Please quote as: Ebel, P.; Bretschneider, U. & Leimeister, J. M. (2016): Leveraging Virtual Business Model Innovation: A Framework for Designing New Business Model Development Tools. In: Information Systems Journal (ISJ), Vol. Online First, Erscheinungsjahr/Year: 2016.

Leveraging Virtual Business Model Innovation:

A Framework for Designing Business Model Development Tools

Abstract

This paper presents a framework for developing tool support for the design and management of new business models. Existing IT tools supporting the process of designing, innovating, and evaluating a company's business model are currently not leveraging the full potential of tool support, since they do not make use of theoretical and empirical knowledge around business model development. Against this backdrop, we analyze existing knowledge on business model design and management, resulting in a first systematization of the activities that are necessary for developing and managing new business models. In order to complement this knowledge and to identify the requirements for supporting these activities, a series of expert interviews is conducted. Based on the results of the interview series, a new business model development tool (BMDT) is created and evaluated. The learnings of this development process are then consolidated in a unified framework. This framework constitutes a new solution for systematically designing tool support for business model development, and extends existing literature by highlighting the importance of collaboration between participants in a business model development project. It also provides designers of new BMDTs with an empirically based conceptualization to guide their efforts.

Keywords: Business Model Design, Design Support Tools, Virtual Collaboration, Action Design Research, Online Knowledge Collaboration Theory

1. Introduction

Rapid changes in their economic environment put increasing pressure on firms to adapt their business logic and processes in order to stay ahead of the market and their competition (Chesbrough et al., 2006, Teece, 2010, Chesbrough and Rosenbloom, 2002). In this regard, business models, which can be defined as a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating and delivering this value, have gained significant attention in practice as well as in academic literature (Zott et al., 2011). Especially within the field of management literature, there is an increasing interest in understanding the phenomenon of open business model innovation, meaning developing business models together with customers in a collaborative manner. Such co-creation of a company's business model would not only support the integration of customer needs into a company's business development process, but might also enhance the quality of the developed business models. Research shows that most innovations are not the result of a single inventor but rather that of collaboration processes where many individuals contribute their individual knowledge, experiences and strengths (Gasco-Hernandez and Torres-Coronas, 2004, Franke and Shah, 2003, Nemiro, 2001, Sawhney et al., 2005).

While this stream of literature has increased our understanding of the significance of open business model innovation (Teece, 2010, Chesbrough and Rosenbloom, 2002, Johnson et al., 2008) and its impact on firms performance (Zott and Amit, 2008), little attention has been given to the process of designing business models (Osterwalder and Pigneur, 2013). Especially the role of IT-tools supporting the open process of designing a company's business model has been largely neglected. This is surprising, since such IT- tools are expected to facilitate the process of developing new business models together with a company's stakeholders (Del Giudice and Straub, 2011) by reducing transaction costs and improving organizational routines when coordinating different development activities (Skinner, 2008, Timmers, 1998, Malone et al., 1987).

In this paper, we report on an action design research (ADR) project to build an IT- tool for the development of new business models. In the course of this research, we first review existing literature in the field of business model development, resulting in a conceptual classification of activities required to conduct a business model development project. We then move forward and complement existing literature in terms of the requirements for completing each of the identified activities by conducting a series of expert interviews. This study thereby delivers additional descriptive knowledge to inform the design of the BMDT developed in this study (Gregor and Hevner, 2013). We then use the acquired knowledge to build and evaluate a corresponding BMDT. In the course of this design process, we draw especially upon online knowledge collaboration theory in order to derive functionalities for the BMDT. By reflecting on this design step, we are able to derive a framework that extends existing literature by addressing major research gaps identified in the course of the literature review. From a practical point of view, our research delivers a new BMDT based upon theoretical as well as empirical results, thus providing designers of a new BMDT with the opportunity of guiding their efforts in building adequate IT support for developing and managing new business models.

2. Research Approach

Our research follows the action design research approach. In 2011, Sein et al. (2011) introduced their action design research (ADR) method that claims to be a process for action research. In the course of an ADR project, a researcher has to: 1) address a practical concern of people in an immediate problematic situation, (2) design a problem solution for the aforementioned problem and (3) pilot this solution as a measure of intervention for this problem. This corresponds to a typical action research methodology proposed, for example, by Rapoport (1970); Susman and Evered (1978) or Peters and Robinson (1984). However, ADR focuses strongly on an IT artifact as subject of an underlying problem solution.

We chose ADR because it responds to a dual mission: making theoretical contributions and assisting researchers in solving anticipated problems that are of use for practitioners in the field (Benbasat and Zmud, 1999, Rosemann and Vessey, 2008). In this regard, ADR supports the creation of knowledge through the design and evaluation of IT artifacts. By executing a process of concurrent building and evaluation, it becomes possible not only to analyze the continuing adaptation of the artifact and the local practices of its use, but also to generalize upon the results of this analysis.

Additionally, ADR focuses on the development of an IT-artifact that constitutes an ensemble of technological features embedded in a social environment. Such an integrated view requires addressing concerns that are traditionally separated by existing design research approaches. Thus, ADR was developed as a design research approach that addresses the emergence of artifacts at the intersection of IT and social environment (Sein et al., 2011). ADR is therefore well suited to answer the call for theorizing ensemble artifacts, which has been expressed by Orlikowski and Iaconvo (2001). ADR is a research method for generating prescriptive design knowledge through building and evaluating ensemble IT artifacts. As a BMDT is supposed to facilitate the interaction between the stakeholders of a company as well as between the company and its stakeholders, we consider the ADR to be a suitable approach for guiding our research.

Following the ADR approach, our research builds on three major steps. In a first step (**problem formulation**), we systematically formulate the problem that has been broached in the introduction of this paper and constitutes the motivation for our research. The next section defines this problem as an instance of a class of problems. By doing so, we are able to conceptualize our research (Sein et al., 2011).

In the next step, the so-called **Building, Intervention, Evaluation (BIE) step**, we developed, piloted and evaluated the BMDT. For this, we conducted two BIE cycles. The first cycle allows for an intervention that is focused on the IT artifact itself, meaning that this iteration loop aims at ensuring the IT-artifact will be designed to later serve as an effective instrument for solving the underlying research problem. In the second cycle, we build on the initial iteration, and results are then used for building a more mature artifact piloted into a wider organizational context (Sein et al., 2011). This cycle allows for a comprehensive intervention that involves evaluating the artifact in the use setting.

Parallel to the two BIE cycles, the **Reflection and Learning** step focuses on reflecting on the results of the different design steps. In the last step (**Formalization of Learnings**), we apply the learnings from our research to a broader class of problems (generalization), identifying the contributions of our research to the theoretical and practical body of knowledge. Figure 1 summarizes the mentioned steps and the main contents.

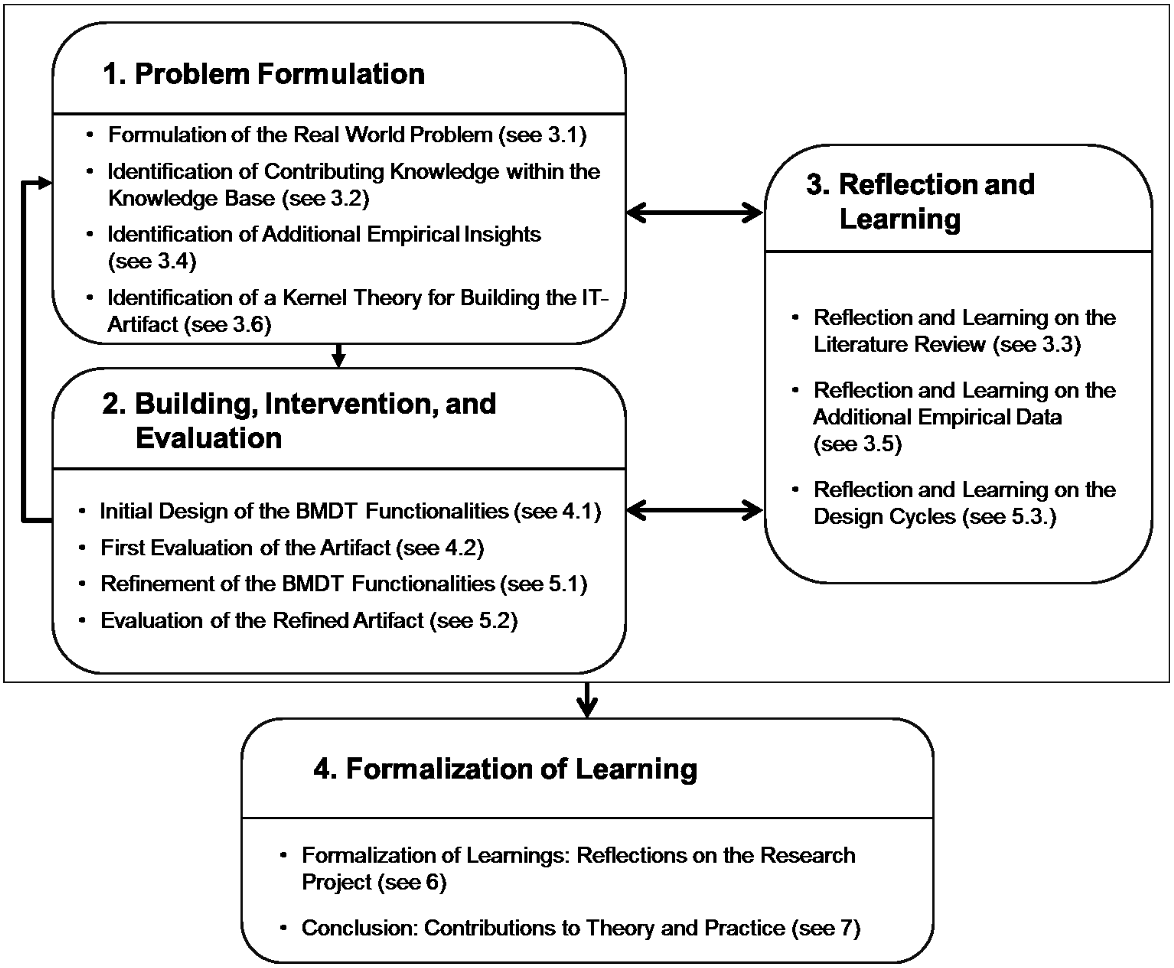

Figure 1: Stages and Tasks in an ADR Project (adapted from Sein et al. (2011))

3. Problem Formulation

3.1. Formulation of the Real World Problem

Our company partner for conducting this research study was the German software manufacturer SAP. In order to stay ahead of their competitors, SAP intended to explore future market segments when initiating the study at hand. As a consequence, external consultants (in this case the research team) were commissioned to review the existing product portfolio and to deliver recommendations for further courses of action. Their report rec-

ommended that SAP should explore promising future market segments, together with their external stakeholders, in order to get new insights into the company's relevant markets.
The company board discussed the report and concluded that the establishment of external project teams would be a promising course of action to identify new market segments. However, as the company's stakeholders were distributed around the globe, the board considered the identification of new markets and the development of suitable business models within a traditional workshop setting as being too costly and not feasible. As a result, a virtual platform had to be established, allowing participants to elaborate on new market segments and to identify further courses of action.
When gathering existing knowledge that would inform the development of the new BMDT, the project team faced the problem of drawing upon merely sparse knowledge for the designers of a BMDT. The project team therefore faced the need to gather different theoretical as well as empirical knowledge sources in order to inform the design of the new BMDT. As broached in the introduction, this is in line with existing calls for research in this field (Del Giudice and Straub, 2011, Osterwalder and Pigneur, 2013, Veit et al., 2013).

