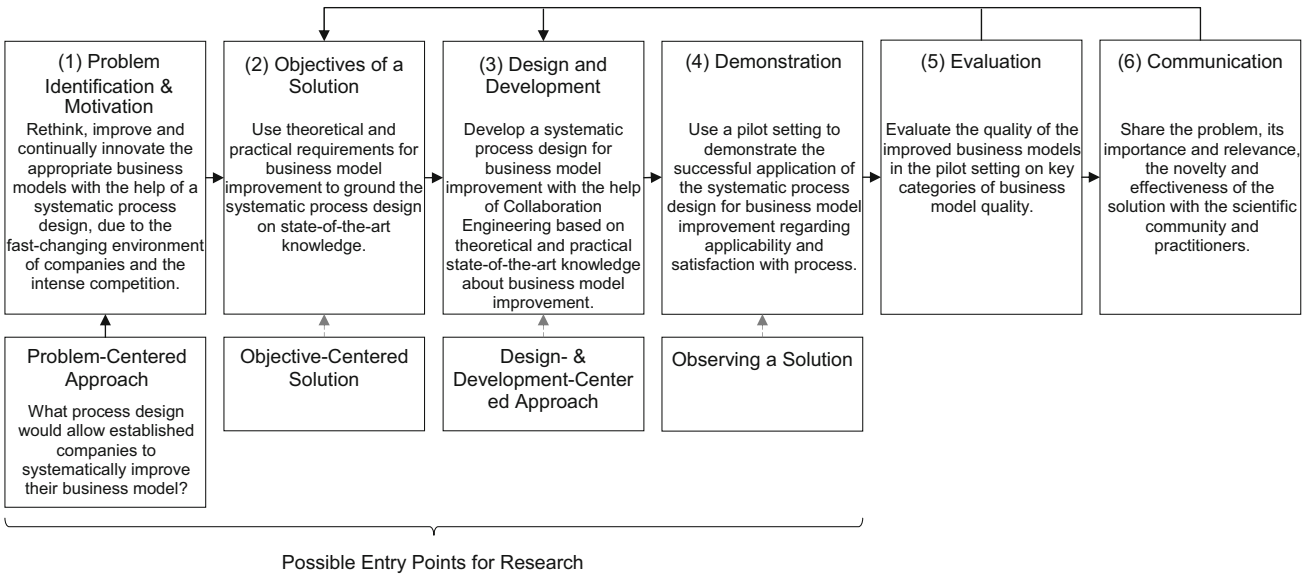

Fig. 1 The DSR approach employed in this study (adapted from Peffers et al. 2007)

Consequently, the research question arises: *What process design would allow established companies to systematically improve their business model?*

2 Methodology

To derive the intended process design, we conducted a design science research (DSR) project (Gregor and Hevner 2013) to develop a new and innovative artefact that helps to solve the real-world problem of business model improvement. Such novel artifacts that extend the current body of knowledge can take the form of constructs, instantiations, models, or methods (Hevner et al. 2004). Our developed process design pertains to methods as it delivers a step-by-step guidance for business model improvement.

To conduct our research, we followed the iterative DSR methodology process of Peffers et al. (2007) consisting of six phases: (1) problem identification and motivation; (2) objectives of a solution; (3) design and development; (4) demonstration; (5) evaluation; and (6) communication.

The introduction section of this paper addresses phase 1, "problem identification and motivation". The second phase, "objectives of a solution", consists of determining the requirements for business model improvement from literature and practice; therefore, we conducted a literature review (Sect. 3 of this paper) and an interview study (Sect. 4). The third phase, "design and development", focuses on how to transfer the identified theoretical and practical requirements into a systematic process design for business model improvement using the Collaboration Engineering (CE) approach. Therefore, we explain and then use the Collaboration Process Design Approach (CoPDA) of CE in Sect. 5 of this manuscript. In the fourth phase of the DSR process, "demonstration", we apply the developed process design within a pilot setting to demonstrate its applicability (Sect. 6). With the help of the CoPDA, the results of the evaluation were transferred back to the "objectives of a solution" and "design and development" phases. In the fifth phase, "evaluation", we evaluate the process design for the quality of the improved business models within the pilot setting (Sect. 7). Using this multi-step ex-ante and ex-post evaluation, we intend to ensure the validity of our results (Sonnenberg and Vom Brocke 2012). Based on the feedback received concerning the problem definition and the process itself, it was also possible to iteratively adjust the goal and the developed process design. Subsequently, we outline our contribution and discuss limitations and future research (Sect. 8). Lastly, we summarize the paper with a conclusion (Sect. 9). The described procedure is also depicted in Fig. 1.

3 Conceptual Background

3.1 Contributing Knowledge for Developing a Business Model Improvement Process

To ensure an effective process design, we analyzed extant research for theoretical and practical requirements for improving existing business models. In this context, we first identified theoretical requirements by means of a systematic literature review.

For the systematic literature review, we used the multi-step process proposed by Zott et al. (2011). First, we

Table 1 Overview of the literature search process

Database	Search string	Search fields	Coverage	Number of hits	Reviewed
Business source premier	'Business model' AND ('design' OR 'development' OR 'engineering' OR 'framework' OR 'innovation' OR 'process' OR 'tool')	Title, abstract, keywords, introduction	January 2000–March 2017	402	14
Emerald insights				86	9
IEEE explore				154	10
JStor				22	3
Science direct				804	16
SpringerLink				382	11
Added books, conference articles, and dissertations by forward and backward search					16

searched in leading scientific databases (i.e., Business Source Premier, Emerald insight, IEEE explore, JStor, Science Direct, and Springer Link) for peer-reviewed journal articles and conference articles published from January 2000 to March 2017, dealing with the requirements of business model improvement. We used broad-based keywords (i.e., Business Model *Design, *Development, *Engineering, *Framework, *Innovation, *Process, *Tools) and received 1850 hits. Then, we compared the results and eliminated duplications. Based on a structured review of the title, keywords, abstract, and introduction (including forward and backward search), 79 relevant sources – including referenced books, conference articles, and dissertations that dealt with requirements of business model improvement – were identified. Table 1 gives an overview of the described search process.

