Dissertation zum Themengebiet

BUSINESS MODEL MODELING LANGUAGES AS TOOLS FOR INNOVATION: THEORY AND EMPIRICAL EVIDENCE

vorgelegt von

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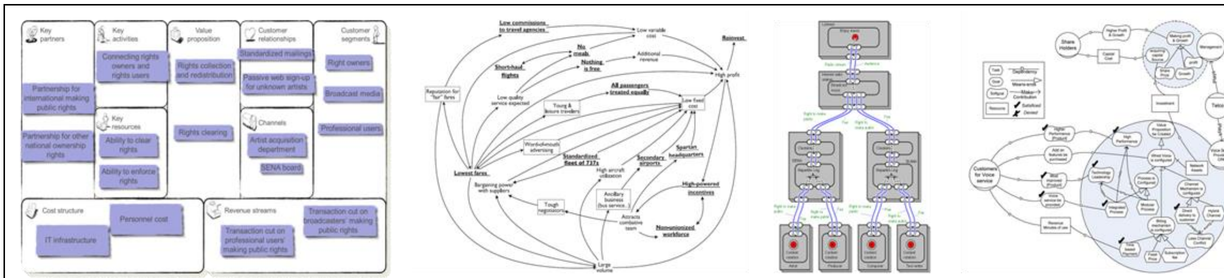
1. Introduction

1.1. Motivation

A business model describes a firm's mechanisms for value creation, value delivery, and value capture (Teece 2010), and as such is a detailed description of a firm's strategy (Adner et al. 2014; Casadesus-Masanell and Ricart 2010). The interest in business models and business model innovation is enormous – from researchers and practitioners alike. A recent global survey of some 3,000 executives in 26 countries finds that a majority of 60% consider *"defin[ing] an effective business model"* a major challenge in their firms' innovation activities (GE 2014). Likewise, IBM's global CEO studies (IBM 2006, 2008, 2010, 2012) consistently underline the importance of business model innovation, with each study drawing on interviews with several hundreds to nearly 2,000 CEOs. In line with the interest among practitioners, academic attention to business models has increased rapidly in disciplines as varied as information systems (IS), innovation management, and strategy (Zott et al. 2011). Moreover, research emphasizes the importance of business model innovation not only for established, but also for entrepreneurial firms (George and Bock 2011; Zott and Amit 2007).

High-quality ideas are important for successful innovation (Kornish and Ulrich 2014). Consequently, idea generation is crucial for successful business model innovation (Schneider and Spieth 2013) or, put bluntly, *"ideas constitute the lifeblood for firms in generating [...] new business models"* (Ende et al. 2015). However, at the same time, prior business model research has largely neglected business model idea generation (Schneider and Spieth 2013), and consequently *"idea generation [...] is the step in business model innovation that is least understood"* (Martins et al. 2015). A recent review of business model research (Schneider and Spieth 2013) corroborates this view, and identifies the need to better understand how firms can be supported in business model idea generation as an important future research direction.

The primary aim of the present dissertation is to respond to that call, and advance our understanding of business model idea generation in general and, more specifically, of how firms can be supported in developing better business model ideas. To scope the present work, the focus is on one specific approach for promoting business model idea generation: *business model modeling languages* (*BMMLs*). These languages allow to visually represent the core logic and elements of a business model (see Figure 1 for examples) and, in the idea generation context, provide support for recording intermediate ideas either physically or digitally (e.g., Gordijn and Akkermans 2003; Osterwalder and Pigneur 2010). Other approaches have been proposed to promote idea generation for business models, such as catalogs of existing business models (e.g., Stampfl and Sniukas 2013) or catalogs of business model patterns (e.g., Abdelkafi et al. 2013; Gassmann et al. 2014). Also, morphological approaches have been proposed that support humans in decomposing the idea generation problem (Im et al. 2013), and in some cases come with extensive catalogs of design options to facilitate idea generation (Kley et al. 2011). However, compared to BMMLs, none of these approaches has achieved considerable popularity in practice so far. This by no means is intended to imply a judgement of the value that these approaches have for business



Business Model Canvas (Osterwalder 2010)	Causal Loop Diagram (Casadesus-Masanell and Ricart 2010)	e3-value (Gordijn and Akkermans 2003)	Strategic Business Model Ontology (Samavi et al. 2009)

Figure 1: Sample models created with selected business model modeling languages

model idea generation. Nonetheless, as I will argue below, there seems to be a more pressing need to explore BMMLs. This is because for them there is a striking imbalance between the potential they seem to carry (given the fascinating success of one of their exemplars) and the state of knowledge we currently have.

BMMLs such as the *Business Model Canvas* (Osterwalder and Pigneur 2010), *e3-value* (Gordijn and Akkermans 2003), or the *e-business model schematics* (Weill and Vitale 2001) have been referred to by a variety of terms such as as *business model representations* (which arguably is the most popular term, e.g., Casadesus-Masanell and Zhu 2010; Zott et al. 2011), *conceptual models/conceptual modeling languages* (Pateli and Giaglis 2004; Samavi et al. 2009), or *maps of business models* (Chesbrough 2010). Nonetheless, I propose using the term *business model modeling language (or BMML)* for the following two reasons. First, the term business model representation could be misleading because there are other ways to represent business models than through a modeling language, for example, plain text (Doganova and Eyquem-Renault 2009) or morphologies (Kley et al. 2011). Second, in contrast to its alternatives, the term business model modeling language provides consistency with the terminology for other types of modeling languages, such as *process modeling languages* or *database modeling languages*[1].

Business models were once characterized as *"perhaps the most discussed and least understood aspect of the web"* (Rappa 2000). Paraphrasing this quote, as I will demonstrate in the following, BMMLs can arguably be called the most discussed and least understood aspect of business model research. On one hand, at least one of the existing BMMLs, the *Business Model Canvas* (or, simply, *Canvas*, Osterwalder and Pigneur 2010, see Figure 2) has had tremendous impact on research, practice, and education. Its impact on research is evident, for example, in that the corresponding book (Osterwalder and Pigneur 2010) according to *Google Scholar* has received more than 2,700 citations in just about five years. This is more than three times of what the most-cited papers in the leading management and IS journals have received within the same time frame[2]. In practice, the Canvas has become the quasi-standard for describing business models and is widely used for idea generation. The corresponding book has sold about one million copies (Strategyzer 2015), and the Canvas' popularity has led to the proliferation of

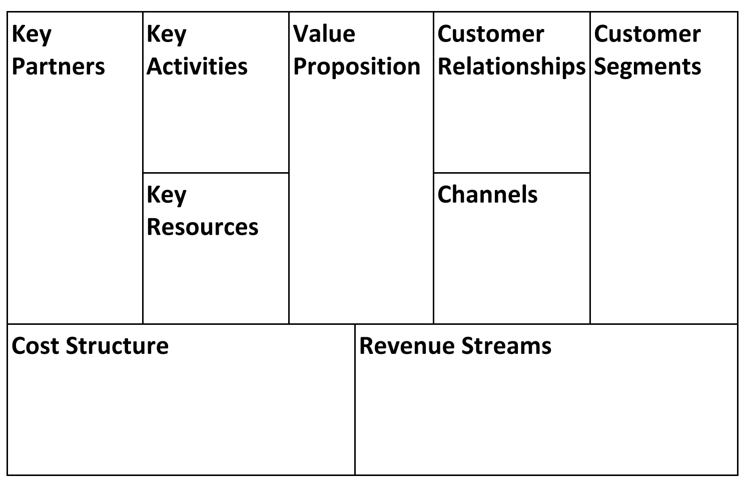


Figure 2. Business model canvas (Osterwalder and Pigneur 2010)

[1] Osterwalder (2004) also uses the term business model modeling language and by that refers to a markup language for formally representing business models. However, in subsequent work he did not further refer to the term or the language.

[2] For example, *Academy of Management Journal*: 634 (Zhang and Bartol (2010), *Information Systems Research*: 303 (Tsai et al. (2011), *Management Science*: 340 (Brynjolfsson et al. (2011); Venkatesh et al. (2012) (most-cited papers in the corresponding journals as of 3rd October, 2015).

supporting software tools and workshop offers[3]. In addition, the Canvas is widely taught in business schools. For example, Chesbrough, who with his *Xerox* case study (Chesbrough and Rosenbloom 2002) was one of the founding fathers of business model research, states that *"the Business Model Canvas is now taught to every fulltime MBA student at our school [Berkeley]. It has become the standard for describing and designing business models."* (Strategyzer 2015). Also McGrath, who was recently voted into the top 10 of global management thinkers[5], confirms that *"the Business Model Canvas [...] has completely transformed how we teach planning for new businesses"* (Strategyzer 2015).

So in summary, the success of at least one specific BMML, the Canvas, is impressive by virtually every conceivable popularity metric. However, despite the fascinating success of that one BMML, our knowledge on BMMLs in general is limited in at least five major ways:

(1) *Limited consolidation:* A number of BMMLs have been proposed and, in line with the interdisciplinary character of the business model concept (Chesbrough and Rosenbloom 2002), have emerged in various disciplines such as computer science, finance, IS, and strategy. However, research on BMMLs within and across these disciplines has remained rather fragmented than cumulative. Hence, there is little common ground for advancing the field and for establishing BMMLs on equal footing with other subdisciplines of the conceptual modeling discipline (Wand and Weber 2002), such as *process* or *database modeling languages*.

(2) *Limited theoretical grounding:* Despite the prevalent use of the Canvas, at a theoretical level we know virtually nothing about what makes this most popular BMML potentially more effective than other BMMLs. Put differently, concerning the Canvas' design there is little to no *justificatory knowledge* (Gregor and Jones 2007) available that could contribute to a post-hoc explanation of the Canvas' success, that could facilitate designing other BMMLs, or could constitute the foundation for improving the Canvas or other BMMLs even further.