3.2. Identification of Contributing Knowledge within the Knowledge Base

According to Sein et al. (2011), one of the first tasks within an ADR project is to review existing knowledge in order to inform the design of the problem solution respectively the IT artifact. The goal of this step is to structure the problem, identify solution possibilities and to guide the actual design of the solution (Sein et al., 2011). When gathering corresponding knowledge, two different types of knowledge have to be examined: Descriptive knowledge is the "what" knowledge about a certain phenomenon, comprising relevant information about the state of the art in the problem domain. Prescriptive knowledge is the "how" knowledge of human-built artifacts, including theories that can be used in order to inform the actual design of the new IT artifact (Gregor and Hevner, 2013).
In order to structure the problem at hand and to identify first solution possibilities, we first review existing literature in order to develop an overarching process that captures all activities that are required to develop and manage a new business model and to identify existing requirements for each of the process steps. However, before elaborating on the different activities that are necessary for developing new business models, we further elaborate on the definitions of the term business model.

Most definitions circle around three distinct notions that can also be seen as common relevant themes in business model research: First, business models underline a system-level, integrated view to explain how firms operate. Second, the combination of elements and their interrelationships are important for business models. Third, the creation and capturing of value are included in most business model definitions (Zott et al., 2011, Hedman and Kalling, 2003, Relander, 2008). A definition by Osterwalder (2004) matches these three elements. “A business model is a conceptual tool that contains a set of elements and their relationships and allows expressing a company's logic of earning money. It is a description of the value a company offers to one or several segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital in order to generate profitable and sustainable revenue streams” (Osterwalder 2004, p.15).

When conducting this study, we followed a multistep process proposed by Zott et al. (2011). First, we searched for articles published in leading scientific databases for the period of January 1975 to August 2013. Our initial list of databases included Business Source Premier, EconLit, JStor, Science Direct database, AIS electronic library, ACM digital library, IEEE explore, as well as the Emerald database. We searched for publications that included the composition of the keywords ‘business model’ and ‘activities,’ ‘process,’ ‘tasks’ and ‘procedures’ in titles, abstracts or keywords. In the course of our initial search we identified 402 papers. An initial analysis of these articles that included the article titles, abstracts, keywords, and introductions revealed that not all the articles identified would be relevant for the purpose of our study.

To reduce our sample to an analyzable number, we adopted two additional criteria for our literature review. First, to be included in our review, an article needed to deal with the business model concept in a nontrivial and non-marginal way. Second, an article also needed to refer to at least one activity within the business model development process. This narrowed our sample down to 46 articles that were included in our literature review. Reading these 46 articles in depth, we became aware of further works on business models (in particular books) that appeared relevant, and we therefore included these in our review. Table 1 gives an overview of the described search process.

Database	Search string	Search fields	Coverage	Number of Hits	Number of unique publications	Reviewed
Business Source Premier	‘business model’ AND (‘activities’ OR ‘process’ OR ‘tasks’ OR ‘procedures’)	Title, abstract, keywords	Since 1975	172	402	9
EconLit				174		6
JStor,				31		2
Science Direct				490		12
AIS electronic library				21		1
ACM digital library				60		10
IEEE explore				55		6

Table1: Overview of the Literature Search Process (Source: Own Research)

To develop an overarching process for the development of new business models, we conducted a qualitative content analysis of the publications identified in the course of the literature review (Forman and Damschroder, 2008). We screened each identified publication for activities that are necessary for developing and managing new business models. After this, we searched for a concrete description on how to conduct these activities in order to derive requirements for the development of our BMDT. As the different publications provided different labels for the activities that are necessary to develop a new business model, we had to synthesize the different labels in order to derive an overarching process. Therefore the members of the research team individually read the identified articles in order to identify activities necessary to develop new business models and to derive a suitable label for each of the identified activities. The research team then shared their impressions of the screened publications in order to merge their individually developed labels and to derive a revised set of labels for the different activities. Finally, the team members entered an iterative process in which they applied the revised labels to the publications and met again to further refine the labels for each of the activities. At the end of this analysis we derived a set of five distinct activities that are necessary to conduct a business model development project:

1) The mobilization of the project team,
2) The understanding of the competitive environment of the company,
3) The design of the new business model,
4) Its implementation and
5) Continuous management

Further, we found that all publications that implied a concrete description of a business model development process dealt with business models as part of a company's innovation management. In the context of innovation management, Chesbrough (2006) mentions that business models are essential in the transformation process of ideas and technologies to achieve value creation. He explains that the business model is the framework that allows the combination of ideas and technologies (Chesbrough, 2006). This is interesting, since business model development can also be part of the company's strategic management in which it functions as a moderator between a company's strategy and business processes (Zott et al., 2011). While this stream of literature clearly highlights the importance of designing business models in accordance with existing strategies, none of the publications identified in the course of the review provides information about the required activities for doing so.

Further, we found more detailed information regarding these publications. First, the main body of research focused mainly on the design activity in a business model development project. Accordingly, the variance of the several sub-steps in this activity was rather high, ranging from the sole development of a customer value proposition (Lee et al., 2011) to the derivation of the several building blocks that a holistic business model has to address (Osterwalder and Pigneur, 2010). As a consequence, there was no consensus regarding the steps that are necessary to successfully design new business models. Moreover, the mobilization activity as well as the management of the newly developed business model had been largely neglected. These studies thus contributed only fragmented knowledge on the activities that are necessary for conducting these steps.

Finally, there was only sparse knowledge concerning the requirements that needed to be fulfilled in order to successfully execute the different activities within a business model development project. While the identified publications dealt with activities for developing and managing new business models, only two publications provided a concrete description of how to conduct the different activities. Table 2 summarizes these insights from the conducted literature review.

Publication	**Phases of the Business Model Development Process**					**Description of Requirements**
	Mobilization	Environmental Analysis	Design	Implementation	Management	
(Achtenhagen et al., 2013)	○	○	○	○	●	No
(Chatterjee, 2013)	○	○	●	●	○	No
(Chesbrough, 2007)	○	○		●	○	No
(Fritscher and Pigneur, 2010)	●	○	●	●	○	No
(Giesen et al., 2007)	○	●	●	●	○	No
(Im and Cho, 2013)	○	○	●	○	●	No
(Johnson, 2010)	○	●	○	●	○	No
(Lee et al., 2011)	○	●	●	●		No
(Leem et al., 2005)	○	●	●	●	●	Yes
(Nesse et al., 2012)	○	●	○	○	○	No
(Osterwalder et al., 2005)	○	○	○	●	○	No
(Osterwalder and Pigneur, 2010)	●	●	●	●	●	Yes
(Palo and Tähtinen, 2013)	○	●	●	●	●	
(Rasmussen et al., 2011)	○	○	●	○	○	no
(Teece, 2010)	○	○	○	●	○	no
○= not addressed		●= addressed				

Table 2: Results of the Literature Review (Source: Own Research)

As can be seen in Table 2, out of the 46 articles identified in the course of the review, 15 of these publications address at least one of the five activities that are conducted in a business model development project. In the following, we describe each of these main activities in greater detail.

Mobilization of the project team: Upstream to the actual development of the business model, some authors recommend a first mobilization activity (Osterwalder and Pigneur, 2010, Fritscher and Pigneur, 2010). Here, the company has to appoint a project team to be responsible for the development of the new business model. According to existing literature, the project team should include employees that possess a diverse set of competencies and should include a member of the department for which the business model should be designed. This project team will work together throughout the whole project. As a consequence, team members have to be motivated to participate in the project, and a shared understanding of the project scope has to be developed.

Analysis of the competitive environment: In the second main activity, the project team conducts a thorough analysis of the company's competitive environment. This involves the team analyzing: 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 of the business model: After completing the necessary preparatory activities, the project team begins the third main activity: the actual design of the new business model. After consolidating the different publications, three overarching design sub-steps are identified. First, the project team carefully analyzes the company's position concerning the different building blocks that the business model will later include (Osterwalder and Pigneur, 2010, Giesen et al., 2007, Fritscher and Pigneur, 2010, Lee et al., 2011). In a second sub-step, the project team analyzes future market developments (Leem et al., 2005, Palo and Tähtinen, 2013, Im and Cho, 2013), as well as the corresponding mechanism to capture value from these developments (Giesen et al., 2007, Teece, 2010, Chatterjee, 2013, Lee et al., 2011). In a last sub-step, the project team consolidates its results within a unified framework in order to allow a consistent implementation of the business model (Osterwalder and Pigneur, 2010, Fritscher and Pigneur, 2010, Lee et al., 2011, Im and Cho, 2013).

Implementation of the business model: The implementation of the new business model comprises the fourth main activity in which the project team decides whether the business model can be implemented into the company's existing structure or whether a new division has to be established in order to commercialize the business model (Chesbrough, 2007, Johnson, 2010, Palo and Tähtinen, 2013). Additionally, the developed business model has to be aligned to the company's operational processes (Fritscher and Pigneur, 2010, Osterwalder et al., 2005, Osterwalder and Pigneur, 2010, Lee et al., 2011, Leem et al., 2005, Chatterjee, 2013), and a mechanism to prevent imitation has to be developed (Giesen et al., 2007, Teece, 2010).

Management of the business model: The last main activity of a business model development project deals with the management of the new business model. In the course of this activity, the business model has to be constantly shaped, adopted and renewed in order to remain competitive (Achtenhagen et al., 2013, Osterwalder and Pigneur, 2010, Leem et al., 2005, Palo and Tähtinen, 2013, Im and Cho, 2013).

3.3. Reflection and Learning on the Literature Review

As described in the literature review, there are several different approaches to developing and managing new business models. Consolidating these different approaches, we have been able to identify five distinct activities necessary to conduct a business model development project. When developing the BMDT, these five activities will build the basis for further investigation. This systematization of existing literature as well as the classification of the several publications can be considered as a first contribution of our study (Torraco, 2005).

Our literature review further revealed several shortcomings of existing literature, which we elaborate in the following:

1. While existing literature puts emphasis on designing new business models in accordance with the existing strategy of a firm, none of the publications identified in the course of the review provides information about the required activities for doing so.
2. The mobilization activity in which the participants of a business model development project are selected has been largely neglected in previous literature.

3. There is only sparse knowledge concerning the requirements that have to be fulfilled in order to successfully execute the different activities within a business model development project.

In order to complement existing literature in regards to these three aspects, we conducted an interview study with experts in the domain of business model development. In doing so, we intended to collect further knowledge concerning the content of the several project activities. We also aimed at completing the literature-based business model development process not only according to the identified process phases but also to the requirements within the different phases. This is in line with Gregor and Jones (2007), who argue that knowledge from the field and the experience of practitioners is capable of informing design research.

3.4. Identification of Additional Empirical Insights with the Problem Domain

Methodology: The expert interviews conducted in the course of this study were designed as semi-structured interviews (DiCicco-Bloom and Crabtree, 2006). This technique relies on the usage of a unified interview protocol that allows for the comparison of different interviews that have been conducted. It also gives the interviewees the freedom to express their views in their own words, which can help avoid misunderstandings but does create reliable, comparable qualitative data. To determine how many people needed to be interviewed, we used the concept of theoretical saturation (Glaser, 1992).