To develop an overarching process for the improvement of business models, we conducted a qualitative content analysis of the publications identified in the course of the literature review (Mayring 2014). We screened each article for activities that are necessary for improving and managing business models. After this, we searched for existing requirements on how to conduct these activities to inform our process design. As the different publications provided different labels for the activities necessary to improve a business model, we had to synthesize the different labels to derive an overarching process. At the end of this analysis we derived a set of five distinct phases that are necessary to conduct a business model improvement process:

Mobilization Phase At the beginning of the business model improvement process, some authors recommend conducting a mobilization phase (Fritscher and Pigneur 2010; Osterwalder and Pigneur 2010) wherein the workshop participants are introduced to each other, are motivated to participate in the workshop, and develop a shared understanding concerning the aims and the scope of the workshop.

Analysis Phase During the second phase, the project team analyzes the company's competitive environment. Main fields of this analysis include the industry context (Giesen et al. 2007; Nesse et al. 2012), the current market situation (Lee et al. 2011; Palo and Tähtinen 2013), the competitors within the market (Leem et al. 2005), and the customer's needs (Johnson 2010; Osterwalder and Pigneur 2010).

Design Phase This is a three-step phase pertaining to the actual design of the business model. In the first step, participants analyze the company's current business model (Giesen et al. 2007; Fritscher and Pigneur 2010; Osterwalder and Pigneur 2010; Lee et al. 2011). Next, they analyze future market developments (Leem et al. 2005; Im and Cho 2013; Palo and Tähtinen 2013) in order to develop value-capturing mechanisms that will allow the company to react to these developments and realize future profits (Giesen et al. 2007; Teece 2010; Lee et al. 2011; Chatterjee 2013). In a last step, the project team uses predefined frameworks in order to consolidate the results of the design phase (Fritscher and Pigneur 2010; Osterwalder and Pigneur 2010; Lee et al. 2011; Im and Cho 2013).

Implementation Phase In this phase, the project team decides whether the improved business model can be implemented within the existing structure of the company, or if a new venture has to be established in order to commercialize the improved business model (Chesbrough 2007; Johnson 2010; Palo and Tähtinen 2013). Additionally, the project team develops operational processes that will allow the execution of the business model (Leem et al. 2005; Osterwalder et al. 2005; Fritscher and Pigneur 2010; Osterwalder and Pigneur 2010; Lee et al. 2011; Chatterjee 2013) as well as the execution of mechanisms to prevent imitation of the business model (Giesen et al. 2007; Teece 2010).

Management of the Business Model Last, the project team must manage the improved business model. Within this phase, the business model has to be constantly adapted

and renewed in order to ensure the company's market position (Leem et al. 2005; Osterwalder and Pigneur 2010; Achtenhagen et al. 2013; Im and Cho 2013; Palo and Tähtinen 2013).

Out of the 79 articles identified during the review, 19 addressed at least one of these five phases.

3.2 Findings from the Literature Review

Although there are five phases of the business model improvement project described above, most extant research focuses on the design phase. Accordingly, the variance of the several sub-steps in this phase is rather high, ranging from the sole development of a customer value proposition (Lee et al. 2011) to the derivation of several building blocks that a holistic business model has to address (Osterwalder and Pigneur 2010). Consequently, there is no consensus regarding the precise steps that are necessary to improve business models.

Our literature review also reveals that the ongoing improvement of business models has only been sparsely researched. While existing literature agrees on the necessity of constantly adapting and renewing a company's business model in order to ensure the company's market position, concrete guidelines on how to conduct this adaption process are not mentioned (Leem et al. 2005; Osterwalder and Pigneur 2010; Achtenhagen et al. 2013; Im and Cho 2013; Palo and Tähtinen 2013).

However, as we have outlined in the previous sections, it is increasingly important to constantly adapt a company's business model to strengthen its competitive position. Such a continuous refinement of their business models represents a challenging task for companies (Zott and Amit 2010; Palo and Tähtinen 2013). Therefore, companies need support in executing and implementing the appropriate improvements of business models (Giesen et al. 2010).

Finally, there is only sparse knowledge concerning the requirements that must be fulfilled to successfully execute the different phases within a business model improvement project. Therefore, there is a need for directly implementable process designs for business model improvement with clear links to required methods and tools. Improvement of business models must be a continuous reaction to changes in a company's environment (Demil and Lecocq 2010) as well as an on-going learning process (Chanal and Caron-Fasan 2010; McGrath 2010; Sosna et al. 2010).

To complement existing literature regarding the three aspects that have been outlined above, we conducted an interview study with experts in the domain of business model improvement. In doing so, we intended to collect further knowledge concerning the content of the phases that are necessary for improving business models. We also aimed at completing the literature-based business model improvement process, not only according to the identified process phases, but also to the requirements within the different phases.

4 Identification of Practical Requirements for Conducting Business Model Improvement

To develop a systematic process design for business model improvement, we interviewed experts in the field of business model improvement about the goals they would propose for a business model improvement workshop and the main products that must be achieved when conducting such workshops. In addition to that, we tried to identify basic conditions that must be met when conducting business model improvement workshops. *Goals* of the process design represent targets in the form of desired states or desired results of the group. *Group products* are the material or immaterial artifacts or conditions of the group that mark the results of the collaboration process. *Basic conditions* represent important steps, procedures, tools, behavior, or requirements that frame the process of business model improvement. Goals, group products, and basic conditions represent categories in a classification system which serve as the basis for the derivation of requirements; this is reflected in the structure of Table 2.

In sum, eleven semi-structured interviews were conducted with experts in the field of business model improvement: i.e., consultants, enterprise architects, business developers, and entrepreneurs from different industries with a minimum of 3 years of experience in business model improvement. The interviews were each 30–55 min long and were transcribed for analysis. The interview guideline was based on the insights from the literature review and addressed the business model improvement process, the tools and methods used in the process, as well as the conditions, best practices, and general experiences in business model improvement. The interview guideline (see Appendix A; available online via http://link.springer.com) served as a starting point for in-depth questions. By using the classification system shown in Table 2, the interview results could confirm the literature review findings. Moreover, additional requirements and deeper insights could be derived. In this context, one author of this study defined the respective requirements of the interview study with the help of an iterative and detailed coding based on a 15-step process, which was inspired by the qualitative content analysis according to Mayring (2014). Then, the results were examined and improved by the remaining authors with the help of a joint vote. The results of the literature review and the interview study were combined and are presented in Table 2. By including theoretical and practical requirements (RQs), a detailed basis to develop a systematic process design for business model improvement is created.