(3) *Limited empirical evaluation:* On the one hand, as noted above, the Canvas' adoption in practice has been impressive, implying that its utility has been sufficiently demonstrated. On the other hand, the only experiment that so far has sought to evaluate the Canvas yields contradictory results. Eppler et al. (2011) hypothesized that employing the Canvas would increase its users' creativity compared to the *PowerPoint* control condition. However, the authors find that *"the results are significant, but in the opposite direction of our predictions. Subjects who use the interactive template [Canvas] perceive themselves as significantly less creative"* (Eppler et al. 2011). One possible interpretation is that the Canvas is indeed limited concerning its idea generation support, which would further emphasize the need to better understand the underlying theoretical mechanisms. Another interpretation is that our methodological knowledge regarding BMML evaluation is insufficient, and that for this reason evaluation results contradict real world observations. It is not clear which interpretation is more valid, especially given that (Eppler et al. 2011) acknowledge that their *"significance testing is conducted with illustrative aim, due to the limited number of subjects [n = 45 in three groups], rather than with the purpose of generalization"* (Eppler et al. 2011). Nonetheless, that both interpretations are equally undesirable (i.e., interpretation 1: the Canvas is widely used for idea generation despite being ill-suited for this task, interpretation 2: our evaluation methods are ill-suited for evaluating BMMLs) suggests the need to further explore the issue of how best to evaluate BMMLs.

(4) *Limited idea generation support of existing tools:* BMMLs are seen as a promising future field for IS research; a field which provides a *"unique opportunity"* to strengthen the impact of IS beyond its own domain by leveraging IS competences in modeling and tool development (Osterwalder and Pigneur 2013). Accordingly, a multiplicity of software tools has been proposed that support business model development with BMMLs. These tools are valuable means to record intermediate ideas during idea generation, and also go beyond that, for example, by providing functionality for remote collaboration (Strotmeyer 2015). However, for generating ideas, these tools rather passively rely on their human

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3 A recent survey identifies more than 20 software tools specifically addressing business model development with the Canvas (Strotmeyer (2015). A Google search for *workshop AND "business model canvas"* returns more than 100,000 results (as of 3rd October, 2015).

5 Thinker50.com, as of 17th November 2015.

users, and do not actively promote idea generation by proposing ideas themselves. At least in the near future it would be foolish to expect that tools can replace humans in the idea generation phase. However, it seems equally foolish to not even consider that these tools could actively support human idea generation – given that our times according to *Science* magazine are characterized by *"triumphs in the field of AI [artificial intelligence, that] are bringing to the fore questions that, until recently, seemed better left to science fiction than to science: [such as] how will we ensure that the rise of the machines is entirely under human control?"* (Stajic et al. 2015).

(5) Limited idea evaluation support of existing tools: Implementing a new business model can be seen as an investment – and once implemented, business models are not doomed to remain as they are; rather, they may contain a variety of options to be changed or extended. According to real options theory, valuing investments that have options without considering the value of these options leads to undervaluation (Benaroch and Kauffman 1999) and thereby potentially to shortsighted decisions and underinvestment (Trigeorgis 1996). Nevertheless, current software tools for business model development cannot handle such options because no appropriate modeling constructs are available. This means that options cannot be considered explicitly during idea generation, and hence cannot be considered in subsequent quantitative idea evaluation.

1.2. Overview

In the following, I describe how this dissertation contributes to alleviating each of the described limitations (for an overview, see Figure 3).

Addressed limitation	Paper	Research Question(s)		Method(s)	Source Discipline(s)	Contribution(s)
(1) Limited consolidation	(1) John & Kundisch (2017a)	1) Which BMMLs do exist? 2) How do they compare to each other? 3) What is needed to advance the field?		Literature review	CS, finance, IS, strategy	1) Sef of identified BMMLs 2) Classification framework 3) Research agenda
(2) Limited theoretical grounding	(2) John & Kundisch (2015)	How do visual templates affect creativity at the theoretical level?		Behavioral theory building	Creativity, IS	Behavioral theory that explains the relation between visual templates and creativity
	(3) John & Kundisch (2017b)	How does the visual template of the most widely used BMML, the Business Model Canvas, affect creativity at the...	...theoretical level	Design theory building	IS	Design theory that explains the relation between the Canvas' visual template and creativity
(3) Limited empirical evaluation			...empirical level	Experiments, survey, participatory observation	Creativity, IS	Preliminary evidence in favor of the proposed design theory, methodological advice for BMML evaluation
(4) Limited idea generation support of existing tools	(4) John (2016)	(How) Can BMMLs be used to promote creativity through machine-generated ideas?		Design theory building	Collective intelligence, creativity, machine learning, IS	Design theory that describes the architecture of business model idea generators
(5) Limited idea evaluation support of existing tools	(5) Kundisch & John (2012)	(How) Can options reasoning and options evaluation be incorporated into modeling tools for BMMLs?		Conceptual modeling	IS, finance	Extension of the e3-value BMML, with the extension being grounded in real options theory

BMML = business model modeling language, CS = computer science, IS = information systems

Figure 3. Limitations in research on business model modeling languages and corresponding papers

Addressing the first limitation of *limited consolidation*, the first paper (John and Kundisch 2017a) provides a literature review that identifies the BMMLs that have been proposed so far across a variety of domains. In addition, drawing on prior conceptual modeling research, that paper develops a classification framework that provides a unified terminology for describing and comparing BMMLs. Finally, by analyzing the identified BMMLs through the classification framework, a research agenda is derived that defines key research priorities to advance the field of BMMLs.

While the first paper takes a broad perspective on BMMLs, the second and third are more specific in that their motivation centers on the most successful BMML, namely the Business Model Canvas. More specifically, the second and third paper seek to identify whether specific characteristics inherent in the Canvas contribute to its success, and to explore these factors through theoretical and empirical perspectives. The Canvas is chosen because better understanding what makes the most successful BMML useful holds the promise to reveal valuable insights for BMMLs in general. The focus of these papers is on the visual template of the Canvas, because user studies (e.g., Strategyzer 2015) indicate that the visual template is crucial for the Canvas' usefulness.

As noted, no theoretical foundation is available that explains how the Canvas' visual template affects performance in business model idea generation. Even at a more general level a theoretical foundation is lacking, as neither within nor outside business model research there is a theoretical foundation available that explains how visual templates affect idea generation performance in general. This means that, independent of the business model context, it is not yet clear through which mechanisms (if any at all) differences in the (visual) design of visual templates translate into differences in the quality of resulting ideas. Hence, towards addressing the second limitation of *limited theoretical grounding*, the second paper (John and Kundisch 2015) develops theory that explicates the mechanisms through which visual templates affect idea generation performance. The paper does so by means of a *theory blending* approach (Oswick et al. 2011), taking an established theory for information presentation (*cognitive fit theory*, (Vessey 1991) and research on the role that visual sketches have for designers (e.g., Goldschmidt 2014) as the sources for the resulting theory.

Also addressing the second limitation of *limited theoretical grounding*, the third paper (John and Kundisch 2017b) builds on the second paper's general theory on idea generation with visual templates, and refines that theory for business model idea generation with the visual template of the Canvas. The third paper employs a *theory contextualization* approach (Hong et al. 2014), which results in a *design theory* (Kuechler and Vaishnavi 2012) that describes what characteristics of the Canvas visualization contribute to making the Canvas useful for idea generation, and through what theoretical mechanisms these characteristics become effective. Addressing the third limitation of *limited empirical evaluation*, the prediction of the proposed design theory – that the Canvas carries benefits for idea generation – is tested in a *mixed-methods* study (Venkatesh et al. 2013). That study includes three experiments, a survey, and a participatory observation, which including the pilot experiments draw on more than 700 subjects. Altogether, these studies provide preliminary evidence in favor of the theoretical prediction. Moreover, they yield methodological implications concerning the experimental evaluation of BMMLs.

While the second and third paper focus on the Canvas, the fourth paper (John 2016) has a wider perspective again. Addressing the fourth limitation of the *limited idea generation support of existing tools*, that paper proposes a new class of information systems termed *business model idea generators* (or, simply, *idea generators*). Such idea generators provide business model ideas for a product or service defined by the user, and thereby extend the set of unique ideas that the human user can produce alone. As increasing the number of unique ideas increases the probability for obtaining high-quality ideas (Girotra et al. 2010), the additional ideas produced by the idea generator increase the probability for high-quality business model ideas. The contribution of this paper is a *design theory* (Gregor and Jones 2007) that describes the high-level architecture of business model idea generators. The proposed design theory draws on and integrates research in creativity, collective intelligence, and machine learning, and thereby introduces a new perspective into research on business model idea generation, a perspective that is *human-with-machine* rather than *human-only*. Moreover, the paper explicates what role BMMLs can play in that context.

Addressing the fifth limitation of *limited idea evaluation support of existing tools*, the contributions of the fifth paper (Kundisch and John 2012) are twofold: at a *'macro-level'*, that paper introduces real options theory from finance into the realm of BMMLs. At a *'micro-level'*, that paper extends one specific BMML, namely e3-value (Gordijn and Akkermans 2003), for handling real options. The extension includes an extension of the formal e3-value ontology for option modeling and a corresponding graphical notation. Finally, that paper illustrates in a case study how the proposed extensions can support options reasoning and also serve as a basis for the correct financial evaluation of a business model.

Taken together, the papers in this dissertation exhibit considerable diversity in terms of the employed theory building approaches (i.e., behavioral and design theory building) and the employed empirical methods (i.e., qualitative and quantitative, see Figure 3). Such diversity brings about a multiplicity of challenges, as is evident, for example, in the long-lasting debates over the relative value of design versus behavioral theorizing (Gregor and Hevner 2013) and qualitative versus quantitative research (Venkatesh et al. 2013). Still, given the character of the outlined limitations, this methodological diversity seemed rather inevitable. For example, in the third paper it would not have been possible to develop a design theory that explains how the Canvas' visual template affects creativity without in the second paper having developed a behavioral theory on how visual templates in general affect their users' creativity. Taking another example, in the third paper it would hardly have been possible to derive such rich insights on how users actually use the Canvas if the quantitative experiments had not been complemented with a qualitative observation. Consequently, addressing the outlined limitations of BMML research seems hardly possible without accepting the complications that come with multi-method research.

In addition to the diversity in methods, the papers in this dissertation exhibit considerable diversity concerning the source disciplines they draw prior knowledge from (e.g., collective intelligence, creativity, IS, machine learning, see Figure 3). While it was far from easy to identify these contributions in disciplines that in some instances are quite distant from IS, it seemed highly desirable, and sometimes even inevitable to go that far beyond the IS discipline. For example, the empirical evaluation of the Canvas in the third paper could not have been undertaken solely by relying on IS contributions. Rather, it was essential to draw on contributions from creativity research, because IS lacks the expertise necessary for validly assessing the dependent variable, that is, assessing creative performance. Similarly, in the second paper, the theory that links visual templates to creativity could not have been developed solely from IS contributions, because IS has so far barely addressed the use of visualizations for creative purposes. Last but not least, the value of the fourth paper, the design theory for business model idea generators, almost exclusively lies in that this paper combines contributions from disciplines other than IS. While the employed methodological foundation of design theorizing is unique to IS, the justificatory knowledge for the resulting design theory resides in disciplines that are rather distant from IS, and even distant from one another (e.g., creativity, collective intelligence, machine learning). Taken together, this suggests that addressing the outlined limitations would hardly have been possible without accepting the need to explore a number of disciplines that in some instances are rather distant from IS.