While conducting the interview study, we complemented the insights of our literature review with additional empirical data in order to inform the design of our BMDT. We therefore asked the interviewees to name and describe every activity that would have to be executed when developing and managing new business models. In a next step, we asked interviewees to explain the requirements for successfully executing each of the named activities. In this part of the interview, the interview guideline was based on the activities of a business model development project that had been identified in the course of the literature review. Correspondingly, the interview guideline followed the five process steps identified in the course of the literature review. If the participants named an additional activity that had not been identified in the course of the literature review, we also asked them to specify the requirements for the additional activities.

Twelve interviews (each lasting about one hour) with twelve different experts who frequently worked on business model development projects were conducted. These individuals included innovation consultants, entrepreneurs as well as managers responsible for business development within their companies. The selection of experts was based on their expertise within the field of business model development and years of experience, which was 10 years on average. Apart from these requirements, we targeted individuals who had been involved in different and diverse projects in order to acquire multiple perspectives. The nationalities of the interviewees were German, Swiss, Serbian and American. All interviews were conducted in the German language, as all participants were fluent in the German language. Due to the fact that participants were distributed across different locations, the interviews were conducted via telephone. All interviews were recorded and transcribed using qualitative content analysis, as it offers concrete guidelines on analyzing big amounts of data in a rigid manner (Forman and Damschroder, 2008).

Following Forman and Damschroder (2008), we divided our analysis into three phases: immersion, reduction and interpretation. During immersion, we transcribed the interview data and engaged with the data in order to obtain a sense of the whole material before rearranging it into discrete units for analysis. In a next step, the so-called reduction phase, we reduced the amount of raw data to what is relevant to answering the research question and to break the data into more manageable themes. In order to do so, we first developed a coding scheme and codebook, as the coding of the data allows the researcher to rearrange the data into analytically meaningful categories. We started the coding procedure with the so-called preliminary coding (Forman and Damschroder, 2008). Within this preliminary coding, the research team independently read through the text and highlighted passages that could be of importance to the research questions. The members of the research team then moved forward and developed a first list of codes. After this initial round of coding, the research team shared their impressions of the data in order to merge their individually developed codes and to derive a revised set of codes. The team then entered an iterative process in which the team members applied the revised codes to the interview data and met again to further refine code definitions. Prior to applying the codes to the entire data set, we established a coding agreement in order to assure the application of the same codes to the same text segments. This step resulted in a codebook, which helped us to achieve agreement for the different portions of the data that had been coded

differently by members of the research team. Once all transcripts were coded, we examined all data within a particular code. Some codes were combined during this process, whereas others were split into subcategories. Whenever inconsistencies occurred, the research team discussed and refined the codes until mutual agreement was reached.
Third, we executed the so-called interpretation step, in which we further synthesized the collected data in order to formulate our results. This step of the analysis involved the usage of the developed codes for reassembling the data to promote a coherent and revised understanding of the interview material (Forman and Damschroder 2008).

Results: From this analysis, we found that the interviewees confirmed the process that we had developed during the literature review. The interviewees also confirmed that the process included all major activities necessary to develop and manage a new business model. After validating the developed process, we moved forward and examined whether the sub-steps and requirements that had been identified in the course of the review were described exhaustively. In order to be confirmed, a sub-step had to be mentioned by at least three participants ($n \geq 3$). The corresponding results are depicted in Figure 3. The interviewees confirmed most of the sub-steps that had been identified in existing literature. As indicated in Figure 3 (confirmed items are depicted as underlined), ten out of the fifteen sub-steps were confirmed. We also identified 15 additional sub-steps that the interviewees regarded as being relevant in the several activities of a business model development project (additional sub-steps identified in the course of the interview study are depicted in bold).

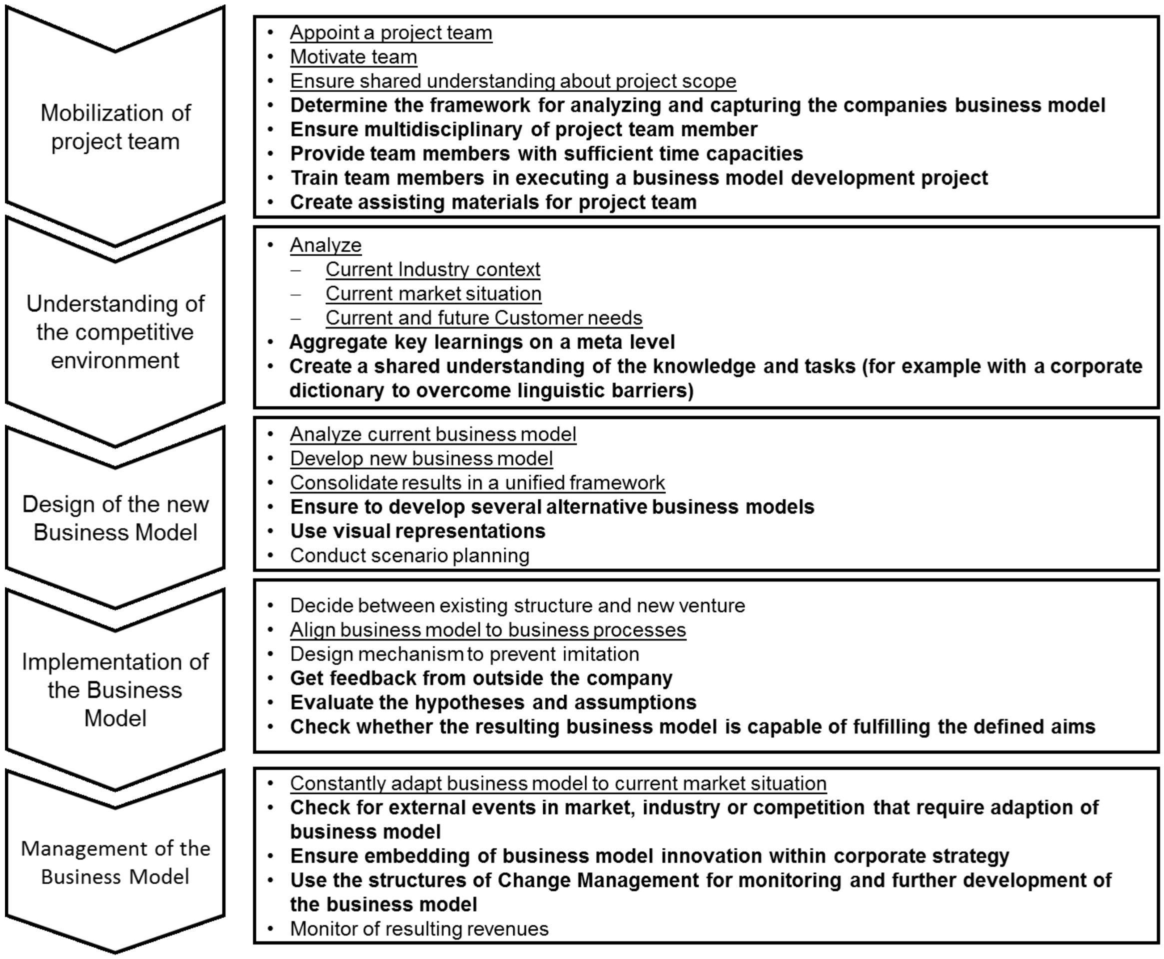

Figure 2: Empirically Derived Business Model Development Process

(Source: Own Research)

3.5. Reflection and Learning on the Additional Empirical Data

When looking at the results of the interviews, our study delivered interesting insights regarding the requirements for conducting a business model development project. In this section, we go through each of the activities identified in the course of the literature review, and elaborate on the additional insights generated by the interview study.

Regarding the mobilization activity, the experts put strong emphasis on providing the members of the project team with training on how to develop new business models. This can either be done in the course of an initial workshop or by providing the participants with corresponding training material. According to the experts, these trainings facilitate the performance of the team when developing new business models. When designing our BMDT we thus searched for possibilities to provide the project team with corresponding training materials.

Concerning the second activity, the interview study revealed the need to aggregate knowledge on the project in order to create a shared understanding among the project team regarding the central terms used in the course of the project. While existing literature requires the creation of a shared understanding within the mobilization activity, the experts strongly recommended documenting the central aspects of the project at hand when conducting the analysis activity.

When looking at the activity for designing the business model, we found that the interviews delivered only sparse additional knowledge. This might be due to the fact that there is a relatively large amount of existing literature on this activity. However, the development of several alternative business models was a new insight generated in the course of the interview study. When developing the BMDT, we thus searched for ways to enable the project team to generate these alternatives.

Regarding the fourth activity, namely, the implementation of the developed business models, the interview study highlighted the need for external feedback. This feedback includes evaluation of the generated business model in terms of a market assessment. Company representatives outside of the project team also evaluated the business model in light of the predefined project aims. Considering the ongoing management, the experts required the ongoing screening of the external environment in regard to possible events with the potential to impair the success of the developed business models. In addition, they required a final evaluation of whether the generated business model fits to the company's strategy. As both aspects were previously not considered in the existing literature, we had to find new ways of incorporating these requirements in the developed BMDT.

In sum, the interview series delivered a detailed overview of the activities executed when conducting a business model development project, as well as the requirements for conducting these activities. However, we were not able to identify knowledge on how to support the different activities with the help of a BMDT. We therefore investigated existing design theories (i.e., kernel theories) used to solve similar problems (Gregor and Hevner, 2013).

3.6. Identification of a Kernel Theory for Building the IT-Artifact

A kernel theory that adequately informs the design of our BMDT is the so-called online knowledge collaboration theory by Faraj et al. (2011). Online knowledge collaboration theory theorizes the way in which participants of online communities, where creative knowledge products are being created in the form of information, ideas or – as in our case – business models, contribute to knowledge creation. Examples of such communities include Wikipedia or virtual ideas communities, such as Dell's Ideastorm community, in which distributed groups of individual customers focus on voluntarily sharing and elaborating innovation ideas, and which are used by firms to integrate customers into ideation for new product development (Di Gangi and Wasko, 2009, Bretschneider et al., 2015).

According to online knowledge collaboration theory, online knowledge collaboration is defined as individual acts of offering knowledge to others as well as adding to, recombining, modifying and integrating knowledge that others have contributed (Faraj et al., 2011). Such collaboration can take various forms. It could involve a user posting a contribution and then engaging in a process of reflecting on incoming responses (Wasko and Faraj, 2005; von Krogh, 2012) or it could involve users engaging in editing contributions (Jarvenpaa and Majchrzak, 2010b). Yet another form involves providing feedback on the knowledge contributed, while still waiting for others to include the feedback on the knowledge (Faraj et al., 2011). According to knowledge collaboration theory, technology can facilitate online collaboration and, as a result, improve the overall quality of knowledge contributed. As such collaboration is also an important factor within a BMDT, we employed online knowledge collaboration theory in order to inform the design of our BMDT.

Online knowledge collaboration theory postulates that online communities, such as a BMDT, suffer from fluctuations in resources (e.g., time, passion and effort of users). This will cause tensions in creating effective online collaboration processes (Faraj et al. 2011; Majchrzak and Malhotra 2013). Tensions may cause content disorganization which makes it difficult for individuals to find and elaborate on creative knowledge products, or ways to enter into a topic and make a valuable contribution. As a result, tensions hamper the effectiveness of knowledge collaboration (Faraj et al., 2011). Online knowledge collaboration theory proposes that technology affordance is an important coping mechanism for such tensions and facilitates the effectiveness of knowledge collaboration.