Table 2 Theoretical and practical requirements of business model improvement

Category	Requirements (RQs)	Literature	Interviews
Goals	*Theoretical requirements*		
	Improve the current business model (G1)	Ebel et al. (2016) and Peters et al. (2015)	X
	Structural procedure (G2)	Peters et al. (2015) and Wiesner et al. (2014)	X
	Create awareness for the need for change (G3)	Osterwalder and Pigneur (2010) and Wiesner et al. (2014)	X
	Practical requirements		
	Fast and easy application of the process design (G4)		X
	Continuous documentation of the results (G5)		X
Group products	*Theoretical requirements*		
	Mobilized business model improvement team (P1)	Ebel et al. (2016), Fritscher and Pigneur (2010) and Osterwalder and Pigneur (2010)	X
	Created team spirit in the group (P2)	Ebel et al. (2016)	X
	Executed environmental analysis of the existing business model (P3)	Ebel et al. (2016), Gassmann et al. (2014), Osterwalder and Pigneur (2010), Papakiriakopoulos et al. (2001) and Peters et al. (2015)	X
	Elaborated tool/framework for business model improvement (P4)	Ebel et al. (2016), França et al. (2017), Fritscher and Pigneur (2010), Giessmann and Legner (2016), Im and Cho (2013), Lee et al. (2011), Osterwalder et al. (2005), Osterwalder and Pigneur (2010), Papakiriakopoulos et al. (2001) and Peters et al. (2015)	X
	Shared understanding about the project scope (P5)	Ebel et al. (2016)	X
	Shared knowledge of basics of business model improvement (P6)	Gassmann et al. (2014), Osterwalder and Pigneur (2010) and Wiesner et al. (2014)	X
	Analyzed existing business model (P7)	Ebel et al. (2016), França et al. (2017), Gassmann et al. (2014), Giesen et al. (2007), Giessmann and Legner (2016), Grasl (2009), Palo and Tähtinen (2013), Peters et al. (2015) and Wirtz (2011)	X
	Practical requirements		
	Shared knowledge about the existing business model (P8)		X
Basic conditions	*Theoretical requirements*		
	Use and prepare a wide range of materials and tools (post-its, index cards, mind maps) (Bc1)	Ebel et al. (2016), Fritscher and Pigneur (2014a, b) and Osterwalder and Pigneur (2010)	X
	Visual representation of operating steps and results (Bc2)	Fritscher and Pigneur (2014a), Osterwalder and Pigneur (2010) and Wirtz (2011)	X
	Arrange enough time (Bc3)	Ebel et al. (2016)	X
	Use interdisciplinary teams (Bc4)	Ebel et al. (2016), Eppler and Hoffmann (2012), Gassmann et al. (2014) and Osterwalder and Pigneur (2010)	X
	Practical requirements		
	Use technical options for storing the results (Bc5)		X
	Design simple procedures (Bc6)		X
	Enable cross-divisional communication (Bc7)		X
	Convince doubters (Bc8)		X
	Achieve commitment (Bc9)		X
	Despite technology, use face-to-face approaches (Bc10)		X

5 Development of a Process Design for Business Model Improvement

In the search for a design approach that allows the systematical derivation of a collaborative process in a step-by-step manner and is grounded on sound theoretical and practical knowledge, we chose Collaboration Engineering. CE addresses the challenge of designing and deploying collaborative work practices for high-value recurring tasks and transferring them to practitioners to execute them on

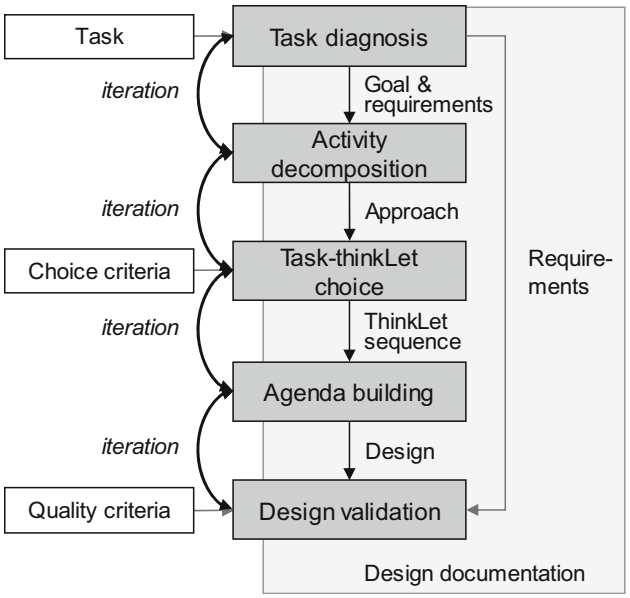

Fig. 2 Collaboration process design approach (adapted from Kolfschoten and de Vreede 2009)

their own without ongoing support from a professional collaboration expert (Kolfschoten et al. 2006a; de Vreede et al. 2009). Pre-scripted instructions in the form of a detailed agenda, specific prompts, and restrictions by pre-configured tool-support functionalities help group members combine their knowledge and skills to achieve a defined goal (Kolfschoten et al. 2006b). With the help of validated, transparently documented, collaborative work practices, practitioners are enabled to execute the tasks of professional collaboration experts.

Collaboration Process Design Approach (CoPDA) represents the central design approach for collaborative processes in CE. Based on this structured approach to detailed collaboration process scripts, a detailed process design for business model improvement can be created and documented. The CoPDA consists of five iterative steps (see Fig. 2) which are explained below and applied in their respective order.

5.1 Task Diagnosis

In this first step of CoPDA, task diagnosis, an analysis of required tasks, stakeholders, resources, facilitators, and practitioners is conducted. To address the respective goals and requirements for business model improvement, we identified theoretical and practical requirements (Table 2). Furthermore, the group products (outcomes) and the basic conditions (e.g., the agreed-upon business model draft, awareness for a need to change, etc.) are considered when formulating the objective. Consequently, the overarching objective of the process design for business model improvement can be defined as follows:

> The purpose of the process design is a structured improvement of a business model for an established company with a cross-functional group of up to seven people with heterogeneous experience in a one-day-workshop. In addition, the compiled results of the workshop are continuously documented. Furthermore, an awareness of the need for change is created within the group (G1-G5).