To summarize, the field of BMMLs is characterized through the five major limitations of a lack of consolidation, of theoretical grounding, of empirical evaluation, and of functionality in tool support concerning idea generation as well as idea evaluation. The papers in this dissertation contribute to alleviating these limitations, and in doing so draw on a variety of theory building methods, empirical methods, and source disciplines. Moreover, while each paper hopefully is a direct contribution in itself, additional value may lie in that these papers bridge gaps between so far rather disconnected fields of research. This is likely to contribute to making researchers in the respective disciplines aware that there are other disciplines whose expertise could hold value for them. In that sense, besides the direct contributions of each paper, an indirect contribution of the papers and the dissertation as a whole is that they highlight so far disconnected disciplines with mutual strengths, which could contribute to catalyzing research around BMMLs altogether.

1.3. Joint work, presentations, and scientific dissemination

<table>
<tr><th colspan="2">Table 1. Joint work, presentations, and scientific dissemination for paper 1</th></tr>
<tr><td>Publication</td><td>John and Kundisch (2017a): Business Model Modeling Languages: A Systematic Review, Working Paper, University of Paderborn</td></tr>
<tr><td>Contribution to joint work with co-authors</td><td>Co-authorship with Prof. Dr. Dennis Kundisch (70% T. John, 30% D. Kundisch)
- Concretization of the research question and positioning together with D. Kundisch
- Literature review by T. John
- Framework development by T. John; Feedback, comments and corrections by D. Kundisch
- Coding of reviewed papers together with D. Kundisch
- Write-up of the paper by T. John; Feedback, comments, and corrections by D. Kundisch</td></tr>
<tr><td>Presentations at conferences, workshops, and seminars</td><td>The paper was presented at the following conferences, workshops, and seminars:
- 02/2012: Multikonferenz Wirtschaftsinformatik, Braunschweig, Germany*
- 07/2012: Department of Business Information Systems Research Seminar (University of Paderborn), Bad Lippspringe, Germany
- 10/2012: Business Models and Information Systems Workshop, Mannheim, Germany
- 06/2013: Pre-ECIS Workshop on Digitization in Business Models and Entrepreneurship, Utrecht, the Netherlands
- 09/2014: Wissenschaftliche Tagung der Erich-Gutenberg-Arbeitsgemeinschaft zum Thema Business Model Innovation and Transformation, Nuremberg, Germany

*Presentation by a co-author. The presented version was joint work with two additional co-authors, however, the subsequent revisions and extensions of the paper were performed without these two co-authors – therefore, the two co-authors confirmed they do not claim co-authorship for the version of the paper that is submitted as part of this dissertation.</td></tr>
<tr><td>Scientific dissemination</td><td>- Work on this paper started in July 2011
- First draft: September 2011
- Current version: September 2017
- An earlier version of the paper was published in the Proceedings of the Multikonferenz Wirtschaftsinformatik 2012 (VHB Jourqual 3 ranking: D)</td></tr>
</table>

Table 2. Joint work, presentations, and scientific dissemination for paper 2	
Publication	John and Kundisch (2015): Why Fit Leads to Surprise: An Extension of Cognitive Fit Theory to Creative Problems, *Working Paper*, University of Paderborn.
Contribution to joint work with co-authors	Co-authorship with Prof. Dr. Dennis Kundisch (90% T. John, 10% D. Kundisch) - Concretization of the research question and positioning together with D. Kundisch - Review of the theoretical background by T. John - Theoretical development and proposition by T. John - Write-up of the paper by T. John; Feedback, comments, and corrections by D. Kundisch - Write-up of the response to the reviewers and revision of the paper for one round of review for the International Conference on Information Systems by T. John; Feedback, comments, and corrections by D. Kundisch
Presentations at conferences, workshops, and seminars	The paper was presented at the following conferences, workshops, and seminars: - **12/2015:** International Conference on Information Systems, Fort Worth, USA
Scientific dissemination	- Work on this paper started in January 2014 - First draft: September 2014 - Current version: September 2015 - The paper was published in the *Proceedings of the International Conference on Information Systems 2015* (VHB Jourqual 3 ranking: A)

Table 3. Joint work, presentations, and scientific dissemination for paper 3	
Publication	John and Kundisch (2017b): Why Use the Canvas for Idea Generation? A Design Theory and First Evidence
Contribution to joint work with co-authors	Co-authorship with Prof. Dr. Dennis Kundisch (90% T. John, 10% D. Kundisch) - Concretization of the research question and positioning together with D. Kundisch - Review of theoretical background by T. John - Theoretical development and hypotheses by T. John - Development of experimental materials by T. John, Feedback by D. Kundisch - Acquisition and training of expert raters: T. John - Quantitative studies (pretests & experiments) conducted by T. John - Qualitative study conducted by T. John - Data preparation and statistical analyses by T. John - Write-up of the paper by T. John; Feedback, comments, and corrections by D. Kundisch
Presentations at conferences, workshops, and seminars	The paper was presented at the following conferences, workshops, and seminars: - **08/2014:** Americas Conference on Information Systems, Savannah, USA (Poster presentation) - **03/2015:** International Conference on Wirtschaftsinformatik, Osnabrück, Germany - **07/2015:** Kick-off Workshop of the GEMINI (Geschäftsmodelle für Industrie 4.0) project, Paderborn, Germany
Scientific dissemination	- Work on this paper started in July 2012 - First draft: March 2014 - Current version: December 2017 - An abstract of an earlier version of the paper was published in the *Proceedings of Americas Conference on Information Systems* 2014 (VHB Jourqual 3 ranking: D), an earlier version of the paper was published in the *Proceedings of the International Conference on Wirtschaftsinformatik* 2015 (VHB Jourqual 3 ranking: C)

Table 4. Joint work, presentations, and scientific dissemination for paper 4	
Publication	John (2016): Supporting Business Model Idea Generation Through Machine-generated Ideas: A Design Theory, *Working Paper*, University of Paderborn.
Contribution to joint work with co-authors	Single-authored paper.
Presentations at conferences, workshops, and seminars	The paper was presented at the following conferences, workshops, and seminars: - **09/2015:** Faculty of Business Administration and Economics Research Workshop, University of Paderborn, Bad Arolsen, Germany - **12/2015:** Pre-ICIS Workshop on Practice-based Design and Innovation of Digital Artifacts, Fort Worth, USA - **12/2016:** International Conference on Information Systems, Dublin, Ireland
Scientific dissemination	- Work on this paper started in June 2015 - First draft: September 2015 - Current version: September 2016 - Earlier versions of the paper were published in the *Proceedings of the Pre-ICIS Workshop on Practice-based Design and Innovation of Digital Artifacts 2015* and the *Proceedings of the International Conference on Information Systems 2016* (VHB Jourqual 3 ranking: A)

Table 5. Joint work, presentations, and scientific dissemination for paper 5	
Publication	Kundisch and John (2012): Business Model Representation Incorporating Real Options: An Extension of e3-value, *Working Paper*, University of Paderborn.
Contribution to joint work with co-authors	Co-authorship with Prof. Dr. Dennis Kundisch (60% T. John, 40% D. Kundisch) - Concretization of the research question and positioning together with D. Kundisch - Literature review by T. John - Extension of e3-value by T. John; Feedback, comments, and corrections by D. Kundisch - Write-up of the paper together with D. Kundisch
Presentations at conferences, workshops, and seminars	The paper was presented at the following conferences, workshops, and seminars: - **07/2011:** Department of Business Information Systems Research Seminar (University of Paderborn), Erwitte, Germany - **01/2012:** Hawaii International Conference on System Sciences, Maui, USA
Scientific dissemination	- Work on this paper started in December 2010 - First draft: February 2011 - Current version: September 2011 - The paper was published in the *Proceedings of the Hawaii International Conference on System Sciences* (VHB Jourqual 3 ranking: C)

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2. Papers Submitted as Part of the Dissertation

2.1. Business Model Modeling Languages: A Systematic Review

Business Model Modeling Languages: A Systematic Review

Abstract

A multiplicity of visual languages have been proposed for representing business models. These languages are claimed to facilitate tasks such as understanding, communicating, and innovating a business model; and have been developed rather independently by scholars from accounting, computer science, information systems, and strategy. Consequently, the existing approaches greatly differ and to some extent contradict each other, for example, regarding their understanding of the business model concept, their terminology, and their visual notations – which means there is little common ground for developing a cumulative stream of research. Therefore, we provide a systematic, cross-disciplinary review of this emerging field and synthesize the pragmatic, semantic, and syntactic foundations of the proposed approaches. Further, we derive an agenda for future research and discuss the challenges that lie ahead to advance the field.

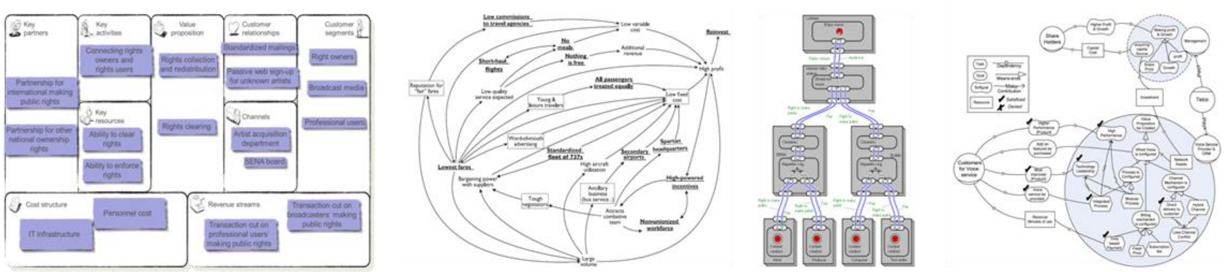
Keywords: Business model, modeling language, visual language, representation, review

1. Introduction

A business model describes the mechanisms of how a firm creates, delivers, and captures value (Teece 2010), and as such can be understood as a detailed description of a firm's strategy (Adner et al. 2014; Casadesus-Masanell and Ricart 2010a). The interest in business models and business model innovation is enormous – from researchers and practitioners alike: In a global survey with more than 1,000 CEOs, practically all respondents said that business model innovations are desirable – and more than two-thirds even said they strive for "extensive" business model innovations (IBM 2008, p. 48). Likewise, researchers in fields as diverse as information systems (IS), entrepreneurship, and strategy emphasize the importance of business model innovations for the competitiveness of firms (e.g., Wirtz et al. 2016).