Three principles of technology affordance are proposed for knowledge collaboration in online communities: 1) experimentation, 2) reviewability and 3) recombinability. All three reflect different mechanisms of self-disclosure within which users may share their private information and knowledge (Wakefield, 2013). **Experimentation** refers to trying out, piloting or prototyping novel knowledge products (Faraj et al., 2011). Experimentation refers to creating and submitting novel knowledge products. While experimentation is per se not a collaborative act, it reflects the major requirement for knowledge collaboration by providing the shared materials for collaboration. (2) **Reviewability** refers to mechanisms through which users are able to manage the content produced in the community over time (West and Lakhani, 2008). Review functionalities, such as comments, allow users to provide feedback and contextual information regarding already generated knowledge (Bayus, 2013). **Recombinability** refers to forms of technology-afforded action where individual users directly build on others' contributions (Faraj et al., 2011). It enables users to extend existing contributions of others', e.g., - as in our case - business models (von Krogh, 2012). Functionalities affording recombinability, such as wikis, thus, exceed review functionalities that may provide somewhat loosely coupled feedback for certain knowledge products by forcing users to directly integrate and adapt their knowledge contributions to another user's original knowledge product.

When designing the functionalities of our BMDT, we consequently employed these three mechanisms. In the following, we go through this design process and illustrate how we addressed these three principles of online knowledge collaboration when developing the initial design of the BMDT.

4. First Iteration Loop: Initial Design of the Artifact

After gathering the needed information that would be capable of informing the design of a new BMDT for SAP, we moved forward and started the actual design process. In ADR, the first BIE cycle comprises the development of an alpha-version of the IT- artifact, as well as its first evaluation within a limited organizational setting (Sein et al., 2011).

4.1. Initial Design of the BMDT Functionalities

For building the IT- artifact, the research team started by transforming the identified design guidelines into functional requirements and finally into tangible functionalities. These functionalities were integrated into one single BMDT before being evaluated with the help of 27 test users. In the following, we elaborate on the development of the first instantiation of the BMDT.

4.1.1. Shared Material

In order to provide the project team with the training material that had been requested by the experts, we had to implement a shared material section. Sticking to online knowledge theory's principle of reviewability, we designed this section as a repository of shared material to be accessed across all phases of the business model development process. The repository helps users of the BMDT to keep track of the project goals and to review contributions in light of these goals.

The material within the repository includes guidelines on how to develop new business models, as well as tutorials for the different steps of the project. Without this material, the project team could have, only with great difficulty, arrived at a shared understanding of the different tasks of the project and would struggle to execute the different tasks. In addition to these auxiliary materials, a detailed description of the project goals should be provided in all phases of the project in order to align the project team's efforts.

4.1.2. Community

In order to give the project team the possibility to receive feedback throughout the different phases of the business model development project, a community section was implemented. This community section refers to online knowledge theory's principle of recombinability, as it allows users of the BMDT to identify peers when looking for partners to further develop existing contributions. Further, the community serves as the foundation of the project in terms of integrating project members in the different phases of the project. Whenever the project team needs assistance in working on the different project steps, the community allows them to contact corresponding experts in order to request their assistance.

Correspondingly, the BMDT allows users to create their own profiles. These profiles should include the competencies of the users, which would not only allow the building of a project team possessing a wide range of diverse competencies, but also enable the project team to search for domain experts to assist them in developing the new business model. In order to support this search process, the platform also contains a messaging system and search functionality for screening member profiles.

4.1.3. Environmental Analysis

When conducting the environmental analyses, the project team has to review existing material and document the results of this review process. Consequently, we employed online knowledge theory's principle of reviewability and experimentation in order to support collaboration within this activity.

Following the principle of reviewability, the BMDT contains a repository of data concerning actual industry benchmarks, as well as current market data. External links for further information have been integrated to reduce search costs for team members. In order to support the principle of experimentation, the BMDT provides the team with a shared write board to document the key results of the environmental analysis. For more detailed information on the different results, external documents can be attached by the project team.

4.1.4. Business Model Design

In the course of the business model design activity, the project team has to develop new business model alternatives and refine them until mutual agreement among all stakeholders that are involved in the project is achieved. In order to realize the requirements that were identified in the course of the expert interviews, we employed online knowledge theory's principles of experimentation, reviewability and recombinability.

For supporting the design of the actual business model, we drew on the principle of experimentation. We therefore designed functionalities that would allow users of the BMDT to generate different business models with the help of a standardized template. This template allows the team to compare the different contributions and to judge whether all relevant aspects of the business model have been elaborated upon. In order to support the further development of the developed alternatives as well as their recombination, the BMDT allows a versioning of the several interim results. This links back to our interview study, in which the experts recommended the design of multiple business models. The implemented versioning provides members with the possibility to understand changes that were made by other team members and allows skipping between different versions.

In order to document more detailed results, the BMDT also allows the attachment of external documents that supplement the team's results. In addition to the design recommendations for the design of the business model, we also implemented a separate representation of the revenue streams. This representation allows for the calculation and forecasting of the revenue streams in order to allow for scenario planning, thereby allowing for evaluation of the different design alternatives.

4.1.5. Business Model Implementation

When it comes to the implementation of the developed business model, the team members need to be provided with the feedback from their results. In order to allow such feedback, we employed the reviewability and recombinability principles of online knowledge collaboration theory in order to design functionalities that allow the integration of other community members. These members could include domain experts not only within the business domain that the business model targets but alsoexternal members (i.e., customers and suppliers of the company).

Following the principles of reviewability and recombinability, the domain experts are provided with the possibility of further refining the developed business model with regard to their expectations. When the evaluation and refinement of the business model were finished, the team had the possibility of translating their business model into corresponding business processes. This ensures the consistent realization of the business model within the functional divisions.

4.1.6. Business Model Management

When it comes to the management of the developed business models, it is important to ensure that the business models can be adapted to changing market situations. We therefore used the principle of recombinability in order to design functionalities that enable the project team to constantly refine their business model in case of external events.

Consequently, the BMDT provides functionalities to keep track of external developments within the market or industry. In this context, we also gave the community members the possibility to communicate external events to the project teams. In addition, domain experts within the functional division were allowed to change the business model according to their needs. While this engagement of experts would contribute to the business models applicability within the functional division, it also caused coordination problems in terms of keeping track of the recent changes that had not been made by the project team. We therefore drew on the reviewability principle in order to implement functionalities that allowed the project team to keep track of the changes that may have been made in their absence.

4.2. First Evaluation of the Developed Artifact

The first evaluation of our IT artifact serves as lightweight intervention, meaning that this intervention is focused on the BMDT itself. It aims at ensuring that the IT artifact will be designed to later serve as an effective instrument for solving the underlying research problem. We therefore conducted the first evaluation with the help of a predefined sample of test users, developing business models for a hypothetical case.

When evaluating the artifact's usability, we used the Questionnaire for User Interaction Satisfaction (QUIS), as a tool developed to assess users' subjective satisfaction with specific aspects of the human-computer interface (Chin et al., 1988). In its current version, the QUIS contains: 1) a demographic questionnaire, 2) a measure of overall system satisfaction along six scales, and 3) hierarchically organized measures of nine specific interface factors. Each area measures the users' overall satisfaction with that facet of the interface on a 9-point scale.

When evaluating the developed BMDT, we focused evaluation on the factors “overall user satisfaction,” “screen,” “terminology and system feedback,” “learning,” “system capabilities” and “multimedia.” We considered the other factors included in QUIS (e.g., teleconferencing and software installation, as well as technical manuals) not to be relevant for a web-based BMDT (QUIS, 2014). In sum, 27 test- users participated in the evaluation of the artifacts' first prototype. For this evaluation, the testers were asked to develop a fictional business model in groups of up to five individuals.

After the task was successfully completed, the testers were asked to answer the QUIS in order to determine their satisfaction with the system when working on their business mod-

els. To analyze the results of the QUIS, we conducted an independent-samples t-test (M>5). The results of this evaluation step are summarized in Appendix 1.
As can be seen in the appendix, a major weakness of the artifacts is that the used terminology does not relate well to the work situation (t (22) = -.284, p = 0.779). The testers also criticized the system as being too dull (t (25) = .814, p = 0.423) and too rigid to cope with their needs (t (25) = 1.355, p = 0.188).

5. Second Iteration Loop: Reshaping the IT- Artifact

5.1. Refinement of the BMDT Functionalities

In the second iteration loop, we focused our efforts on the weaknesses that had been identified in the course of the first evaluation of the artifact. In the following, we go through each of the identified weaknesses and explain how we improved our BMDT with respect to these weaknesses.
To raise the user's perception of the system's capabilities, we implemented a feedback mechanism that would allow users to track the success of their actions. We also added supplementary information that explained the functions of the BMDT and demonstrated their significance for developing new business models to the users of the BMDT. To give the BMDT a more stimulating user interface, we decided to redesign the BMDT in terms of its outer appearance. Apart from the interface redesign, the BMDT was amended with multimedia content (e.g., video tutorials or visual representations of project goals). When looking at the inflexibility of the system, the test users mainly criticized their lack of freedom when attaching additional data to their business models. As a consequence, we gave users the freedom to choose any kind of format when attaching additional data to their business models. Moreover, we implemented a module that would allow users to freely format their texts when working on their business models.

5.2. Evaluation of the Refined Artifact

Evaluation of the earlier version of our BMDT was formative and contributed to its refinement (Remenyi and Sherwood-Smith, 1999, Scriven, 1996). According to Sein et al.'s (2011) ADR approach, evaluation of a later version of an IT- artifact should be "summative, assessing value and utility outcomes.” Consequently, evaluation during the second iteration of our research focused on assessing the BMDT's efficacy.

5.2.1. Set-up of the Evaluation

As described in the introduction of this paper, the aim of this research project was to open up SAP’s business model development process. Consequently, when evaluating our IT artifact, we conducted a business model development project on the developed BMDT. In a first step, the community of the BMDT was staffed with a mix of stakeholders of SAP who voluntarily committed themselves to contribute to the project.

In a next step, six project teams were formed and commissioned with the task to develop new business models for SAP’s cloud computing division. Each of the project teams consisted of five members. The teams were given six weeks to elaborate on their business models. Whenever they needed help in developing their business models, the teams could contact a member of the community in order to get professional advice. After the development time had expired, the results were forwarded to an expert jury that was responsible for evaluating the developed business models. This jury consisted of three experts in the field of cloud computing who had at least five years of working experience in this field (average of 6.3 years).

5.2.2. Evaluation of the Developed Business Models

To assess the value and utility of the IT- artifact, we had to evaluate the creative outcome of the stakeholder involved in the business model development initiative. In other words, the IT- artifact can be interpreted as being a good instrument to solve this study’s underlying problem when the business models emerge with the help of the IT- artifact to fulfil a certain level of quality. According to creativity research, business models can be interpreted as creative products. Creativity research has addressed the aspects of assessing creative products, such as ideas, paintings, et cetera (Amabile, 1996). Research efforts that focus on assessing creative products cover the scale for evaluation and the assessing process itself. Consequently, we considered both aspects, as described below.