5.2 Activity Decomposition

The second step of CoPDA, activity decomposition, deals with the determination of the sequence of activities necessary for reaching the defined goal. These activities are derived from the group products by identifying the intermediate results necessary to build these products. These intermediate products are considered inputs and outputs of the activities. We derived the flow of activities by sequencing the inputs and outputs and defining which modifications (activities) are needed to achieve them. In the case at hand, every participant needs to be aware of his own understanding of the current business model before a shared conception of the current business model can be negotiated (Ebel et al. 2016), which in turn is a prerequisite for business model improvement.

5.3 Task-thinkLet Choice

In the third step, thinkLets are assigned to each of the previously defined activities. ThinkLets are design patterns in the form of documented techniques that have proven to be useful in facilitation practice. They are used for evoking a certain predictable behavioral pattern in teams, for example for quickly organizing a large number of contributions (PopcornSort) or generating ideas on a specific topic in a small group (OnePage, see also Appendix B) (Briggs and de Vreede 2009). Thus, when designing new collaboration process scripts, as for business model improvement, out-of-the-box thinkLet techniques can be used and configured for the specific application domain. ThinkLets are used in process design to build on the experience of collaboration experts who documented the flow of actions and prompts, usage rules, and necessary conditions and restrictions as well as instructions for non-expert facilitators that evoke a certain replicable result. To demonstrate the concept of thinkLets, Table 3 shows the general documentation of the thinkLet "OnePage". In addition to a brief overview and the selection criteria to choose a suitable thinkLet for a certain type of activity and setting, the documentation lists necessary inputs and

Table 3 thinkLet OnePage (Briggs and de Vreede 2009)

thinkLet: OnePage	
Choose this thinkLet	*Do not choose this thinkLet*
To generate a few (less than 80 or so) comments on one topic	When you expect more than 80 or so comments because it may cause information overload. Consider FreeBrainstorm or ComparativeBrainstorm instead
When 5 or fewer people will brainstorm together	When six or more people will brainstorm until They run out of ideas. Consider FreeBrainstorm or ComparativeBrainstorm instead
When 6 or more people will brainstorm for fewer than 10 min	When the team must address more than one topic at a time. Consider LeafHopper or Dealer's choice instead
When there aren't likely to be many comments generated on the topic under discussion	
To support back-channel communication among distributed team members	
Overview	
In this thinkLet, team members will all contribute comments simultaneously to the same electronic page or list at the same time	
Inputs	*Outputs*
The brainstorming question or prompt	A set of comments in response to a brainstorming question or prompt
How to use OnePage	
Setup	
1. Open a single list or comment window in Topic Commenter, Vote, Group Outliner, or Categorizer	
2. Match views with participants to open the same list or card on their screens	
Steps	
1. Make sure the participants understand the brainstorming question or prompt. Say this: a) If you have any questions with respect to the brainstorming question or assignment, please speak up	
2. If necessary, facilitate a verbal discussion to address any understanding difficulties. If necessary, re-formulate the question or prompt	
3. Inform the participants of time limits, if any	
4. Let the participants contribute comments until they run out of ideas or until the run out of time	

outputs (hinting on which activities may need to precede or follow the thinkLet) as well as the procedure the facilitator and team should follow (Briggs and de Vreede 2009). Appendix B contains the remaining thinkLets used in the process design (PopcornSort, ChauffeurSort, MultiCriteria, StrawPoll, OnePage and RichRelations) in the original notation. The instantiation of the thinkLet design patterns for the given problem and the process design is described briefly in Table 3 as well as in more detail in Appendix C.

5.4 Agenda Building

In the fourth step, agenda building, thinkLets are transferred into an executable script using an internal agenda and a formal modelling approach, the *Facilitation Process Model (FPM)* (see Fig. 3). In this step, the general design patterns are adapted to the specific application domain by, for example, adding appropriate guiding questions or setting the time boxes for each activity.

To ensure the mentioned applicability of the process by practitioners without major facilitation experience, a conclusive *internal agenda* of the collaborative process was created. The internal agenda shown in Table 4 offers detailed activities including action-guiding instructions and questions, group formations, thinkLets, Pattern of Collaboration (PoC), the duration of activities, and tool support. These specifications enable an immediate implementation of the process design. A detailed description of the activities of the internal agenda is available in Appendix C. Additional tools created for the execution of the process are available in Appendix D. Moreover, the internal agenda indicates how outlined requirements of business model improvement (RQs) (identified group products, and basic conditions) are incorporated into the systematic process design.

6 Demonstration of the Resulting Business Model Improvement Process

The last step of the CoPDA, design validation, represents the evaluation of the developed collaborative process (Kolfschoten and de Vreede 2009). The aim of the design validation step is to test whether the collaborative process design succeeds in leading to the pre-defined goal and products. Combining different evaluation methods allows us to identify potential flaws or inefficiencies of the process design, ambiguities in the process documentation, and potentials for design optimizations (Kolfschoten and de Vreede 2009; de Vreede et al. 2009). Triangulation of