Innovating a business model is a collaborative task (Ebel et al. 2016; Eppler et al. 2011) that often requires people from various disciplines to work together (e.g., sales, marketing, research & development). The corresponding activities include generating business model ideas and refining, analyzing, and evaluating them. Additional activities include communicating business model ideas to budget managers or investors (to acquire funding), and to technical staff (to prepare the implementation of the required IS). Given the numerous parties typically involved in business model innovation, their often interdisciplinary background, and the fuzziness inherent in the subject matter (Al-Debei and Avison 2010), it is essential to have means for making business model ideas concrete and tangible: That is, means that facilitate capturing, manipulating, and communicating the key characteristics of business model ideas (e.g., Gordijn and Akkermans 2003).

Business model modeling languages[1] *(BMMLs)* are one important way for making business model ideas more concrete and tangible (see Figure 1 for examples). These languages allow to visualize the core logic and elements of a business model, and are claimed to facilitate tasks such as understanding and communicating a business model (Osterwalder et al. 2005), generating business model ideas (Chesbrough 2010), and deducing requirements for the underlying IS (Gordijn and Akkermans 2003). These languages have been identified as one major theme in past IS business model research (Zott et al. 2011) and are seen as a promising future field for the IS discipline (Osterwalder and Pigneur 2013; Veit et al. 2014). Moreover, one specific language, the *Business Model Canvas*, has had tremendous impact on research and practice: The corresponding book (Osterwalder and Pigneur 2010), for example, has sold more than one million copies (Strategyzer 2015) and within only a few years has received more than 5,000 citations (according to Google Scholar).



Business Model Canvas (Osterwalder 2010) | Causal Loop Diagram (Casadesus-Masanell and Ricart 2010) | e3-value (Gordijn and Akkermans 2003) | Strategic Business Model Ontology (Samavi et al. 2009)

Figure 1: Sample Models Created with Selected Business Model Modeling Languages

[1] Please note that the approaches that we subsume under the term *business model modeling language* have in prior research also been referred to by other terms, such as *business model representations* (e.g., Zott et al. 2011) and *maps of business models* (e.g., Chesbrough 2010). We will justify our choice of terminology in the background section of this article.

Despite these varied indicators of the significance of BMMLs, the current state of knowledge concerning these languages is rather tentative and fragmented. In line with the interdisciplinary character of the business model concept (Chesbrough and Rosenbloom 2002), research on BMMLs has emerged in a variety of disciplines, including accounting (e.g., Sonnenberg et al. 2011), computer science (CS, e.g., Eriksson and Penker 2000), IS (e.g., Samavi et al. 2009), and strategy (e.g., Casadesus-Masanell and Ricart 2010b). Research within and across these disciplines has, however, remained rather disparate than cumulative, and the lack of cross-disciplinary integration inhibits leveraging the disciplines' comparative strengths. CS and IS researchers have, for example, made considerable achievements in thoroughly developing and evaluating modeling languages, but these achievements have only to a limited extent found their way into strategy research (Osterwalder and Pigneur 2013). Strategy researchers, in turn, have highlighted social aspects of using visual artifacts in the strategy process (Eppler and Platts 2009), but social aspects have largely been neglected in CS/IS works on modeling languages (Poels et al. 2006).

So, to summarize, research on BMMLs seems to have great potential, which is evident in existing calls for research and in the fascinating success of one specific BMML, the Business Model Canvas. At the same time, the knowledge we currently have is at an infancy stage, being fragmented, tentative, and partly contradictory, which means there is little common ground for advancing BMMLs in a cumulative fashion. In reply to this issue, we perform a review of research on modeling languages for business models, which – in the spirit of a *critical review* – seeks "to reveal weaknesses, contradictions, controversies, [and] inconsistencies" (Paré et al. 2015, p. 189) in the field. In so doing, we make three contributions: First, we identify the BMMLs that have been proposed rather independently from one another across a variety of disciplines. Second, by drawing on existing modeling language research, we develop a framework that provides a unified terminology for describing and comparing BMMLs. Third, we derive a research agenda that identifies key research priorities for advancing the field of BMMLs.

For practitioners, our comprehensive identification and characterization of existing languages can aid in identifying languages that best possibly fulfill the requirements of a specific business model innovation context. For researchers, with our work we hope to lay the foundation for an independent research discipline on modeling languages for business models. We envision such a discipline to be devoted to the cumulative and cross-disciplinary study of visual means for representing business models, and in the long term to be on equal footing with other subdisciplines of modeling language research, such as modeling languages for process or data modeling.

2. Background

As our aim is to provide a review on modeling languages for business models, in the following, we briefly review research on business models and then introduce the concepts from modeling language research that are relevant in our context. We thereafter bring together the insights from business models and modeling languages to further motivate and refine the notion of modeling languages for business models.

2.1. Business Models

The business model concept became prominent with the advent of the Internet era in the mid-1990s, when increasing uncertainty and dynamics surrounding digital businesses called for a new concept to address the widening gap between strategy and business processes (Al-Debei and Avison 2010). In the meantime, the concept has gained prominence in a variety of domains such as entrepreneurship (George and Bock 2011), IS (Al-Debei and Avison 2010), innovation management (Schneider and Spieth 2013), and strategic management (Zott et al. 2011) – and is widely appreciated in research as well as practice: In research, despite having been criticized for its vagueness and lack of theoretical foundation (Porter 2001), the business model concept is now seen as a valuable complement and extension of the traditional notion of a firm's strategy. The reason is that the business model concept acknowledges the importance of the customer perspective, whereas the customer perspective is largely neglected in the existing definitions of the strategy concept (Massa et al. 2017; Priem et al. 2013). In practice, business models are important because firm performance does not only depend on the characteristics of the products/services that a firm offers, but also on the business model(s) employed for commercializing these products/services. Put differently, "a mediocre technology [product, service] pursued within a great business model may be more valuable than a great technology [product, service] exploited via a mediocre business model" (Chesbrough 2010, p. 355). Accordingly, a recent global survey of some 3,000 executives finds that a majority of 60%

consider "defin[ing] an effective business model" to be a major part of their innovation activities (GE 2014, p. 40). Also IBM's global CEO studies (IBM 2006, 2008, 2010, 2012) consistently underline the importance of business model innovation, with each study drawing on interviews with several hundreds to nearly 2,000 CEOs.

Given the business model's paramount importance for firm success, the number of academic and journalistic articles on business models has "virtually exploded" (Zott et al. 2011, p. 1021), and this has triggered the publication of a number of literature reviews. These reviews can broadly be categorized into the following three types: The first type reviews the business model literature across scientific disciplines, but with a focus on specific thematic perspectives, such as definitions (Al-Debei and Avison 2010), innovation (Schneider and Spieth 2013), or empirical business model research (Lambert and Davidson 2012). A second type reviews business model research with a broad perspective on the business model concept, but with a focus on a specific discipline, for example, business model research in marketing (Coombes and Nicholson 2013) or in entrepreneurship and management (George and Bock 2011). A third type reviews business model research from a general perspective, that is, across scientific disciplines and with a broad perspective on the business model concept (e.g., Foss and Saebi 2017; Massa et al. 2017; Osterwalder et al. 2005; Pateli and Giaglis 2004; Zott et al. 2011). To the best of our knowledge, however, no review exists so far that synthesizes research on modeling languages for business models.

2.2. Modeling Languages

Modeling languages employ predefined constructs and mostly a visual notation to represent real-world phenomena in a certain domain (Wand and Weber 2002). Such languages are used to represent static phenomena (e.g., things and their properties) as well as dynamic phenomena (e.g., events and processes) (Wand and Weber 2002) – and popular applications of modeling languages include process modeling (e.g., Recker et al. 2011), conceptual modeling (e.g., Bera et al. 2014), and data modeling (Parsons and Wand 2008). The origin of modeling languages lies in requirements analysis in the 1970s, as at that time the understanding emerged that faulty requirements analyses are a major reason for the failure of IT projects – and that a formal approach for eliciting and articulating user requirements could help to improve the quality of requirements analyses. After a period of lower research intensity, research interest in modeling languages was renewed at the end of the 1990s, among others, because of the increased significance of process reengineering and enterprise resource planning systems (Wand and Weber 2002).

There are three main perspectives that modeling languages can be studied from, namely the *semantics*, the *syntax*, and the *pragmatics* of a modeling language (Burton-Jones et al. 2009). The semantics of a modeling language refer to the content that a language seeks to represent (i.e., the 'vocabulary' of a language, or *what* does a language represent?). The (visual or concrete) syntax of a modeling language refers to the form of the visual representation (i.e., *how* does a language represent content?). The pragmatics of a language refer to the context that a language is used in (Burton-Jones et al. 2009). To facilitate understanding these three perspectives, before continuing with modeling languages, we illustrate the perspectives using the example of Google Maps (admittedly, a somewhat distant example – but one that nonetheless helps developing an intuition for the terms semantics, syntax, and pragmatics): Analyzing Google Maps from a semantic perspective would imply to identify the content (i.e., information) that the maps from Google seek to represent. That content includes, for example, information on the locations of local streets as well as the locations of highways, rivers, and parks. Which content to include is a deliberate decision of Google (as is the decision to not include into its maps information on, for instance, local wind speeds and local temperatures). Analyzing Google Maps from a syntactic perspective would imply to identify which visual elements the maps use to represent the mentioned content. For example, local streets are represented through white lines, highways are represented through orange lines, rivers through blue lines, and parks through green areas. Which visual elements to use, again, is a deliberate decision of Google (e.g., Google could also decide to represent local streets through black lines instead of white ones). Analyzing Google Maps from a pragmatic perspective would imply to identify the context factors that characterize the intended or actual use context. Such context factors could, for example, include the users' characteristics (e.g., the users' level of knowledge concerning the represented geographic area) and the presentation medium (e.g., paper or a tablet).