Scale for Assessing the Developed Business Models

Quality of creative products is a complex construct. Various metrics consisting of different dimensions for assessing the quality of creative products have been discussed in the literature. In order to develop a reliable scale, we searched for work done in creativity research. An extensive literature review which identified several relevant papers that were useful for this research was conducted. First, all of the reviewed papers dealt with empirical evaluation of the quality of creative products. Second, all papers used a certain scale for evaluating creative products. According to these criteria, the research team carefully analyzed the scales, particularly the used dimensions, in order to check which dimensions existed and which were appropriable for the development of the metric used for this evaluation.

The most appropriate dimension for this case was the dimension “elaboration.” Elaboration is seen as the extent to which a creative product is complete, detailed and well understandable (Dean et al., 2006). In other words, if a business model had a high degree of elaboration, it could be concluded that the business model was proven to have value. In this way, the dimension elaboration was adapted for the scale.

Apart from the dimension elaboration, the literature review revealed further dimensions briefly described as follows. Novelty, a key criteria when evaluating creative products, has been used by Binnewies et al. (2008). A creative product is described as most novel if – from the perspective of its contemplator – it is rare and nobody has previously expressed it (MacCrimmon and Wagner, 1994). Novelty was adopted unvaried in the scale.

Originality is another dimension discussed in evaluating creative products. An original creative product is defined consistently as a creative outcome that has the characteristic of being inconvenient, visionary and surprising (Dean et al., 2006). Some authors speak of unusualness (Mumford et al., 2001), creativity (Binnewies et al., 2008, Kramer et al., 1997, Potter and Balthazard, 2004) or even non-obviousness (MacCrimmon and Wagner, 1994) in terms of originality. This criterion was adopted as originality.

Further, feasibility was considered - also named “workability,” “implementable” or “practicable” - in the scale. In general, in all analyzed articles, feasibility is used to assess ideas. An idea is considered feasible if it is implementable (Potter and Balthazard, 2004). We adopted this criterion in a modified way. We considered “feasibility” relating to the question of whether or not an underlying business model could be implemented easily.

Cooper et al. (1998) and Dean et al. (2006) use acceptability in order to express the degree to which an idea is socially, legally or politically accepted by others. We adopted acceptability in terms of customer acceptance. With this criterion, we measured the degree to which customers deemed a business model to be acceptable.

Effectiveness describes the degree to which a creative product will solve a problem (e.g., (Barki and Pinsonneault, 2001, Valacich et al., 1995). As this criterion was useful for our scale, we adopted it, since it expresses the degree to which a business model can generate new revenue streams for SAP.

With the help of these dimensions, we were able to assess the quality of the business models. In a next step, each of the six distinct dimensions was operationalized by one item (see Table 2).

Dimensions	Corresponding item	ICC-Coefficient (two-factorial, random)
Novelty	The business model delivers an unprecedented new approach.	0.891
Originality	The business model is unusual, fanciful, original, and surprising.	0.940
Feasibility	The business model is easy to implement for SAP.	0.857
Acceptability	The business model has the potential to meet the goodwill of SAP’s customers.	0.724
Effectiveness	The business model has the potential to generate new revenue streams for SAP.	0.952
Elaboration	The idea is complete and mature.	0.866

Table 3. Operationalization of Dimensions and Corresponding ICC-Coefficients. (Source: Own Research)

Process of Assessing Idea Quality

Due to the “fuzziness” of the creative products, a broad range of different evaluation methods for assessing the quality of creative products is discussed in the literature and applied in practice (Plucker and Renzulli, 1999). This evaluation made use of Amabile’s Consensual Assessment Technique (CAT) (Amabile, 1996) to evaluate all business models resulting from the piloting phase. By using the CAT method, an independent expert jury evaluated these business models. This jury consisted of three experts within the field of business model development at SAP. Each of them had at least five years of working experience within this field (average of 6.3 years).

For evaluation, each business model was pasted into separate evaluation forms that also contained the scales for idea evaluation. Thus, six evaluation forms were handed out to each referee in a randomized order. All judges were assigned to rating the ideas with the six different items on a rating scale ranging from 1 (lowest) to 5 (highest). Each member of the jury evaluated the creative products independently. According to Amabile (1996), reliability of a scale that is used in the scope of Amabile’s CAT is good if all judges of the jury evaluate the creative products concerning each dimension almost equally, suggesting that ratings on each dimension should be analyzed for inter-judge reliability (1996). We checked the inter-rater reliability for our case by calculating Intra-Class-Correlation (ICC) coefficients. According to Amabile, ICC coefficients have to be higher than, or equal to, 0.7 in order to indicate a sufficient degree of inter-rater reliability (Amabile, 1996). In our case, all ICC coefficients were > 0.7 (see Table 2).

5.2.3. Empirical Results

To express the degree of the quality for each of the six evaluated business models, a quality index, ranging from 21 to 105, was constructed. This index is calculated as follows: All of the seven applied evaluation dimensions may have a minimum value of 1 and a maximum value of 5. Each business model covering all evaluation dimensions may have a maximum index of 7*5=35 per referrer. As there were three referrers, the maximum index for every business model is 35*3=105. Accordingly, the minimum index is 7*1*3=21. The evaluated ideas reached quality scores between 45 and 86 (Table 3). The average value is 63.167 and standard deviation is 16.523. The Kolmogorov-Smirnov test confirmed the normality of the distribution (p=0.868).

Statistical values	
N	6
Average value	63.167
Standard deviation	16.253
Minimum	45
Maximum	86
Kolmogorov-Smirnov-Test	
Kolmogorov-Smirnov-Z	0.597
Asymptotic significance (bilateral) (p)	0.868

Table 4. Statistical Results. (Source: Own Research)

Figure 3 shows the quality indices for every evaluated business model, including the average value of 63.167. Compared to the maximum achievable 105 points per business model, 66% of the evaluated ideas are above the medium level of 52.5. These results thus clearly indicate a substantially good level of idea quality.

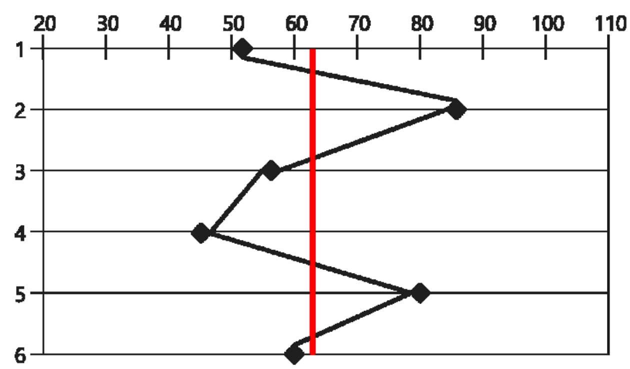

Figure 3. Quality Indices for the Business Models (Source: Own Research)

5.3. Reflection and Learning on the Design Cycles

As outlined when formulating the problem situation, this ADR study aimed at developing a BMDT that would allow SAP, together with their stakeholders, to elaborate on new market segments and to identify further courses of action. In this regard, keeping the results of our formative and summative evaluation in mind, the outcomes of the research project can be considered as being positive. When looking at the artifact's utility, which is an important success criteria for design science projects (Gregor and Hevner, 2013), our research can be considered to be successful.

The winning business model described an innovative strategy for analyzing customer sales data in order to integrate them into SAP's product development process. The winning team presented their business model in front of the jury and selected members of the corresponding business unit. The business model itself was forwarded to the business unit in order to realize the underlying idea.

Comparing the developed business models to the previously developed business models, the initiator was very satisfied with the submissions quality. Of the six developed business models, two were completely new to the initiator and were considered be 'high-quality business models.' This is even above average, compared to current research on stakeholder integration in which about 10 to 20% of stakeholder-generated content is labelled as new and valuable (Kristensson et al., 2004, Füller et al., 2006). The other business models were described as minor improvements of current products or services. In sum, the developed business models reached quality scores between 12 and 27. We therefore consider the solution that has been developed in the course of the project to be a promising extension to other tools in the field of stakeholder integration.

In contrast to other forms of integrating customers into a company's innovation process (e.g., idea generation), however, the development of new business models implies not only the impression of customer needs or value creation mechanisms (Amit and Zott, 2001), but also the definition of value approbation mechanisms. Keeping the outcome of our evaluation in mind, this study provides first indications that stakeholders are, in fact, able to generate valuable solution information for a company's innovation process. This study thereby contributes to an ongoing discussion in the field of innovation management which centers around the question whether external stakeholder are capable of providing such solution information (Poetz and Schreier, 2012).

6. Formalization of Learnings: Reflections on the Research Project

According to Sein et al. (2011), the objective of the fourth stage of ADR is to formalize the learning. In this regard, the learnings from an ADR project should be further developed into general solution concepts for a class of field problems (Sein et al., 2011). Accordingly, in this section, we will consolidate the learnings of this research into a unified framework for designing new BMDTs.

The framework was initially developed by two researchers that were involved in the research project. In the course of this development process, the researchers individually translated all functionalities identified and elaborated in the course of the development project into general design guidelines. In a next step the individual results were merged. Whenever dissimilarities occurred, the two researchers discussed and refined the guidelines until mutual agreement was reached. The final guidelines were then integrated into the design framework. To improve the framework and confirm its utility in the application field, we conducted an exploratory focus group (Hevner and Chatterjee, 2010). Originating in the field of psychology, the focus group has gained increasing popularity use as a knowledge elicitation technique in the field of software engineering (Massey and Wallace, 1991, Nielsen, 1997).

We conducted our focus group with six expert developers of virtual collaboration platforms. The involved experts previously developed several different web-based ideation platforms aiming at activating customers of a company for engaging into the company's innovation process. For this reason, the customers are provided with functionalities that allow them to generate, elaborate and evaluate new ideas concerning a company's product or service portfolio (Leimeister et al., 2009, Ebner et al., 2009). Due to the analogies to the different phases of a business model development project (mobilization of participants, generation of new business models and elaborating on their implementation), we considered these experts to be suitable candidates for the generation of design guidelines for BMDTs. Additionally, we decided to employ such a homogenous sample in order to integrate the target group of our developed framework and to ensure sufficient depth of the focus groups' results (Bloor et al., 2001).

The design framework we developed in the course of our research project is presented in Figure 4. It includes all activities as well as the design guidelines for supporting these activities that are necessary to develop and manage new business models. It also differentiates between two different roles that are responsible for developing and maintaining a BMDT. The administrator is responsible for developing the BMDT and implementing its functionalities, as well as maintaining the reliable operation of the BMDT. In contrast, the project manager is responsible for the content management within the BMDT. The project manager provides the teams with content relevant to the project (e.g., training materials or the documentation of the project goals). The project manager is also responsible for granting users of the system with sufficient access rights while also coordinating the collaboration of the users within the several activities.