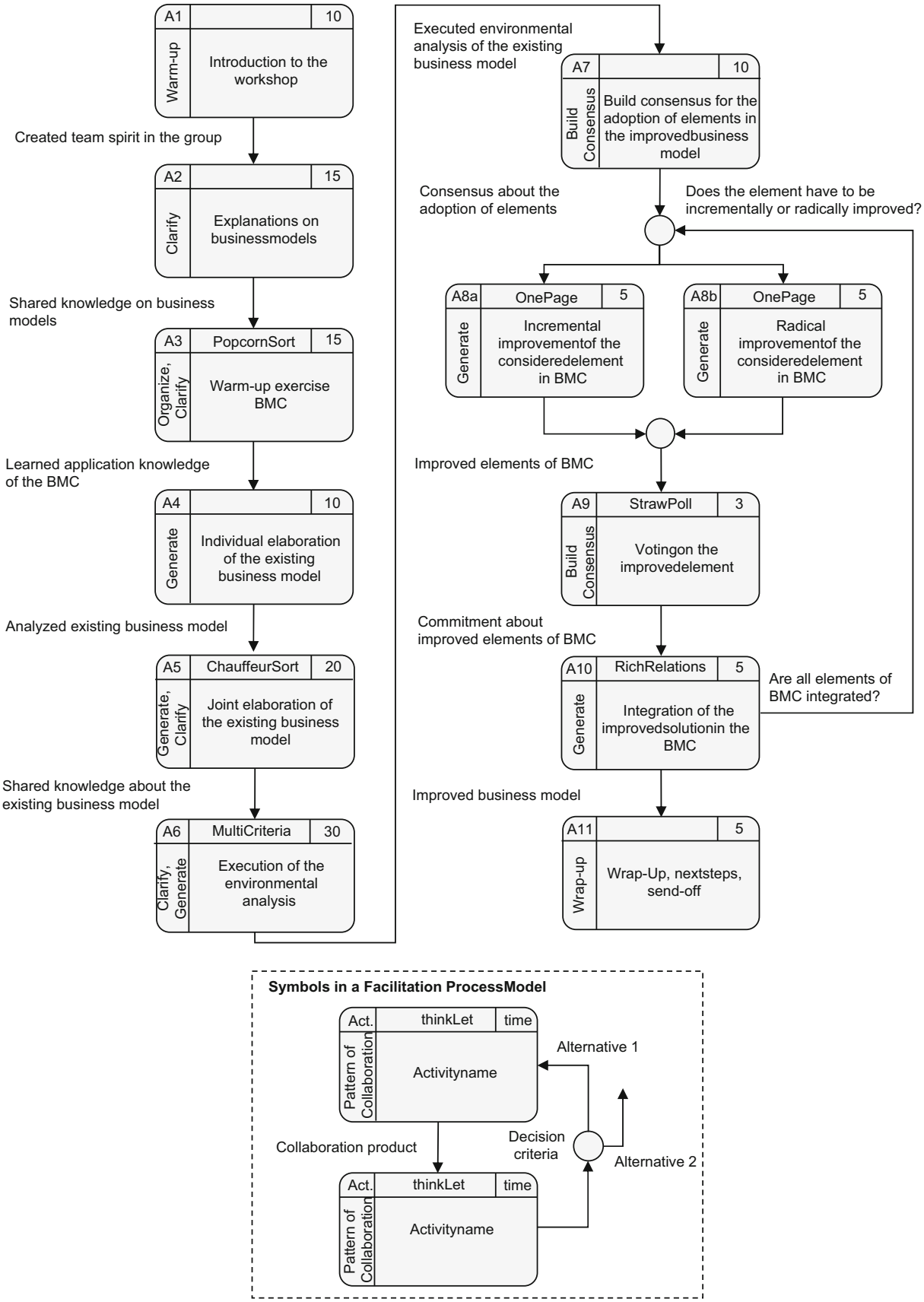

Fig. 3 Facilitation process model – systematic process design of business model improvement (adapted from Kolfschoten and de Vreede 2009)

Table 4 Internal agenda of the systematic process design

Act. min.	Group formation	Activity	Group products	PoC/thinkLet	Instructions	Tools	RQs
Preparatory activities prior to the workshop: mobilize an interdisciplinary team of 4–7. Prepare all necessary tools for conducting the process							Bc4
A1 10	Plenary group	Introduction to the workshop	Created team spirit in the group	Warm up	Facilitator and practitioners introduce themselves Facilitator presents the agenda and goals of the workshop Achieve commitment to the goals from practitioners	Presentation introduction	P1; Bc9; P5
A2 15	Plenary group	Explanation on business models	Shared knowledge on business models	Clarify	Emphasize the relevance of BMs and explain the basic knowledge about BMs and the BMC Ask: Do you understand the basics of business models?	Presentation BM/BMC knowledge	P2; Bc9
A3 15	Subgroup	Warm-up exercise BMC	Learned application knowledge of the BMC	Organize, clarify *PopcornSort*	Practitioners create the business model (prepared example of a well-known company) in subgroups based on content predefined in the BMC	Presentation warm up, BMC (DIN A3), prepared post-its	P2; Bc1; Bc2
	Plenary group				Discuss the solutions in the plenary group		
A4 10	Individual	Individual elaboration of the existing business model	Analyzed existing business model	Generate	Practitioners individually elaborate the existing BM in the BMC	Existing BMC (DIN A3), small post-its, pens	P6; Bc1
A5 20	Plenary group	Joint elaboration of the existing business model	Shared knowledge about the existing business model	Generate, Clarify *ChauffeurSort*	Prepare the post-its of the existing BM for the BMC. Present the post-its and discuss which field is addressed Stick the post-its to the right place as soon as consensus has been reached Achieve commitment and perform these steps for all predefined post-its Summarize the existing BM and take a picture of the elaborated BMC	Prepared BMC post-its (current BM), BMC (DIN A0)	P6; P7; Bc9; Bc1; Bc2;Bc5
A6 30	Plenary group	Execution of the environmental analysis	Executed environmental analysis of the existing business model	Clarify, Generate *MultiCriteria*	Prepare the environmental analysis questionnaire for each practitioner and introduce the practitioners to the environmental analysis (EA)	Presentation EA questionnaire, EA questionnaire	P8; Bc1; Bc2; Bc5
	Individual				Each participant answers the EA questionnaire (20 min.)		
	Plenary group				Consolidate (for example: calculate the average of the EA questionnaire for each element of the BMC) and present the results of the EA questionnaire		
A7 10	Plenary group	Build consensus for the adoption of elements in the improved business model	Consensus about the adoption of elements	Build Consensus *StrawPoll*	Remind the participants of the results of the respective element from the EA questionnaire Ask: Does the element have to be incremental or radical improved? Facilitate the (optional) transfer of the existing elements in the new BMC. Stick the transferred elements (post-its) to a new BMC Take a picture of the new BMC	BMC (DIN A0), EA questionnaire	P8; Bc1; Bc2; Bc5