In the context of modeling languages, the terms semantics, syntax, and pragmatics, can be refined as follows (see also Figure 2):

- The semantics of a modeling language define the content or "vocabulary" of a modeling language. The *semantics* are defined by a *metamodel* that consists of the *semantic constructs* that a modeling language aims to represent (Moody 2009). To illustrate, the metamodel of a process modeling language could, for example, include the semantic constructs *start of a process*, *end of a process*, *task*, and *follows after* (to describe for instance a process that is defined through a sequence of tasks that need to be executed one after another).
- The (visual or concrete) syntax of a modeling language refers to the form of the visual representation. The syntax is defined by a *visual notation* that consists of *graphical symbols* that each represent a specific semantic construct (Moody 2009). The visual notation of a process modeling language could, for example, include a *black circle* as the graphical symbol for symbolizing the semantic construct *start of a process*, a *grey circle* as the graphical symbol for symbolizing the semantic construct *end of a process*, a *rectangle* for symbolizing *tasks*, and *black arrows* that connect tasks to symbolize that one task *follows after* another.
- The pragmatics of a language refer to the context that a language is used in (Burton-Jones et al. 2009). That context includes, for example, the characteristics of the modeler (e.g., modeling is different for modeling novices and modeling experts) and characteristics of the task that a modeling language is used for (e.g., modeling with 'pen & paper' is different from modeling with a software tool; the task of representing the current state of a domain is different from the task of exploring possible alternative states of a domain) (Wand and Weber 2002).

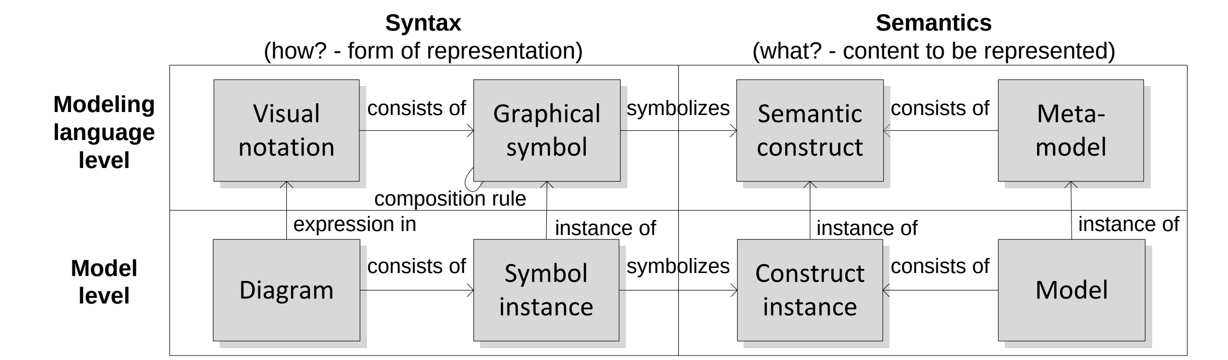


Figure 2: Syntax and Semantics of a Modeling Language (adapted from Moody 2009)

2.3. Business Model Modeling Languages

Besides modeling languages, there are a number of other means for representing business model ideas, including text, graphics, and combinations thereof, each with varying degrees of formality. The following approaches have, for example, been identified in a review of prior case study research on business models (John and Kundisch 2012):

- *Informal text:* Textual descriptions that are structured in a somewhat ad hoc fashion and tailored to a specific case (e.g., Kshetri 2007).
- *Structured text and ontologies:* Textual descriptions that are structured along predefined business model components such as revenue model, sales channels, and key resources (e.g., Sosna et al. 2010).
- *Morphological representations:* Generic or domain-specific frameworks that provide a number of variables and corresponding values for describing a business model (e.g., Kley et al. 2011).
- *Ad hoc graphical representations:* Ad hoc visualizations of the logic behind a business model; these may employ explicitly defined notation elements, but are tailored to a specific case rather than being intended for being repeatedly applied in a variety of contexts (e.g., Kinder 2002).
- *Dedicated graphical representations (i.e., business model modeling languages):* Approaches with defined semantics and a dedicated visual notation, whose explicit aim is to provide a means for describing business models in a variety of contexts (e.g., Gordijn and Akkermans 2003).

As noted, in our review we focus on the last type, and in the following provide a more precise definition of the corresponding approaches. Recall that a modeling language is characterized by two properties: First, a modeling language provides pre-defined semantic constructs that define what content a language allows to represent. Second, a modeling language provides a visual notation for graphically representing the semantic constructs. Accordingly, we define a business model modeling language as an approach that (1) provides pre-defined semantic constructs and (2) a visual notation for representing these semantic constructs (3) for the purpose of representing business models. For ease of exposition, we use the terms business model modeling language, modeling language for business models and BMML interchangeably.

Note that, from a semantic perspective, our definition of BMMLs is deliberately inclusive, as we require these languages to come with pre-defined semantic constructs instead of metamodels. The reason is that metamodels, at least in IS and CS (i.e., computer science) research, come with the flavor of rather formal models. Therefore, requiring BMMLs to have a (formal) metamodel would imply that we exclude all approaches from our definition that define their semantics merely through a textual description rather than a (formal) metamodel, which in turn would exclude all approaches from strategy and management research (as in those disciplines it is rather atypical that the semantics of a visual approach are defined in a formal way). However, excluding approaches from strategy and management research would be rather unfortunate, as this would exclude contributions from precisely those disciplines that should best know what practitioners applying a BMML need (even though researchers from strategy and management research might not possess the level of methodological sophistication in modeling language development that IS and CS researchers have achieved). Hence, acknowledging that it should not be upon IS and CS researchers alone to decide the future of BMMLs, we opted for the proposed inclusive definition.

Concerning the term that we adopt for approaches that comply with the above definition, note that these approaches have also been referred to by other terms such as *business model representations* (which arguably is the most popular term, e.g., Casadesus-Masanell and Zhu 2010; Zott et al. 2011) and *maps of business models* (Chesbrough 2010). With a somewhat broader meaning (e.g., not necessarily requiring a visual notation), these approaches have also been referred to as *formal conceptual representations/descriptions* (Massa et al. 2017) and *conceptual models/design methods & tools* (Pateli and Giaglis 2004). Nonetheless, we propose using the term business model modeling language (or BMML) for two reasons. First, the currently most popular alternative, the term *business model representation*, could be misleading because modeling languages are not the only means for representing a business model (as noted, alternatives include plain text and morphologies). Second, in contrast to the alternatives, the term business model modeling language provides terminological consistency with the terms for other types of modeling languages (e.g., process modeling languages, data modeling languages). A counter-argument could be that Osterwalder (2004) has already introduced the term *business model modeling language* to denote a markup language for formally representing business models. In subsequent work, however, Osterwalder has not referred to the term, and it seems that the corresponding language has not been widely adopted (a full text search for the term in Google Scholar yields less than 10 results). Hence, the risk for hampering cumulative research by adopting the term business model modeling language as proposed above seems negligible.

3. Method

The goal of a literature review is to provide a firm foundation for advancing knowledge by highlighting the areas in which vast research exists and uncovering areas where research is needed (Webster and Watson 2002). To fulfill this goal, Webster and Watson (2002), echoed by other authors, emphasize the importance of (1) a transparent literature search, (2) a structured presentation of the results, and (3) convincingly derived future research avenues. The literature search needs to ensure that the relevant literature on a topic is covered without being biased, for example, towards specific research methodologies, sets of journals or geographic regions (Webster and Watson 2002). Furthermore, the search process needs to be sufficiently transparent to be understandable and replicable by other authors (vom Brocke et al. 2009). For the presentation of results, a concept-centric approach (in contrast to an author-centric approach) is essential to guide the analysis, structure the subject matter, and thereby facilitate the identification of research foci and gaps (Webster and Watson 2002; Rowe 2012). The last step of a literature review, to transform research gaps into research avenues, is the most challenging because research avenues may not directly follow from research gaps, but rather may require more advanced speculative abilities and intuition (Rowe 2012). However, it has been termed the most important part of a review because of its potentially wide-ranging implications for the further advancement of a field (Webster and Watson 2002). In the following we devise the search strategy (to address step 1). The other two steps are addressed in the subsequent sections on results and future research.

For our literature search we used the keywords *business model** together with *diagram**, *graphic**, *visuali**, *modeling language** and *conceptual model**; and in addition *business model representation** on its own in business as well as technical databases (EBSCO, INSPEC, Web of Science). Our search covered titles, abstracts and keywords in these three databases for articles published until July 2014. Inclusion criteria were that an article (1) presents a conceptual modeling approach with a visual notation, (2) for the purpose of modeling business models, and (3) is presented in a peer-reviewed English language journal. Furthermore, we added to our results the four approaches from the BMML subsection of the literature review by Zott et al. (2011) (in that article referred to as business model representations) that complied with the above stated criteria (1) and (2). Finally, we performed backwards and forwards citation searches using Google Scholar. We employed Google Scholar, because some of the approaches taken from Zott et al. (2011) are published as books, which are not included in the electronic databases. A major source of uncertainty when deciding upon inclusion of an approach was the fuzziness of the business model concept. The strategy literature has developed representational approaches that are profoundly similar to approaches that explicitly intend to represent business models (e.g., Value Map (Allee 2000)). We included such an approach if its metamodel is a subset of the business model's semantic structure as defined by Al-Debei and Fitzgerald (2010).

4. Research Findings: What Do We Know?

Table 2. Identified Business Model Modeling Languages and Pragmatic/Syntactic Characteristics

			Business Model Canvas (Osterwalder and Pigneur 2010)	**Business Models for eGovernment** (Peinel et al. 2010)	**Causal Loop Diagram** (Casadesus-Masanell and Ricart 2010a)	**Connection Diagram** (Yongkyun 2012)	**e3-value** (Gordijn and Akkermans 2003)	**eBusiness Model Schematics** (Weill and Vitale 2001)	**Eriksson-Penker Business Extensions** (Eriksson and Penker 2000)	**Integrated business model concept** (Wirtz 2011)	**Resource-Event-Agent** (Sonnenberg et al. 2011)	**Strategic Business Model Ontology** (Samavi et al. 2009)	**Value Map** (Allee 2000; Tapscott et al. 2000)	**Value Net** (Parolini 1999)	**Value Stream Map** (Pynnönen et al. 2008)
Pragmatics	Origin	Accounting									X				
		Computer science					X		X						
		Information systems	X	X				X				X			X
		Strategy			X	X				X			X	X	
	Scope	Domain-specific		X		X		X							
		General purpose	X		X		X		X	X	X	X	X	X	X
	Software tool available?		X	X	X		X		X		X	X			
Syntax	Visualization approach	Connection (network)		X	X	X	X	X	X		X	X	X	X	X
		Geometric (map)	X							X					
		Hybrid													
	Number of views	One	X	X	X	X	X	X		X			X	X	X
		Several							X		X	X			
	If several views: Their relationship	Non-overlapping													
		Overlapping							X		X	X			

Altogether, we identified 13 different modeling languages for business models that have been developed by scholars in accounting, CS, IS, and strategy research. In the following, we characterize these languages from the main perspectives for analyzing modeling languages, namely pragmatics and syntax (Table 2) as well as semantics (Table 3).