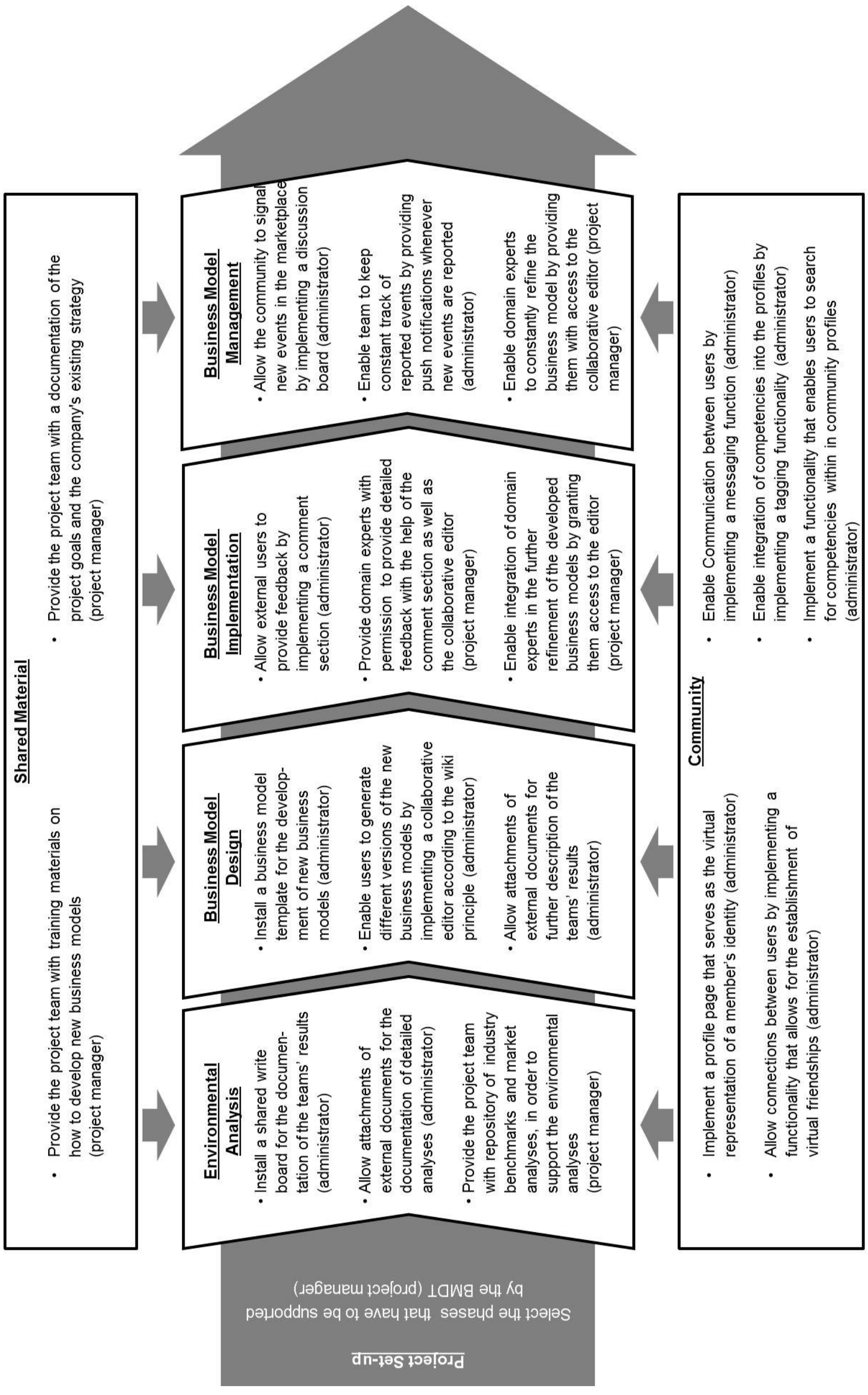

Figure 4: Framework for Developing a Business Model Development Tool

(Source: Own research)

As depicted, the framework follows the main activity that is necessary to develop new business models. However, two aspects of the framework deserve further attention, as they were not part of the existing literature. The first constitutes the shared material section. These shared materials should provide the project team with training material and tutorials regarding the key tasks that are necessary for developing new business models for the company (e.g., tutorials regarding the development of the several building blocks of a business model and training material on how to evaluate a business model). The shared materials should include not only a description of the project goals but also the repository, including the central terms related to the project (e.g., definitions of the several building blocks of a business model, description of the market segment that the business model should address and description of the company's existing strategy). By providing these materials during the whole project, it can be ensured that the collaboration within the project team contributes to the overall project goals.

Collaboration literature refers to this phenomenon as shared understanding (Bittner and Leimeister, 2014). Building a shared understanding (SU) "is important because people frequently use the same label for different concepts, and use different labels for the same concepts. People on a team also frequently use labels and concepts that are unfamiliar to others on the team" (Vreede de et al., 2009, p. 127). Differences in meaning assigned to key concepts, in mental models or in information, can interfere with productivity of collaborative work if they are not clarified early on (Kleinsmann et al., 2010, Kleinsmann and Valkenburg, 2008, Mohammed et al., 2010). In their recent study, Piirainen et al. (Piirainen et al., 2012) identify building a shared understanding as one of the five critical challenges of collaborative design from the design science literature and practice, especially during the early problem definition and artifact construction phases. This challenge can be complicated due to, for example, a lack of overlap in experience; shared context and language of the actors; the wicked, ambiguous nature of design problems; or the disruption of routines, all of which influence how a group forms and performs (Garfield and Dennis, 2012). Despite its importance, the maintenance of shared understanding throughout all project phases has not yet been recognized by existing literature on business model development. In this regard, our study was able to identify an important aspect that is necessary for ensuring both the success of a business model development project and its alignment with the company's strategy.

The second aspect of the framework that enhances existing literature is the so-called community section. This section includes guidelines on how to enable individuals outside of the project team to provide feedback on the developed business models throughout all phases of the development process. It thereby reflects the expert's recommendation that external feedback regarding the development of the business models as well as their implementation and management will improve the quality of the developed business models. This is in line with existing literature on online knowledge collaboration. Online knowledge collaboration can take various forms. It can involve an individual posting a question and then engaging in a process of reflecting on incoming responses and posting clarifying questions or ideas (Wasko and Faraj, 2000, Cummings et al., 2002). It can also involve parties engaging in adding to, recombining, modifying and integrating knowledge that others have contributed (Jarvenpaa and Majchrzak, 2010a).

Yet another form involves providing feedback on the contributed knowledge, while still waiting for others to include the feedback on the knowledge (Faraj et al., 2011). Past literature suggests that online knowledge collaboration will help generate better content in the community (Ransbotham and Kane, 2011). For example, in a study of collaborative content generation in Wikipedia, Ransbotham and Kane (2011) report that collaboration of new and experienced members affects the success of knowledge creation in terms of the articles being featured (best articles) in Wikipedia.

While this research on online collaboration suggests the benefits of community integration in a business model development project, existing literature on business model development largely ignores this aspect. By adding guidelines on how to integrate a community of individuals outside of the project team into the business model development process, this study is able to enhance existing literature in regard to a second important aspect. We will come back to this aspect when elaborating on the possibilities for future research.

7. Conclusion: Contribution to Theory and Practice

This research study started with the aim of developing a BMDT that would allow SAP, together with their stakeholders, to elaborate on new market segments and to identify further courses of action. Due to not only this practical concern in an immediate problematic situation but also to the fact that a BMDT is supposed to facilitate the interaction between the stakeholders of a company as well as between the company and its stakeholders, we employed an action design research approach (Sein et al., 2011). ADR constitutes an approach that facilitates the creation of innovative IT artifacts in its social environment. Because of this fact, we think that ADR was particularly suitable for the research project at hand. ADR has been developed in order to explicitly recognize the emergence of IT artifacts at the intersection of the IT and social environment.

Compared to other design research approaches, it thereby supported us in perusing a more holistic view when designing the BMDT. By executing two iterative design cycles and the explicit recognition of the BMDT in its social environment, we had the possibility of adapting the artifact continually and deriving design guidelines that are of use for practitioners as well as researchers in the problem domain. In this regard, we follow the stance of Sein et al. (2011), who argue that such reasoning is especially important, as unanticipated characteristics often occur during the design of technological artifacts. For example, the piloting of the BMDT in its use setting revealed important insights into SAP's need to keep constant track of the changes made and to integrate its own domain experts in the process of implementing the developed business models. Consequently, these insights had to be incorporated when formulating the design principles that are part of the framework that has been developed in the course of this research.

At this point, in order to evaluate the contribution of ADR, it might be helpful to explore whether a project employing a different design research approach would have gained comparable results. In order to answer this question, one must consider that existing design research approaches are based on the separation and sequencing of building and evaluation. As a result, these approaches do not fully support the development of ensemble artifacts, as building, intervention and evaluation are not integrated. In our case, another design research method might have led to a first prototype of the BMDT. Nevertheless, the refinement of the design principles - by recognizing the needs of the organization that employs the BMDT, as well as the consideration of the users' needs - would not have been fully possible. We therefore argue that another design research approach based on the separation and sequencing of building and evaluation would not have gained the same results.

When evaluating the outcomes of this research project in terms of solving the practical problem at hand, we consider our study as being successful. We could empirically validate that our BMDT helps SAP to realize collaborative business modelling with their stakeholders, resulting in an outcome with a sufficient degree of quality. This is an important finding for SAP, who originally sought to integrate selected employees from different divisions that are scattered around different geographical locations around the globe, transforming the innovation of its business models. For SAP, our BMDT enables integrating employees from all over the world into their business model innovation process and thereby reducing transaction costs and improving coordination of different development activities.

Hence, a BMDT that allows CBM in a virtual environment of the Internet might also be a good opportunity for other multi-divisional companies, such as SAP, to realize distributed business model innovation. Business model developers might learn from the insights of this research, as other companies certainly suffer from the same class of problem as that underlying this research. Implementing BMDT into a firm's business model development activities, which would allow capturing of the innovative potential of stakeholders, could be a means of coping with the increasing pressure of firms to adapt their business logic and processes in order to stay ahead of the market and their competition, as well as to ensure their own economic survival (Teece, 2010, Chesbrough and Rosenbloom, 2002).

However, ADR aims not only to solve the current and anticipated problems of practitioners, but also focuses on delivering theoretical contributions (Sein et al., 2011). Like in other forms of design research, these theoretical contributions constitute knowledge about creating other instances of artifacts that belong to the same class (Vaishnavi and Keuchler, 2004). As Hevner et al. (2004) point out, in contrast to behavioral sciences, design science is not concerned with explaining and "truth finding" but seeks problem solving, creation and innovation. In that it is about evaluating and determining the utility of technology and IT-based systems. Following this argumentation, Goes (2014) as well as Gregor and Hevner (2013) argue that in design science research one of the main concerns is to create new artifacts against the background of the descriptive knowledge about the problem domain (artificial, natural and human). The artifact itself produces knowledge as constructs and instantiations that may or may not lead to the level of abstraction that constitutes a design theory.

Keeping this in mind, we consider our study to deliver three major contributions to the knowledge base in the problem domain. When building our BMDT, we started by consolidating knowledge in the application domain that would be capable of informing our design. We therefore conducted a literature review that resulted in an overview regarding the publications that dealt with activities that are necessary for developing and managing new business models. We then consolidated these publications in order to derive an integrated process for developing and managing new business models. The result of this review constitutes a conceptual classification of the activities in a business model development project and can serve as a means to classify previous research. Our literature review can thus be categorized as an integrative review that synthesizes representative literature on a topic in an integrated way, such that new frameworks and perspectives on the topic are generated (Torraco, 2005). Following Gregor and Hevner (2013), our study thereby delivers a contribution to the descriptive knowledge in the problem domain.

As a second contribution, we conducted an interview study with experts in the field of business model development. On the basis of this, we were able to complement existing literature in the field and delivered additional descriptive knowledge, which could inform later design choices for building future BMDTs (Gregor and Hevner, 2013).