Table 4 continued

Act. min.	Group formation	Activity	Group products	PoC/thinkLet	Instructions		Tools	RQs
A8 05	Plenary group	Incremental or radical improvement of the considered element in BMC	Improved elements of BMC	Generate *One Page*	Yes: Incremental improvement of the considered element	No: Radical improvement of the considered element	Presentation with guiding questions of BMC, BMC (DIN A0)	P3; Bc1; Bc2
					Ask: How can the considered element be incrementally improved? Orient yourself to the key questions of the respective element	Ask: How can the considered element be radically improved? Orient yourself to the key questions of the respective element		
					The practitioners can add the existing solution and stick post-its with suggestions to the BMC	The practitioners are intended to stick post-its with suggestions to the BMC		
A9 03	Plenary group	Voting on the improved element	Commitment about improved elements of BMC	Build Consensus *StrawPoll*	Read each post-it of the element concerned in the BMC and ask for commitment. In case of objections, facilitate a discussion and ensure a solution (majority decision)		BMC (DIN A0)	P3; Bc9; Bc1
A10 05	Plenary group	Integration of the improved solution in the BMC	Improved business model	Generate *RichRelations*	In order to adapt the interrelations between the elements in the BMC, the facilitator gives an overview of each relationship of each element and asks for necessary additions or objections		Presentation with interrelationships of BMC, post-its, pens	P3; Bc1; Bc2
					Facilitate the discussion and ensure a solution (majority decision)			
					The activity must be performed for each element in the order of the BMC			
A11 05	Plenary group	Wrap-Up, next steps, send-off			Summarize the workshop and the improved BM		Presentation wrap up	Bc2; Bc5
					Check if you have achieved the goals of the workshop and take a picture of the final BMC			

different evaluation methods is a common and essential way in CE to ensure an effective and robust process design.

We validated the process design in four iteration loops. After each iteration loop, the process design was revised and adjusted accordingly. To uncover hidden weaknesses and improve the process design continuously, we used three evaluation methods: design simulations, walk-throughs, and pilot tests. Figure 4 depicts the evaluation process including the evaluation methods and the corresponding iteration loops.

We began in the first loop, *V1*, with a *design simulation* of the process design initially created. In CE, design simulations represent a detailed step-by-step review of the process design by the Collaboration Engineer. They enable the elimination of major stumbling blocks, more integration of the structure, and testing the correctness and consistency of the process (Kolfschoten and de Vreede 2009).

In the second loop *V2*, we conducted *walk-throughs*. Walk-throughs are based on detailed step-by-step reviews of the process design by experts. During walk-throughs, valuable ideas and alternative solutions can be collected and discussed (Beecham et al. 2005; Jørgensen 2007). We conducted two walk-throughs with experts of CE, that is, CE researchers with more than 5 years of experience in

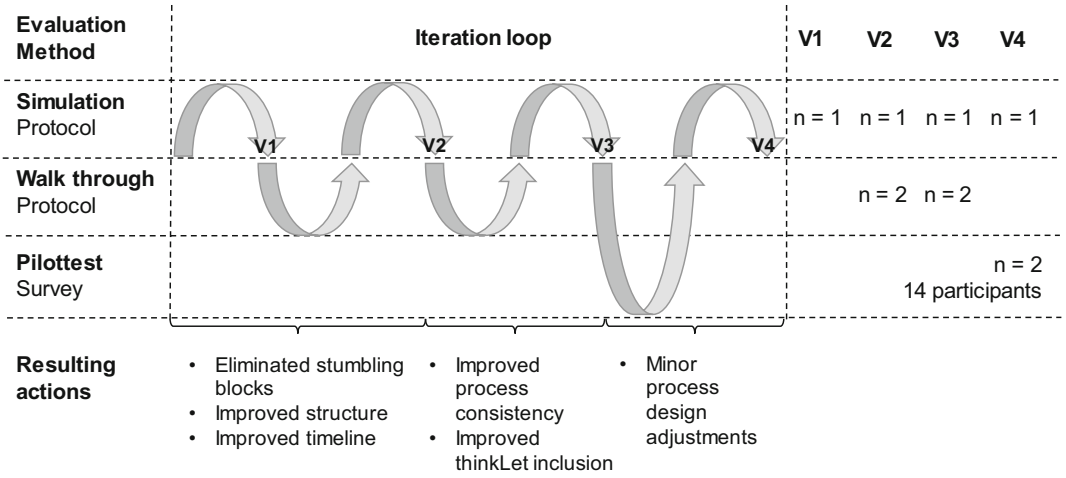

Fig. 4 Iterative evaluation of the process design (adapted from Sein et al. 2011)

CE. This ensured the correct application of CE and collection of valuable suggestions for the adaption of individual activities and sequences from validated prior collaboration process designs. We also included two more thinkLets and adapted them to business model improvement. Furthermore, the experts highlighted the need to allocate sufficient time for each activity. Based on that, we adjusted the timelines for several activities. In addition to the walkthrough, we carried out a design simulation to verify the consistency of the revised process design. The results were included in the second version of the process design (*V2*).

In the third loop, we conducted two walk-throughs with business model improvement experts (business model researchers with more than 5 years' experience in business model improvement projects) to ensure the correct transfer of the theoretical and practical business model requirements. Moreover, we achieved additional insights into the facilitation of workshops on business model improvement. A design simulation also completed the third iteration loop. This way, we created the version *V3* of the process design.

As a final iteration loop and to check the applicability of the process design by practitioners without the ongoing support of a professional facilitator, we conducted two *pilot tests*. Many well-respected collaboration process design papers mainly report action research studies or experiments for the design evaluation that are facilitated by the researchers themselves (de Vreede et al. 2005; Kamal et al. 2007; Bittner and Leimeister 2014). These studies provide in-depth insights for validating and improving the designs. However, we see sound practical value in going beyond this point and testing the designs with non-expert facilitators.

The pilot tests were applied within an experimental setting consisting of a master's course in Information Systems. In these pilot tests, the participants improved the existing business model of an energy consultant platform. While our developed systematic process design does not require domain knowledge about business models or collaboration (both areas of knowledge are imparted and implemented directly in the process), students represent a suitable target group for the implementation of the process. Accordingly, it is possible to evaluate whether novices and non-experts can successfully carry out the process without training. Against this background, both pilot tests used the guidelines and instructions of the process design. The Collaboration Engineer conducted the first pilot test (n = 7 participants). A practitioner conducted the second pilot test (n = 7 participants). Initially, using a questionnaire, the participants were interviewed about their previous experiences and skills in the field of business model improvement. Based on their experiences, the participants were randomly allocated to the groups. The findings obtained were subsequently incorporated into the process; for example, we refined the assignment of tasks for participants and adjusted the internal agenda. In addition, the facilitators of the pilot tests documented their experiences in a protocol. Following a last design simulation, the final version *V4* of the process design was created.