4.1. Pragmatics

Recall that the pragmatics of a language refer to the context that a language is used in (Burton-Jones et al. 2009), and that this context mainly refers to the characteristics of the modeler and the characteristics of the modeling task (Wand and Weber 2002). Concerning the characteristics of the modeler, the identified articles either implicitly or explicitly state that they intend the languages to be applicable by expert users as well as novice users, without making additional qualifications. Concerning the tasks, however, there is more variation. For example, while most of the languages are intended to be applicable across domains (see Table 2), there are also two exceptions that focus on specific domains, namely eGovernment business models (Peinel et al. 2010) and electronic business models (Weill and Vitale 2001). For some languages, software tools are available and this, not surprisingly, is mainly the case for languages that originate from CS and IS[4]. Also the intended purposes for using the languages vary substantially, depending on the discipline that a language has been proposed in: While accounting researchers see BMMLs as a means to facilitate risk assessment, CS and (to a lesser degree) IS researchers value BMMLs for their potential to support requirements engineering. Strategy and IS researchers, in contrast, see BMMLs as a means for developing more innovative business models. At a more fine-grained level, BMMLs are proposed to support the following tasks:

- *Understand a business model and communicate about it* (Eriksson and Penker 2000; Gordijn and Akkermans 2003; Osterwalder et al. 2005): A visual representation is seen to facilitate comprehension as well as to be less ambiguous than (informal) natural language and thereby reduce the risk for misunderstandings.
- *Analyze and evaluate a business model* (Gordijn and Akkermans 2003): Informally stated value propositions – due to their lack of structure – are inherently difficult to analyze (e.g., regarding their potential profitability), and BMMLs are seen to provide the foundation for a more structured analysis.
- *Deduce requirements for the underlying information systems* (Eriksson and Penker 2000; Gordijn and Akkermans 2003): It is easier to deduce requirements from a codified representation than from natural language descriptions, hence using a BMML promises to result in IS that are better aligned with the corresponding business model. In the case of a business model being used as the starting point for several IS, using a BMML can reduce the risk that different development teams interpret reality differently – and potentially develop incompatible systems (Eriksson and Penker 2000).
- *Generate business model ideas* (Chesbrough 2010; Eriksson and Penker 2000; John and Kundisch 2015): Creating explicit representations of a business model can facilitate experimenting with and generating new business model ideas, which is the first step in business model innovation.
- *Support business model design through software tools* (Osterwalder et al. 2005; Samavi et al. 2009): Some authors envision practitioners to benefit from software-based tools for business model design, for example, for comparing or simulating business models. These tools need rigorous representations to be able to capture knowledge on business model ideas.

4.2. Semantics

Recall that the semantics of a modeling language refer to the content or 'vocabulary' of a modeling language (Moody 2009), which in our context means to analyze to what extent the identified BMMLs have the same or at least a similar understanding of what a business model is. There are two possible approaches for analyzing the semantics of the identified languages: First, to identify one of the identified BMMLs as a reference language and then to map the semantic constructs of all other languages to the semantic constructs of this reference language. Second, to use the semantics of a business model

[4] An analysis of the functionalities of these tools is beyond the scope of this article (for an analysis of software tools that support the currently most-widely used BMML, the Business Model Canvas, see Szopinski et al. (2017)).

Table 3. Semantic Constructs of the Identified Business Model Modeling Languages

Semantic constructs of a business model (Al-Debei and Avison 2010; Al-Debei and Fitzgerald 2010)		**Business Model Canvas** (Osterwalder 2004; Osterwalder et al.2010)	**Business Models for eGovernment** (Peinel et al. 2010)	**Causal Loop Diagram** (Casadesus-Masanell and Ricart 2010a)	**Connection Diagram** (Yongkyun 2012)	**e3-value** (Gordijn and Akkermans 2003)	**eBusiness Model Schematics** (Weill and Vitale 2001)	**Eriksson-Penker Business Extensions** (Eriksson and Penker 2000)	**Integrated Business Model Concept** (Wirtz 2011)	**Resource-Event-Agent** (Sonnenberg et al. 2011)	**Strategic Business Model Ontology** (Samavi et al. 2009)	**Value Map** (Allee 2000; Tapscott et al. 2000)	**Value Net** (Parolini 1999)	**Value Stream Map** (Pynnönen et al. 2008)
Value-proposition	Intended-value-element	Value proposition				Value object								
	Product-service				Platform				Market offer model					
	Target-segment	Customer segments			Users/agents		Customer		Customer model	Outside agent				
Value-network	Actor	Customer segments, key partners	Partner		Users/agents	Actor, market segment	Customer, firm of interest, supplier, ally		Procurement model	Inside agent, outside agent	Agent	Member	Actor	Actor
	Role		Role								Role			
	Flow-communication		Object exchange			Value object	Money, product, information					Good, service, revenue, knowledge, intangible benefits	Financial, good, information, influence	Service, free service, product, free product, information
	Relationship	Customer relationship				Value exchange/ port/ interface	Electronic relationship, primary relationship			Economic resource flow				
	Channel	Channels		Choice, flexible/rigid consequence										
	Governance													
	Network-mode													
Value-architecture	Core-competency								Competencies/resources					
	Core-resource	Key resources						Resource						Resource
	Value-configuration	Key activities	Service			Activity		Core process	Manufacturing model	Business process	Task		Mgmt. of external transactions, support, realization	
Value-finance	Total-cost-of-ownership	Cost structure							Finance model					
	Pricing-method													
	Revenue-structure	Revenue streams							Revenue model					
Additional			Advantage, disadvantage, Policy					Domain-specific concepts, quantitative goal, qualitative goal	Strategy		Goal, soft goal			

definition from outside the set of identified articles and then map the semantic constructs of all identified BMMLs to that business model definition. We decided to apply the second approach of using an outside business model definition because we expected that this would allow for a more neutral mapping of the identified languages. Since ex-ante we had expected considerable variation in the semantic constructs of our languages, we chose our business model definition based on the following three criteria: it needed to be (1) well-accepted at least in IS, (2) comprehensive in its scope, and at the same time (3) fine-grained in its semantic constructs. As a result, we chose the business model definition by Al-Debei and Avison (2010, based on Al-Debei and Fitzgerald 2010), which fulfills these three criteria. For performing the semantic analysis, the first and second author independently mapped each semantic construct of each BMML to the semantic constructs defined by Al-Debei and Avison (2010); inconsistencies were resolved through subsequent discussion. In the following, we first outline the semantic constructs of Al-Debei and Avison (2010) and then sketch the main results of the semantic analysis.

Al-Debei and Avison (2010) define a business model to consist of the following four dimensions (see Table 3, left-most column): (1) value-network, (2) value-finance, (3) value-proposition, and (4) value-architecture. *Value-network* comprises the *actors* of a business model and their *roles* (an actor can assume more than one role within a value network). *Relationships* denote the level of intimacy between actors (e.g., no relationship at all, a simple sourcing relationship, or a strategic partnership). Furthermore, the value network comprises the objects that are exchanged (*flow-communication*), the *channels* used for these exchanges (physical or electronic), the *governance* (i.e., which actor has which kinds of power within the network) and *network-mode* (open or closed), which describes whether every actor or whether only selected actors can introduce new ideas into the network. *Value-finance* contains the *revenue structure*, which describes how revenues are divided among actors, the *total-cost-of-ownership* and the *pricing method*. *Value proposition* comprises the products or services offered (*product-service*), the targeted customers (*target-segment*), and the benefits which the product-service is intended to provide to the customers (*intended-value-element*). *Value architecture* consists of *core-resources*, which are combined through the *value-configuration* (i.e., key processes) to enable *core-competences*.

In Table 3, we provide an overview of the semantic constructs that are available in the various BMMLs. Despite some overlap, the overall picture is quite heterogeneous, and five main points can be observed. First, the BMMLs differ greatly regarding what parts of a business model they represent. For example, while the *Business Model Canvas* and the *Value Delivery Modeling Language* cover the majority of the semantic constructs defined by Al-Debei and Avison (2010), the *Eriksson-Penker business extensions* address only two. Second, the terminology of the semantic constructs is not consistent, as in many cases different terms are used for the same constructs (e.g., actor/agent/member/participant all denote constructs with the same semantics). Third, certain areas of agreement emerge. For example, all but two approaches employ the *actor* construct. Fourth, the semantic constructs differ in terms of their level of abstraction; with some languages using aggregate constructs and others more detailed constructs (e.g., an aggregate construct *actor* vs. more detailed constructs that distinguish between actors that are *suppliers* and *allies*). Fifth, a number of approaches define semantic constructs that fall outside the semantic structure of a business model as defined by Al-Debei and Avison (2010). For example, the Strategic Business Model Ontology, the Diagrammatic Business Model Representation, and the Eriksson-Penker Business Extensions each provide constructs for representing strategic goals.