Third, when reflecting on the research project at hand, we developed a framework for building new BMDTs. This framework provides the major contribution of the study, as it constitutes a new solution for a known kind of problem, thereby delivering an improvement in the problem field (Gregor and Hevner, 2013). Following the different types of theories in information systems research proposed by Gregor (2006) as well as Gregor and Hevner (2013), the developed framework can be considered a nascent design theory. It contains new constructs that provide the vocabulary to define and understand problems and solutions in the problem domain.

These constructs thereby enable the construction of models for the problem and solution domain. In our case, the framework contains all necessary activities that have to be addressed when building a BMDT, thus providing other researchers with the possibility to systematically evaluate how IT-support within the several activities might improve the quality of the developed business models. Additionally, the framework contains concrete design guidelines for performing the task of developing new BMDTs. These guidelines allow future research to derive hypotheses in how far the several functionalities of a BMDT improve the success of a business model development project. In this regard, these guidelines can be considered as new knowledge in form of “principles of function” in the taxonomy of Gregor and Jones (2007).

Apart from these theoretical contributions, the framework also contains knowledge from other research domains that have not been considered in the existing literature on business model development. Drawing from literature on shared understanding and online collaboration, it suggests that the implementation of shared material as well as the integration of an expert community will positively influence the success of a business model development project. Thereby, it offers a new theoretical perspective on business model development.

Future research might elaborate on the extent to which these two aspects influence the quality of new business models. Further considerations could include not only stakeholders such as business partners into the collaborative process of business model development but also customers. In many instances, particularly in the world of open innovation, customers are seen as one of the key resources for innovation generation, as they often have deep product knowledge as well as experience and creativity potential gained by regular product usage (Franke et al., 2006). In this sense, what is well established in the world of open innovation could also become relevant to the field of collaborative business model innovation. Thus, future research on our BMDT might also consider customers as an important resource for collaborative business model development.

8. References

Achtenhagen, L., Melin, L. & Naldi, L. 2013. Dynamics of Business Models – Strategizing, Critical Capabilities and Activities for Sustained Value Creation. *Long range planning,* 46**,** 427-442.

Amabile, T. M. 1996. *Creativity in Context: Update to "The Social Psychology of Creativity",* Boulder, CO, US, Westview Press.

Amit, R. & Zott, C. 2001. Value Creation in E-business. *Strategic Management Journal,* 22**,** 493-520.

Barki, H. & Pinsonneault, A. 2001. Small Group Brainstorming: Is Electronic Brainstorming the Most Effective Approach? *Small Group Research,* 32 158-205.

Benbasat, I. & Zmud, R. W. 1999. Empirical research in information systems: the practice of relevance. *MIS Quarterly,* 23**,** 3-16.

Binnewies, C., Ohly, S. & Niessen, C. 2008. Age and creativity at work: The interplay between job resources, age and idea creativity. *Journal of Managerial Psychology,* 23**,** 438-457.

Bittner, E. & Leimeister, J. M. 2014. Creating Shared Understanding in Heterogenous Work Groups. Why it matters and how to achieve it. *Journal of Management Information Systems,* 31**,** 111-143.

Bloor, M., Frankland, J., Thomas, M. & Robson, K. 2001. *Focus Groups in Social Research,* London, Sage Publication Ltd.

Bretschneider, U., Leimeister, J. M. & Mathiassen, L. 2015. IT-enabled Product Innovation: Customer Motivation for Participating in Virtual Idea Communities. *International Journal of Product Development* 20**,** 126-141.

Chatterjee, S. 2013. Simple Rules for Designing Business Models. *California Management Review,* 55**,** 97-124.

Chesbrough, H. 2006. *Open Business Models: How To Thrive In The New Innovation Landscape,* Bosten, Massachusetts, USA, Harvard Business Press.

Chesbrough, H. 2007. Business Model Innovation: It's Not Just About Technology Anymore. *Strategy & Leadership,* 35**,** 12-17.

Chesbrough, H. & Rosenbloom, R. S. 2002. The Role of the Business Model in Capturing Value from Innovation: Evidence from Xerox Corporation's Technology Spin-off Companies. *Industrial and Corporate Change,* 11**,** 529-555.

Chesbrough, H. W., Vanhaverbeke, W. & West, J. 2006. *Open Innovation: Researching a New Paradigm*, Oxford University Press, USA.

Chin, J. P., Diehl, V. A. & Norman, K. L. Year. Development of an Instrument Measuring User Satisfaction of the Human-Computer Interface. *In:* Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, 1988. ACM, 213-218.

Cooper, W. H., Gallupe, R. B., Pollard, S. & Cadsby, J. 1998. Some Liberating Effects of Anonymous Electronic Brainstorming. *Small Group Research,* 29**,** 147-178.

Cummings, J. N., Butler, B. & Kraut, R. 2002. The Quality of Online Social Relationships. *Communications of the ACM,* 45**,** 103-108.

Dean, D. L., Hender, J. M., Rodgers, T. L. & Santanen 2006. Identifying Quality, Novel, and Creative Ideas: Constructs and Scales for Idea Evaluation. *Journal of the Association for Information Systems:,* 7**,** 646-699.

Del Giudice, M. & Straub, D. 2011. Editor's Comments: IT and Entrepreneurism: An on-again, off-again Love Affair or a Marriage? *MIS Quarterly,* 35**,** iii-viii.

Di Gangi, P. M. & Wasko, M. 2009. Steal my Idea! Organizational Adoption of User Innovations from a User Innovation Community: A Case Study of Dell IdeaStorm. *Decision Support Systems,* 48**,** 303-312.

Dicicco-Bloom, B. & Crabtree, B. F. 2006. The Qualitative Research Interview. *Medical Education,* 40**,** 314-321.

Ebner, W., Leimeister, J. M. & Krcmar, H. 2009. Community Engineering for Innovations: The Ideas Competition as a Method to Nurture a Virtual Community for Innovations. *R&D Management,* 39**,** 342-356.

Faraj, S., Jarvenpaa, S. L. & Majchrzak, A. 2011. Knowledge Collaboration in Online Communities. *Organization Science,* 22**,** 1224-1239.

Forman, J. & Damschroder, L. 2008. Qualitative Content Analysis. *In:* Baker, R. & Wayne, S. (eds.) *Empirical Research for Bioethics: A Primer. .* Oxford, UK: Elsevier Publishing.

Franke, N. & Shah, S. 2003. How Communities Support Innovative Activities: An Exploration of Assistance and Sharing Among End-users. *Research Policy,* 32**,** 157-178.

Franke, N., Von Hippel, E. & Schreier, M. 2006. Finding commercially attractive user innovations: A test of lead-user theory. *Journal of Product Innovation Management,* 23**,** 301-315.

Fritscher, B. & Pigneur, Y. 2010. Supporting Business Model Modelling : A Compromise between Creativity and Constraints. *Lecture Notes in Computer Science,* 5963**,** 28-43.

Füller, J., Bartl, M., Ernst, H. & Mühlbacher, H. 2006. Community Based Innovation: How to Integrate Members of Virtual Communities Into New Product Development. *Electronic Commerce Research,* 6**,** 57-73.

Garfield, M. J. & Dennis, A. R. 2012. Toward an Integrated Model of Group Development: Disruption of Routines by Technology-induced Change. *Journal of Management Information Systems,* 29**,** 43-86.

Gasco-Hernandez, M. & Torres-Coronas, T. 2004. *Virtual and Collaborative Teams - Process Technology and Practice* Hershey, PA, Idea Group Publishing.

Giesen, E., Berman, S. J., Bell, R. & Blitz, A. 2007. Three Ways to Successfully Innovate Your Business Model. *Strategy & Leadership,* 35**,** 27-33.

Goes, P. 2014. Design Science Research in Top Information Systems Journals. *Management Information Systems Quarterly* 38**,** iii-viii.

Gregor, S. 2006. The Nature of Theory in Information Systems. *Management Information Systems Quarterly,* 30**,** 611-642.

Gregor, S. & Hevner, A. R. 2013. Positioning and Presenting Design Science Research for Maximum Impact. *Management Information Systems Quarterly,* 37**,** 337-355.

Gregor, S. & Jones, D. 2007. The Anatomy of a Design Theory. *Journal of the Association for Information Systems,* 8**,** 313-335.

Hedman, J. & Kalling, T. 2003. The Business Model Concept: Theoretical Underpinnings and Empirical Illustrations. *European Journal of Information Systems,* 12**,** 49-59.

Hevner, A. & Chatterjee, S. 2010. The Use of Focus Groups in Design Science Research. *In:* Sharda, R. & Voß, S. (eds.) *Design Research in Information Systems: Theory and Practice.* New York Dordrecht Heidelberg London: Springer Science+Business Media.

Hevner, A. R., March, S. T., Park, J. & Ram, S. 2004. Design Science in Information Systems Research. *MIS Quarterly,* 28**,** 75-105.

Im, K. & Cho, H. 2013. A Systematic Approach for Developing a New Business Model Using Morphological Analysis and Integrated Fuzzy Approach. *Expert Systems with Applications,* 40**,** 4463-4477.

Jarvenpaa, S. L. & Majchrzak, A. 2010a. Research Commentary--Vigilant Interaction in Knowledge Collaboration: Challenges of Online User Participation Under Ambivalence. *Information Systems Research,* 21**,** 773-784.

Jarvenpaa, S. L. & Majchrzak, A. 2010b. Vigilant Interaction in Knowledge Collaboration: Challenges of Online User Participation under Ambivalence. *Information Systems Research,* 21**,** 773-784.

Johnson, M. W. 2010. *Seizing the White Space,* Boston, MA, Harvard Business Press

Johnson, M. W., Christensen, C. M. & Kagermann, H. 2008. Reinventing Your Business Model. *Harvard Business Review,* 86**,** 57-68.

Kleinsmann, M., Buijs, J. & Valkenburg, R. 2010. Understanding the Complexity of Knowledge Integration in Collaborative New Product Development Teams: A Case Study. *Journal of Engineering and Technology Management,* 27**,** 20-32.

Kleinsmann, M. & Valkenburg, R. 2008. Barriers and Enablers for Creating Shared Understanding in Co-design Projects. *Design Studies,* 29**,** 369-386.

Kramer, M. W., Kuo, C. L. & Dailey, J. C. 1997. The Impact of Brainstorming Techniques on Subsequent Group Processes: Beyond Generating Ideas. *Small Group Research,* 28**,** 218-242.

Kristensson, P., Gustafsson, A. & Archer, T. 2004. Harnessing the Creative Potential Among Users. *Journal of Product Innovation Management,* 21**,** 4-14.

Lee, J. H., Shin, D. I., Hong, Y. S. & Kim, Y. S. 2011. Business Model Design Methodology for Innovative Product-Service Systems: A Strategic and Structured Approach. *2011 Annual SRII Global Conference*, 663-673.

Leem, C. S., Jeon, N. J., Choi, J. H. & Shin, H. G. 2005. A Business Model (BM) Development Methodology in Ubiquitous Computing Environments. *In:* Osvaldo, G. (ed.) *Computational Science and Its Applications – ICCSA 2005.* Berlin Heidelberg: Springer.

Leimeister, J. M., Huber, M., Bretschneider, U. & Krcmar, H. 2009. Leveraging Crowdsourcing: Activation-Supporting Components for IT-Based Ideas Competitions. *Journal of Management Information Systems,* 26, 197-224.

Maccrimmon, K. R. & Wagner, C. 1994. Stimulating Ideas Through Creativity Software. *Management Science,* 40, 1514-1532.