The pilot tests were analyzed using a questionnaire to evaluate the process design from the perspective of the participant. Participants views concerning "satisfaction with process", "tool difficulty", "process difficulty", and "satisfaction with outcome" ("commitment", "efficiency", "effectiveness", "productivity") were examined using a 5-point Likert scale (Briggs et al. 2006, 2013; Kolfschoten 2007). All in all, we asked eight blocks of questions, with each block consisting of five questions. Table 5 summarizes the results of the survey. Both groups, the 7 participants of the first pilot test run by the CE and the

Table 5 Results of the survey

Category of questions	Group led by collaboration engineer mean (SD)	Group led by practitioner mean (SD)
Satisfaction with process	4.51 (0.50)	4.31 (0.36)
Tool difficulty	4.23 (0.69)	4.40 (0.61)
Process difficulty	4.25 (0.45)	4.06 (0.43)
Satisfaction with outcome	3.92 (0.52)	4.37 (0.56)
Commitment	4.03 (0.48)	4.17 (0.47)
Efficiency	3.77 (0.43)	3.74 (0.52)
Effectiveness	4.06 (0.46)	4.11 (0.62)
Productivity	3.83 (0.67)	3.89 (0.53)

7 participants of the second pilot test run by the practitioner – achieved high average scores across all categories. "Satisfaction with process" showed a high average value, indicating that the participants were very satisfied with the process design. In addition, "tool difficulty" also showed especially high results, suggesting that the selection and application of the tools used in the process design had been effective. Furthermore, the results and the protocol used by the practitioner facilitator indicate that the process can also be autonomously performed by practitioners. In conclusion, we can assume that the process can be implemented and used in organizations without major training in business modelling or CE, and without the ongoing support of a collaboration engineer or a professional facilitator. Overall, the participants of the pilot tests were satisfied with the improvement of the business models as well as with the results of the process.

7 Evaluation of the Business Model Improvement Process

To assess the value and utility of our process design, we evaluated the outcome of the business model improvement workshop against a baseline setting. The control group was first provided with theoretical input (Osterwalder and Pigneur 2010) on how to improve business models. Then they were provided with an existing business model that was depicted by means of the Business Model Canvas (BMC; Osterwalder and Pigneur 2010). Using the canvas and the guiding questions that are part of the BMC, they had to develop an improved version of the existing business model. After this was done, we evaluated the quality of the improved business models.

As business models can be interpreted as creative products, we examined creativity literature to identify a procedure for evaluating the business models improved during this study. Research efforts that focus on assessing creative products cover the evaluation of both the assessment scale and the assessment process (Amabile 1996). Consequently, we considered both aspects, as will be described below.

7.1 Scale for Assessing the Improved Business Models

As the quality of creative products is a complex construct, various metrics for assessing it have been discussed in literature. To develop a reliable scale, we conducted a literature review in the field of creativity research and identified several papers that dealt with an empirical evaluation of the quality of creative products. We then analyzed the scales and dimensions from the identified papers and selected six dimensions relevant for the development of the metrics used for our evaluation.

We operationalized each dimension using one item (see Table 6). With the help of these items, we assessed the quality of the business models that had been developed with our process design and without it.

7.2 Process for Assessing the Improved Business Models

Following prior research on creativity, we adopted the consensual assessment technique (CAT) (Amabile 1996) to assess the quality of the generated business models. This technique has been used to evaluate creative outcomes in various innovation projects (Matthing et al. 2006; Magnusson 2009; Blohm et al. 2011). Using CAT, the quality of the improved business models was assessed by three experts in the field of business model improvement. All three experts possess extensive market and technical knowledge and have participated in several business model improvement projects before. They were not aware of the business models' source: i.e., improved with the help of our process design versus improved without using our process design.

First of all, the experts were trained regarding the evaluation criteria and their proper application

Table 6 Operationalization of dimensions for business model evaluation

Dimensions	Corresponding item	References
Novelty	The business model delivers an unprecedented new approach	Binnewies et al. (2008) and MacCrimmon and Wagner (1994)
Originality	The business model is unusual, fanciful, original, and surprising	Binnewies et al. (2008), Dean et al. (2006), Kramer et al. (2007), MacCrimmon and Wagner (1994), Mumford et al. (2001) and Potter and Balthazard (2004)
Feasibility	The business model is easy to implement	Potter and Balthazard (2004)
Acceptability	The business model has the potential to meet the goodwill of future customers	Cooper et al. (1998) and Dean et al. (2006)
Effectiveness	The business model has the potential to generate new revenue streams	Barki and Pinsonneault (2001) and Valacich et al. (1995)
Elaboration	The idea is complete and mature	Dean et al. (2006)

(Krippendorff 2004; Hayes and Krippendorff 2007). Next, the experts were asked to assess whether the business models were described in a way that would allow evaluation. Then, the actual evaluation by each of the experts took place. For this evaluation, every business model was described on a separate piece of paper. Each paper also included the six different evaluation dimensions on a rating scale ranging from 1 (lowest) to 5 (highest). These papers were presented to the experts in random order.

7.3 Data Assessment and Findings

When assessing the resulting quality scores, we adapted a procedure proposed by Poetz and Schreier (2012). We first averaged the three experts' scores for each of the six dimensions. In addition, we created a six-way interaction term (novelty x originality x feasibility x acceptability x effectiveness x elaboration) to compare the overall quality of the business models.

Quality scores for business models improved by the group using our process ranged from 73 to 85 (see Table 7). Quality scores for business models improved by the control group using the standard procedure ranged from 53 to 69. The average value for the overall business model quality was 79 for our process group and 61 for the control group. Compared to the maximum achievable 120 points per business model, the business models of the groups that used our process design scored significantly above the medium level of 60. These results indicate a good level of business model quality when using our process.

Looking at the six different dimensions for accessing the improved business models, the group using our newly-developed process design achieved better results than the group using the standard procedure. Figure 5 shows the quality dimensions for each group.

8 Contributions, Limitations, and Future Research

Our study makes several major theoretical contributions and a key practical contribution.