4.3. Syntax

The (visual or concrete) syntax of a modeling language refers to the visual notation employed for representing the semantic constructs of a language (Moody 2009). Visual notations can mainly be distinguished according to their *number of views*, the *relationship between their views* (Botturi et al. 2006, by the authors referred to as *stratification* and *perspective*) and their *visualization approach* (Costagliola et al. 2002, by the authors referred to as *modality*). The number of views refers to whether a visual notation employs only one view to represent all its semantic constructs or whether it employs several views. In addition, for a multiple-view notation, *relationship of views* denotes whether each semantic construct is represented in a single view (*non-overlapping* views) or if multiple views at the same construct are available (*overlapping* views). *Visualization approach* refers to the two basic ways in which graphical symbols can be used within a given view, either by freely positioning symbols on a plane and connecting them (*connection-based*, e.g., a network of firms and their relationships, see Figure 1, e3-value) or pre-defining positions on a plane for each semantic construct (*geometric-based*, e.g., having a visual template with pre-defined, spatially fixed boxes for outlining business model elements such as key partners, key activities, and key resources, see Figure 1, Business Model Canvas) (Costagliola et al. 2002). The vast majority of approaches have only one view (see Table 2); the thematic focus of the employed views, however, greatly differs. Examples include views for the structure of the value network (Gordijn and Akkermans 2003), for the causal relationships between business model elements (Casadesus-Masanell and Ricart 2010), and for the relationship between strategic goals (Samavi et al. 2009). Only four languages have multiple views, and each of them also offers multiple views at least for some constructs. For example, Samavi et al. (2009) propose an *operational* and a *strategic* view. In the operational view, actors are represented with their tasks, relationships and (operational) goals. In the strategic view, these (operational) goals are related to strategic goals. Finally, concerning the visualization approach, the vast majority of languages use a connection-based visual notation, which means they allow describing a business model through networks that consist of actors, goals, causes, or the like. Only one language, namely the Business Model Canvas, provides a pure geometric based (in the form of a visual template, see Figure 1). In addition, one language (Boritz et al. 2014) uses a hybrid approach that combines a connection- and a geometric-based notation: This language provides a visual template that provides boxes for textually describing semantic constructs such as the resources, processes etc. that are relevant for a given business model (which makes the visual notation geometric-based). In addition, arrows allow specifying relationships between the resources, processes etc., which makes the visual notation connection-based.

5. Research Gaps: What Do We Need to Know?

So far we have described the current state of knowledge concerning BMMLs, and it has become evident that a considerable amount of work has been done to advance the field: A number of languages have been

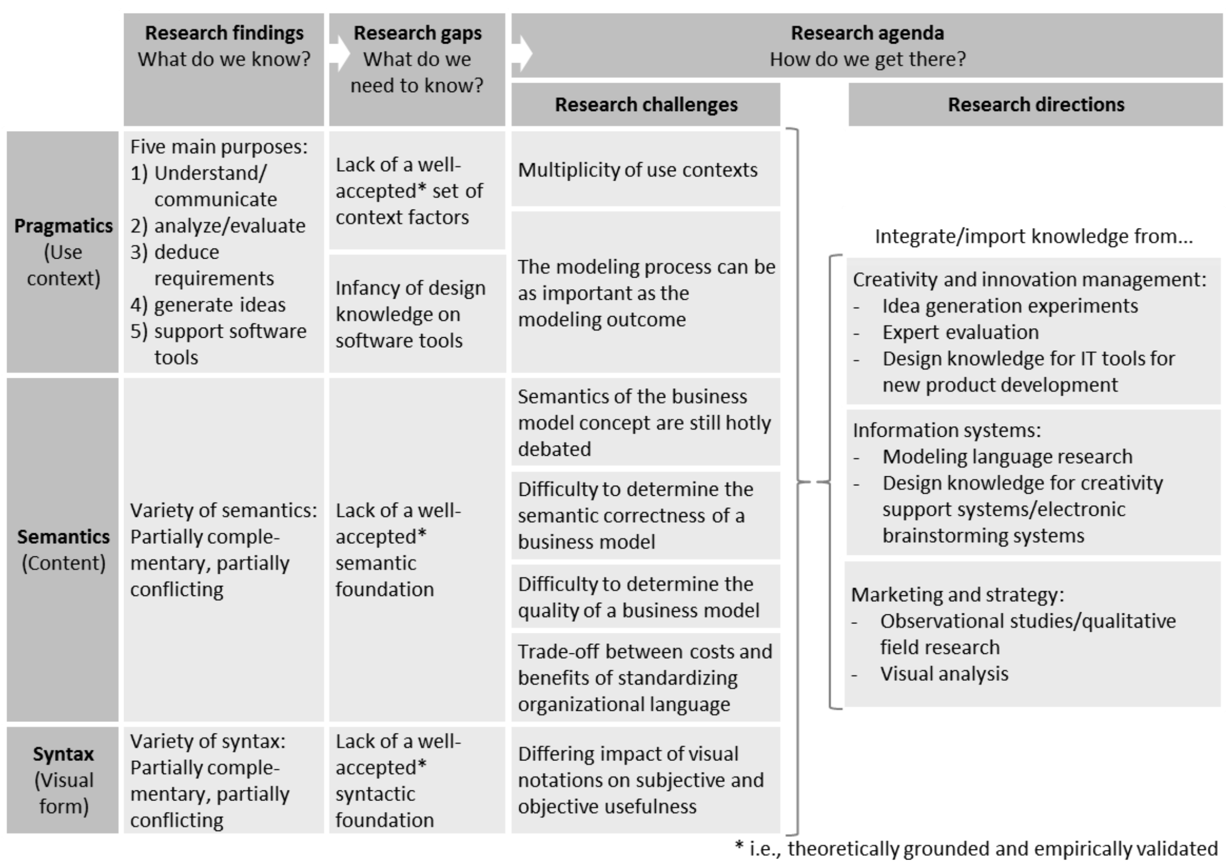


Figure 3: Three Main Perspectives for Analyzing Modeling Languages for Business Models and the Corresponding Research Findings, Research Gaps, and Research Agenda

proposed that exhibit considerable diversity in terms of how they understand a business model (i.e., their semantics), how they represent their business model understanding (i.e., their syntax), and what contexts they are intended for (i.e., their pragmatics). Notwithstanding what has been achieved, as we will argue in the following, quite some more work still lies ahead for developing BMMLs into a mature field. To help achieve such maturation, drawing on research on modeling languages and related disciplines, in the following we describe the research gaps that emerged in our review. Thereafter, we outline the challenges we expect in filling these gaps, and sketch directions that might help in overcoming these challenges. Figure 3 provides an overview of our overall argument.

5.1. Pragmatics

Lack of a well-accepted set of context factors: From the pragmatic perspective, it is foremost needed to know which real-life contexts BMMLs are used in – to better know what factors to consider when evaluating BMMLs. The outlined purposes such as a facilitated communication or analysis of a business model provide some indication of the relevant contexts. However, at a more detailed level, effectiveness and efficiency of a language can depend on a variety of other context factors such as the modeling medium (e.g., whether modeling is performed with a software or a whiteboard, Moody 2009), a user's level of modeling knowledge, and a user's level of domain knowledge (Figl 2017). Therefore, to allow for comparable and transparent evaluation studies, an exhaustive set of context factors needs to be identified (akin to the contribution made to process modeling research by Figl 2017).

Infancy of design knowledge on software tools: Prior research has emphasized the importance of software tools for facilitating the application of modeling languages (e.g., Recker 2012; Burton-Jones and Parsons in Rai 2017). Also business model researchers have acknowledged that such tools have great potential to support their users in innovating business models (Ebel et al. 2016; Osterwalder and Pigneur 2013; Veit et al. 2014). Consequently, a number of such tools have already been developed, which have functions that, among others, allow representing, sharing, annotating, and versioning business models. Nonetheless, there is a lack of design knowledge (Gregor and Jones 2007) concerning the functions that such tools should possess for supporting the use of BMMLs (Szopinski et al. 2017).

5.2. Semantics

The semantic analysis has shown that, despite some overlap, considerably diverging opinions prevail concerning the semantic constructs that should constitute the foundation of BMMLs. In contrast, what is needed is a well-accepted semantic foundation or possibly several well-accepted, context-specific semantic foundations (as there might not be one 'best' semantic foundation that is equally suited for all contexts[5]). There are at least two reasons why research on the semantic foundations of BMMLs is needed:

(1) The semantic constructs available in a BMML are crucial for the quality of the resulting business models. Management research has found that the possibilities that visual tools offer for capturing information influence how managers distribute their attention and how they make sense of their expertise: "Managers may *over-construct* their contributions to make them fit a particular visualization schema, i.e. they try to make sense of their past experience in an inaccurate way" (Eppler and Platts 2009, p. 64). Hence, different BMMLs with different semantic constructs make their users devote attention to different parts of a business model, which is likely to lead to business model ideas of different qualities (as using/focusing one set of semantic constructs may lead to better business models than using another set of semantic constructs). Therefore, it is important to determine which semantic constructs form a suitable foundation for BMMLs – so as to inform practitioners concerning what BMML to use to maximize their chances of arriving at innovative business model ideas.

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[5] To illustrate, for reasoning about one focal firm's business model, it might be reasonable to have a language that comprehensively captures information on that firm's business model only (e.g., akin to the Business Model Canvas, see Figure 1). In contrast, for reasoning about the network of actors that a firm is embedded in, it might be reasonable to have a language that emphasizes the network of actors, but somewhat abstracts from each individual firm's business model (e.g., akin to e3-value, see Figure 1).

(2) An agreed-upon set of semantic constructs would facilitate the integration of BMMLs with adjacent modeling disciplines. In IS research, the view prevails that business models are an interceding layer between the top-most layer of a firm, the business strategy layer, and the lower layer of the business processes (Al-Debei and Avison 2010). Hence, to mature the field of BMMLs, it is necessary to advance its integration with modeling languages at the strategy and the process layers. This integration, however, is complicated as long as the semantic foundation of BMMLs has not been clarified more thoroughly.

5.3. Syntax

It is often put forward that *a picture is worth a thousand words*, and hence a graphical representation by its very nature is superior to a textual representation (Petre 1995). If that were the case, one could argue that further research on visual notations of BMMLs would be of little value. However, prior IS research has found that visual representations are not always superior to textual representations. Rather, it is the "fit" between the characteristics of a task and the characteristics of a visual representation that determines whether a visual representation is indeed superior to other forms of representation (Vessey 1991). Also strategy research has questioned the unambiguous superiority of visualizations. For example, it has been claimed that visualizations can lead to superficial analysis and ambiguous communication (Eppler and Platts 2009), and that visualizations can bias decisions through accentuating specific sets of options (Lurie and Mason 2007). Likewise, modeling language research states that "apparently minor changes in visual appearance can have dramatic impacts on understanding and problem solving performance" (Moody 2009, p. 758). All this suggests that the visual notation of a BMML is highly important for a BMML's effectiveness and efficiency, but that a high level of effectiveness and efficiency is not at all to be taken for granted. This notwithstanding, currently available BMMLs define their visual notations without providing theoretical arguments for their choice of the visual notation (for a notable exception, see Roelens and Poels 2015). Some languages have been developed through action research studies, which allowed improving the visual notations through feedback from users (e.g., Gordijn and Akkermans 2003; Osterwalder and Pigneur 2010). Nonetheless, research is needed that makes the corresponding knowledge explicit and that more thoroughly grounds visual notations in theory, so as to further increase the effectiveness of existing BMMLs and facilitate developing new BMMLs.