Malone, T. W., Yates, J. & Benjamin, R. I. 1987. Electronic Markets and Electronic Hierarchies. *Communications of the ACM,* 30, 484-497.

Massey, A. P. & Wallace, W. A. 1991. Focus Groups as a Knowledge Elicitation Technique: An Exploratory Study. *IEEE Transactions on Knowledge and Data Engineering,* 3, 193-200.

Mohammed, S., Ferzandi, L. & Hamilton, K. 2010. Metaphor No More: A 15-year Review of the Team Mental Model Construct. *Journal of Management,* 36, 876-910.

Mumford, M. D., Feldman, J. M., Hein, M. B. & Nagao, D. J. 2001. Tradeoffs Between Ideas and Structure: Individual Versus Group Performance in Creative Problem Solving. *Journal of Creative Behavior,* 35, 1-23.

Nemiro, J. E. 2001. Connection in Creative Virtual Teams. *Journal of Behavioral and Applied Management,* 3, 92-112.

Nesse, P. J., Svaet, S., Su, X., Strasunskas, D. & Gaivoronski, A. 2012. Telecom Industry in the Cloud Value Chain: Methods for Assessing Business Opportunities. *Proceedings of the 10th International Conference on Advances in Mobile Computing & Multimedia.* Bali, Indonesia: ACM.

Nielsen, J. 1997. The Use and Misuse of Focus Groups. *IEEE Software,* 14, 94-95.

Orlikowski, W. J. & Iacono, C. S. 2001. Research Commentary: Desperately seeking the" IT" in IT research—a call to theorizing the IT artifact. *Information Systems Research,* 12, 121-134.

Osterwalder, A. 2004. *The Business Model Ontology: A Proposition in a Design Science Approach.* PhD, Universite de Lausanne.

Osterwalder, A. & Pigneur, Y. 2010. *Business Model Generation: A Handbook for Visionaries, Game Changers, and Challengers,* New Jersey, Wiley and Sons.

Osterwalder, A. & Pigneur, Y. 2013. Designing Business Models and Similar Strategic Objects: The Contribution of IS. *Journal of the Association for Information Systems,* 14, 237-244.

Osterwalder, A., Pigneur, Y. & Tucci, C. L. 2005. Clarifying Business Models: Origins, Present, and Future of the Concept. *Communications of the Association for Information Systems,* 16, 1-25.

Palo, T. & Tähtinen, J. 2013. Networked Business Model Development for Emerging Technology-Based Services. *Industrial Marketing Management,* 42, 773-782.

Peters, M. & Robinson, V. 1984. The Origins and Status of Action Research. *Journal of Applied Behavioral Science,* 20, 113-124.

Piirainen, K. A., Kolfschoten, G. L. & Lukosch, S. 2012. The Joint Struggle of Complex Engineering: A Study of the Challenges of Collaborative Design. *International Journal of Information Technology & Decision Making,* 11, 1087-1125.

Plucker, J. A. & Renzulli, J. S. 1999. Psychometric Approaches to the Study of Human Creativity. *In:* Sternberg, R. J. (ed.) *Handbook of Creativity.* New York, NY, US: Cambridge University Press.

Poetz, M. & Schreier, M. 2012. The Value of Crowdsourcing: Can Users Really Compete with Professionals in Generating New Product Ideas? *Journal of Product Innovation Management,* 29, 245-256.

Potter, R. E. & Balthazard, P. 2004. The Role of Individual Memory and Attention Processes during Electronic Brainstorming. *MIS Quarterly,* 28, 621-643.

Quis. 2014. *About the QUIS, Version 7.0* [Online]. http://lap.umd.edu/quis/. Available: http://lap.umd.edu/quis/ [Accessed 30.04.2014].

Ransbotham, S. & Kane, G. C. 2011. Membership Turnover and Collaboration Success in Online Communities: Explaining Rises and Falls from Grace in Wikipedia. *Management Information Systems Quarterly,* 35**,** 613.

Rapoport, R. 1970. Three dilemmas of action research. *Human Relations,* 23**,** 499-513.

Rasmussen, J., Kramp, G. & Mortensen, B. S. 2011. Prototyping Design and Business. *Proceedings of the 2011 Conference on Designing Pleasurable Products and Interfaces.* Milano, Italy: ACM.

Relander, S. 2008. *Towards Approximate Reasoning on New Software Product Company Success Potential Estimation: A Design Science Based Fuzzy Logic Expert System*, Helsinki School of Economics.

Remenyi, D. & Sherwood-Smith, M. 1999. Maximize Information Systems Value by Continuous Participative Evaluation. *Logistics Information Management,* 12**,** 14-31.

Rosemann, M. & Vessey, I. 2008. Toward Improving the Relevance of Information Systems Research to Practice: The Role of Applicability Checks. *Management Information Systems Quarterly,* 32**,** 1-22.

Sawhney, M., Verona, G. & Prandelli, E. 2005. Collaborating to Create: The Internet as a Platform for Customer Engagement in Product Innovation. *Journal of Interactive Marketing,* 19**,** 4-17.

Scriven, M. 1996. Types of Evaluation and Types of Evaluator. *Evaluation Practice,* 17**,** 151-162.

Sein, M., Henfridsson, O., Purao, S., Rossi, M. & Lindgren, R. 2011. Action Design Research. *Management Information Systems Quarterly,* 35**,** 37-56.

Skinner, G. D. 2008. A Study into Fostering Entrepreneurship in Information Communication Technology (ICT). *International Journal of Computers and Communications* 4**,** 108-116.

Susman, G. & Evered, R. 1978. An Assessment of the scientific Merits of Action Research. *Administrative Science Quarterly,* 23**,** 582-603.

Teece, D. J. 2010. Business Models, Business Strategy and Innovation. *Long Range Planning,* 43**,** 172-194.

Timmers, P. 1998. Business Models for Electronic Markets. *Electronic Markets,* 8**,** 3-8.

Torraco, R. J. 2005. Writing Integrative Literature Reviews: Guidelines and Examples. *Human Resource Development Review,* 4**,** 356-367.

Vaishnavi, V. & Keuchler, W. 2004. Design Research in Information Systems. *Association for Information Systems* [Online]. Available: http://home.aisnet.org/displaycommon.cfm?an=1&subarticlenbr=279.

Valacich, J. S., Wheeler, B. C., Mennecke, B. E. & Wachter, R. 1995. The Effects of Numerical and Logical Group Size on Computer-Mediated Idea Generation. *Organizational Behavior and Human Decision Processes,* 62**,** 318-329.

Veit, D., Clemons, E., Benlian, A., Buxmann, P., Hess, T., Kundisch, D., Leimeister, J. M., Loos, P. & Spann, M. 2013. Business Models – An Information Systems Research Agenda. *Business & Information Systems Engineering,* 6**,** 45-53.

Vreede De, G. J., Briggs, R. O. & Massey, A. P. 2009. Collaboration Engineering: Foundations and Opportunities: Editorial to the Special Issue on the Journal of the Association for Information Systems. *Journal of the Association for Information Systems,* 10**,** 121-137.

Wakefield, R. 2013. The Influence of User Affect in Online Information Disclosure. *Journal of Strategic Information Systems,* 22**,** 157-174.

Wasko, M. M. & Faraj, S. 2000. 'It is What One Does': Why People Participate and Help Others in Electronic Communities of Practice. *Journal of Strategic Information Systems,* 9**,** 155–173.

West, J. & Lakhani, K. 2008. Getting clear about communities in open innovation. *Industry and Innovation,* 15**,** 223-231.

Zott, C. & Amit, R. 2008. The Fit Between Product Market Strategy and Business Model: Implications for Firm Performance. *Strategic Management Journal,* 29**,** 1-26.

Zott, C., Amit, R. & Massa, L. 2011. The Business Model: Recent Developments and Future Research. *Journal of Management,* 37**,** 1019-1042.

9. Appendix 1: Results of the QUIS evaluation

Variable	Mean	S.D.	Df	t
Overall User Reactions				
Overall reactions to the system (ranging from 1=terrible to 9=wonderful)	6.0769	1.99846	25	2.748*
Overall reactions to the system (ranging from 1=frustrating to 9=satisfying)	6.1923	1.91873	25	3.169**
Overall reactions to the system (ranging from 1=dull to 9=stimulating)	5.2692	1.68660	25	0,.814
Overall reactions to the system (ranging from 1=difficult to 9=easy)	7.5769	1.30148	25	10.096***
Overall reactions to the system (ranging from 1=inadequate to 9=adequate)	5.9231	1.97834	25	2.379*
Overall reactions to the system (ranging from 1=rigid to 9=flexible)	5.6154	2.1650	25	1.355
Screen				
Characters on the computer screen (ranging from 1=dull to 9=stimulating)	7.9583	1.16018	23	12.492***
Highlighting on the screen (ranging from 1=difficult to 9=easy)	6.7368	1.75885	18	4.304***
Screen layouts were helpful (ranging from 1=inadequate to 9=adequate)	6.2381	2.02249	20	2.805*
Sequence of screens (ranging from 1=rigid to 9=flexible)	6.1111	1.81137	17	2.602*

Terminology and System Information				
Use of terminology throughout system (ranging from 1=inconsistent to 9=consistent)	6.5000	1.41421	23	5.196***
Terminology relates well to the work you are doing (ranging from 1=never to 9=always)	4.8696	2.20133	22	-0.284
Messages which appear on screen (ranging from 1=inconsistent to 9=consistent)	6.6364	1.32900	21	5.775***
Messages which appear on screen (ranging from 1=confusing to 9=clear)	6.7727	1.34277	21	6.192***
Computer keeps you informed about what it is doing (ranging from 1=never to 9=always)	6.1500	1.46089	19	3.520**
Error messages are (ranging from 1=unhelpful to 9=hel	6.2143	1.31140	13	3.465**
Learning				
Learning to operate the system (ranging from 1=difficult to 9=easy)	7.3750	1.83712	23	6.333***
Exploration of features by trial and error (ranging from 1=discouraging to 9=encouraging)	6.5600	2.14243	24	3.641***
Remembering names and use commands (ranging from 1=difficult to 9=easy)	7.0556	1.58938	17	5.487***
Tasks can be performed in a straight-forward manner (ranging from 1=never to 9=always)	6.4545	1.99350	21	3.422**
System Capabilities				
System speed (ranging from 1=too slow to 9=fast enou	7.6800	1.46401	24	9.153***
The system is reliable (ranging from 1=never to 9=always)	7.3200	1.40594	24	8.251***
System tends to be (ranging from 1=noisy to 9=quiet)	7.7778	1,.71594	8	4.856***

Correcting your mistakes (ranging from 1=difficult to 9=easy)	7.6471	1.80074	16	6.061***
Ease of operation depends on your level of experience (ranging from 1=never to 9=always)	7.7917	1.31807	23	10.376***
Multimedia				
Quality of still pictures/photographs (ranging from 1=bad to 9=good)	7.4375	1.67202	15	5.831***
Quality of movies (ranging from 1=bad to 9=good)	7.4615	1.50640	12	5.892***
Sound output (ranging from 1=inaudible to 9=audible)	7.3000	1.63639	9	4.445**
Colors used are (ranging from 1=unnatural to 9=natural)	7.6667	1.29099	14	8.000***
Notes: Notes: *** significant at .001 **; significant at .01; * significant at .05				