Using a DSR approach, CE, and a multi-level evaluation including iteration loops, we created a recurring and directly implementable process design – including specific activities, instructions, and tools for business model improvement – that contributes to business model research. This process design is the major contribution of this study, as it constitutes an "invention" type of knowledge and represents a nascent design theory according to Gregor and Hevner (2013). Our collaborative group process enables established companies to systematically improve their existing business model by themselves, using clearly structured instructions and direct links to appropriate tools and validated methods. In sum, it is possible at any time to adapt a business model to address constantly changing environmental conditions with less preparation time and

Table 7 Comparison of quality of our process design versus standard process

	Quality scores for our process design	Quality scores for standard process
N	2	2
Average value	79.000	61.000
Standard deviation	8.485	11.313
Minimum	73	53
Maximum	85	69

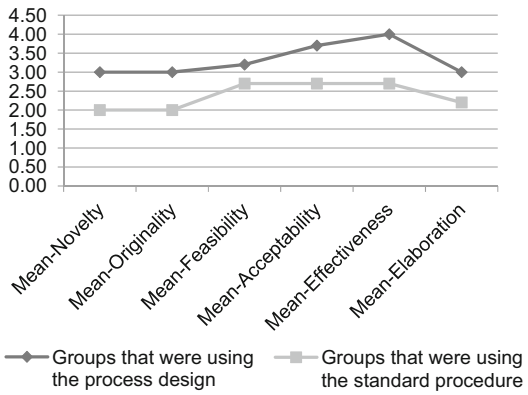

Fig. 5 Mean values of quality dimensions

without need to hire expensive external facilitation expertise.

Furthermore, we consider our study to be an additional contribution to the knowledge base in the field of business model improvement. When developing our process design, we started by consolidating knowledge in the application domain that would be capable of informing our design. Using leading scientific databases, we conducted a literature review concerning the requirements of business model improvement. Thus, our literature review synthesizes representative literature on a topic in an integrated manner so that new processes, frameworks, and perspectives on the topic of business model improvement are generated (Torraco 2005). Following Gregor and Hevner (2013), our study delivers additional descriptive knowledge in the problem domain. Based on the results of our interview study with experts in the field of business model improvement, we were able to complement existing literature in the field by delivering additional descriptive knowledge, which could inform later design choices for developing other business model improvement processes (Gregor and Hevner 2013).

Additionally, we expanded the scope of CE to a new application field. CE has already proven beneficial in many domains, such as requirements engineering (Hoffmann et al. 2013), ideation (Briggs et al. 1997; Reinig et al. 2007), shared understanding (Bittner and Leimeister 2014), and collaborative learning (Oeste-Reiß et al. 2017). However, the use of the CE approach is also on the rise in the promising new field of business model improvement. The innovative combination of CE and business model improvement enables new and interesting application opportunities in the research fields of both CE and business model improvement.

Regarding the practical contribution of this paper, the individual activities in our process design represent sophisticated procedural patterns for the use and development of the BMC. Consequently, the design process of elaborating the BMC has been transferred into a clear and structured approach that uses validated building blocks and decades of knowledge in collaboration and business modelling expertise to make this knowledge accessible to practitioners. As a result, it is possible to use the existing BMC in a structured and detailed manner and without training in business model knowledge and collaboration.

Despite its theoretical and practical contributions, this study is not without limitations. The focus of this paper was on the "design" phase of CE (de Vreede et al. 2009) and on the sample of the fourth evaluation loop. Additional evaluations in various contexts are needed to confirm the generalizability and effectiveness of the process design and to further improve the process design itself. In particular, the process design should be tested in more and different organizational settings and with different constellations of heterogeneous teams to further validate optimal team composition and identify potential needs for the organizational roll-out in the "deploy" phase of CE (de Vreede et al. 2009). Another avenue for future research is to create a toolbox tailored to the needs of individual organizations. Thus, the process design can be converted into structured patterns, allowing the targeted use of individual parts of the process according to an organization's needs.

Our process design is collaboration-intensive, technology-independent, and paper-based. IT-enablement of this process might further increase flexibility and provide greater scalability and faster adoption of small changes. Future research should design (Kleinschmidt et al. 2016a), observe and evaluate (Kleinschmidt and Peters 2017) the underlying process design principles and leverage the strengths of IT and online collaboration in this highly human-centered environment (Kleinschmidt et al. 2016b). For example, IT could be used in the environmental analysis step, where mobile apps or online collaboration tools can help the team conduct the analyses. In this context, the intelligent design and orchestration of IT (or even artificial intelligence) as well as non-IT parts (Peters 2016) and their effects for business model improvements need further investigation. Moreover, additional mechanisms to build business models in a more modular fashion in order to combine several business models could be implemented with the help of IT. Future research has also to consider the new digital ways of working (vom Brocke et al. 2018), for example internal and external crowdworking platforms (Mrass et al. 2017), and the necessity to improve business models so that empowerment of employees can be leveraged.

9 Conclusion

In existing literature, the focus is on business model development, rather than on business model improvement

which takes the legacy of established companies into account. Knowledge concerning the method, form, and function of a process design has been lacking. Therefore, today's companies do not know how interactive patterns and activities can be used to systematically improve their business model without relying on outside business modelling experts and consultants. Furthermore, the collaborative nature of improving business models has been sparsely investigated.

We have addressed these research gaps and present a systematic process design which allows companies to rethink, improve, and continually innovate their business models. The process particularly addresses established companies with a legacy and guides them through their business model innovation and improvement without the constant need for ongoing and costly professional facilitation.

We used a DSR approach as well as CE with a multi-level evaluation including iteration loops to create this process design. In this context, theoretical and practical requirements of business model improvement were identified to ground the design decisions. The process design provides details of procedural steps, materials, and documents that are necessary for facilitation and implementation. To ensure that it reaches the defined collaboration goal effectively and efficiently, the process design was tested and improved using a multi-level and iterative evaluation. Moreover, the quality of the improved business models was evaluated against a baseline. The triangulation of evaluation methods provides a strong indication that the process design is suitable for its aspired application domain and for autonomous use by practitioners without further ongoing and costly support by professional facilitators.

In terms of theoretical contributions, the presented process design represents a nascent design theory (Gregor and Hevner 2013) as the built-and-evaluated process represents design knowledge as operational principles. The new process is both, a new problem – not considering the systematic development of business models, but their improvement – as well as a new solution. Therefore, it is an "invention" type of knowledge contribution (Gregor and Hevner 2013) in the form of "theory of design and action" as defined by Gregor and Jones (2007). As for practical contributions, our process design enables established companies to perform continuous business model improvement – both radically and incrementally – on their own.

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