6. Research Agenda: How Do We Get There?

6.1. Research Challenges

Having outlined the existing research gaps, in the following we describe what challenges we expect in filling these gaps and thereafter make suggestions for overcoming these challenges. The challenges we identify mainly concern the design of empirical studies for testing propositions concerning the design of modeling languages for business models (concerning semantics or syntax – and given a certain set of context factors, i.e., pragmatics). For formulating the challenges, we adopted the view that controlled experiments are the best approach for evaluating propositions concerning the design of BMMLs. Making this assumption is in line with prior methodological contributions in the social sciences in general (Bhattacherjee 2012, p. 83) as well as more specifically in research on modeling language evaluation (Siau and Rossi 2007, p. 258), which see controlled experiments as the 'gold standard' for empirical studies. Assuming the primacy of experiments is also in line with the current practice in modeling language research, which typically uses controlled experiments (e.g., Bera et al. 2014; Recker et al. 2011).

6.1.1. Pragmatics

Multiplicity of use contexts. For all types of modeling languages there is a considerable diversity in terms of use contexts. This notwithstanding, we argue that the diversity of use contexts is more substantial for BMMLs because the range of tasks and users is greater for BMMLs than for other modeling languages: While other modeling languages are mainly used for analysis and communication tasks, BMMLs on top of these tasks are also used for highly creative tasks. Moreover, the range of use contexts is more varied because BMMLs, in contrast to other types of modeling languages, are also frequently used by very inexperienced, casual users. Private investors on equity crowdfunding platforms are one such example (e.g., the leading German equity crowdfunding platform Seedmatch requires startup firms to represent their planned business model through the Business Model Canvas, so as to inform potential investors about the startup's planned business model, www.seedmatch.com). Another example are the typically non-expert contributors of open innovation initiatives (e.g., Waldner and Poetz 2015 in an idea generation context asked contributors to submit their ideas through the Business Model Canvas).

The modeling process can be as important as the modeling outcome. A weakness of CS/IS research on modeling languages is that social factors are largely "assume[d] away" (Poels et al. 2006, p. 545). In contrast, management research acknowledges that strategy development by its very nature is a social process, which means that the shared understanding that discussions about firm strategy create among the participants might be as valuable as the concrete results of these discussion (note that strategy and business model development are substantially similar and interrelated, Zott et al. 2011). Therefore, it has been suggested in the context of strategy development to emphasize "visualizing over visualization" (Eppler and Platts 2009, p. 70), because "the actual act of *visualizing* – the collaboration involved in rendering strategy content into graphic form, rather than the mere aesthetic of the final outcome – is the vital sense-making activity" (Eppler and Platts 2009, p. 67). Experimental approaches in modeling language research, however, often focus on the modeling outcome, which complicates applying experimental approaches from other modeling disciplines to modeling languages for business models.

6.1.2. Semantics

The semantics of the business model concept are still hotly debated in research and practice. At an abstract level, there is agreement on that a business model describes how a firm creates, captures, and delivers value (e.g., Massa et al. 2017; Teece 2010). At a more detailed level, however, there has been a long-lasting and still not resolved debate about the defining constituents of a business model. A recent review of business model research, for example, starts with the following observation: "Over the last 5 years [at each of the large management conferences] in rooms filled to capacity with some of the most recognized scholars in the field, participants [have] debate[d] endlessly on what a business model actually 'is'" (Massa et al. 2017, p. 73). This problem is not likely to be resolved in the short-term and hence will also in the future impede advancing the semantic foundation of BMMLs.

It can be difficult to determine the semantic correctness of a business model created with a BMML. Compared to other types of modeling languages, the semantic constructs of BMMLs are rather fuzzy. In a process modeling language, for example, the semantics of constructs such as *start of a process*, *end of a process*, or *task* can be rather precisely defined. Hence, for a concrete process it is easy to decide whether the semantic constructs have been correctly used. For example, a process that contains a task *kitchen* is not semantically correct because a kitchen obviously cannot be a task (while *clean the kitchen* could). However, for BMML, determining the semantic correctness of a concrete business model can be more complicated. For example, whether a certain resource (e.g., a patent, factory, or brand image) qualifies as a *key resource* of a business model can be subject to considerable debate, which is complicated by the fact that the answer to the most part is also firm-specific. This fuzziness, at least to some degree, is inevitable and necessary to allow the users of a BMML to be creative when generating business model ideas (Fritscher and Pigneur 2010). However, this fuzziness makes it difficult to determine whether a certain business model is semantically correct (i.e., whether the semantic constructs of a BMML have been used correctly). This complicates transferring evaluation approaches from other modeling disciplines, which oftentimes rely on correctness measures (i.e., the errors made in representing a certain real-life instance through a modeling language) (Gemino and Wand 2004).

It can be difficult to determine the quality of a business model created with a BMML. In most modeling domains, the goal of modeling is to create models that faithfully represent the status quo of a subject matter (e.g., a process or an IS) or an agreed-upon future state of that subject matter (Wand and Weber 2002). This implies that oftentimes it is possible to determine the quality of the resulting models by checking whether the information captured in a model complies with reality (or the requirements agreed upon concerning a future state of reality). Accordingly, modeling language research oftentimes uses experiments in which participants create a model from an existing textual description, and researchers thereafter check whether the model complies with the content of that description. When using a BMML, however, especially when innovating a business model, the goal is to deliberately diverge from reality (i.e., diverge from all existing business models). Hence, for evaluating the usefulness of a BMML for supporting business model innovation, there is the challenge to determine the quality of business models that ideally no one has ever thought of before.

There is a trade-off between the costs and benefits of standardizing organizational language with BMMLs. Modeling languages provide a standardized means for representing information, and in CS/IS contexts, this standardization is oftentimes desirable because it facilitates communication and understanding. Also in the business model context, a standardized language can facilitate communication (Strategyzer 2015). At the same time, however, such standardization can stifle creativity, and thus lower an organization's capability to generate innovative business model ideas. Recent management research, for instance, has proposed that a *unique organizational language* can be a source of competitive advantage, as "the limits of my language mean the limits of my world" (Wittgenstein 1921, quoted after Brandenburger and Vinokurova 2012, p. 1), which implies that a unique organizational language can allow a company to see other business opportunities than its competitors (Brandenburger and Vinokurova 2012). This organization-level statement is also supported by a plethora of cognitive-level research in creativity and innovation. Such research, for example, states that framing a problem in similar ways over extended periods of time compromises one's ability to see that problem from different perspectives, and compromises one' ability to access knowledge that would allow solving the problem in a non-standard, creative way (e.g., Dane 2010). Obviously, the notion of a unique organizational language is at odds with the standardized language prescribed by BMMLs. So the question arises which effect of a standardized language is stronger: the communication-enhancing effect or the creativity-stifling effect? Answering this question is rather difficult because especially the stifling effect of BMMLs is likely to become manifest only over longer time periods. At the same time, this challenge may be the most important to address, because if using BMMLs did indeed stifle firms' long-term creativity, the impact would be tremendous.

6.1.3. Syntax

Visual notations may differently impact the subjective and the objective usefulness of a BMML. In the context of visual programming it has been reported that individuals sometimes perceive visual languages to be superior to textual ones even when experimental evaluations do indicate no advantage (Petre 1995). Corresponding results are attributed to the *likability* of visualizations, and "sheer likeability should not be underestimated; it can be a compelling motivator" (Petre 1995, p. 41). Similarly, in a survey among 1,500 users of one specific BMML, the Business Model Canvas, more than half of the respondents (803) affirmed that "[it] is a visual tool" was one reason for adopting that BMML. As a result, it is possible that the subjective and the objective usefulness of a BMML are not always in line with one another, which might complicate the interpretation of experimental results.

6.2. Research Directions

While the outlined challenges are substantial, in the following, we try to make some suggestions for addressing these challenges. The main suggestion we make is that researchers should see the field of BMMLs as truly interdisciplinary: While other types of modeling languages might be clearly in the domain of CS and IS researchers because these modeling languages are intended for users with a somewhat technical background, BMMLs, as noted, are intended for an interdisciplinary audience. This suggests that the challenges outlined above cannot be overcome with the expertise of CS and IS researchers alone. Rather, future research should draw upon the rich body of knowledge that has been compiled also in other disciplines. We would suggest that BMML researchers can especially benefit from the theoretical and methodological expertise of the following disciplines:

Creativity and innovation management: Researchers from these discipline are devoted to understanding how the creativity of individual, groups, organizations, and even societies can be fostered (Amabile and Hennessey 2010). As such, these disciplines are familiar especially with the challenge of determining the value of innovation ideas and with developing as well as evaluating methods/tools for promoting idea generation. Especially the following two methodological contributions hold value for BMML research: idea generation experiments and expert-based idea evaluation. In idea generation experiments, participants are given an idea generation task that participants in the treatment group solve with a specific idea generation method or tool, and participants in the control group without that method/tool (e.g., Dahl and Moreau 2002; Goldenberg and Mazursky 2002). Thereafter, experts evaluate the quality (i.e., creativity/innovativeness) of the generated ideas. For this evaluation, considerable research has established to what extent and under what circumstances expert evaluations are valid measures for idea quality (e.g., Amabile 1996; Baer and McKool 2009; Magnusson et al. 2016). Through this setup of idea generation experiment and subsequent expert evaluation, it is possible to evaluate idea generation techniques/tools and underlying theoretical propositions in a controlled manner. Given the similarities between, on one hand, business model idea generation with a BMML, and on the other, idea generation in creativity and innovation management, we expect that adopting the methods of idea generation experiments and idea quality evaluation through experts holds value for BMML research. Moreover, in research on product innovation management a stream of research has recently begun to emerge that explores how software tools can support product innovation processes (e.g., Kawakami et al. 2015; Mauerhoefer et al. 2017). Given the similarities between product innovation and business model innovation (Bucherer et al. 2012), we would expect that the insights developed in product innovation have the potential to also inform the design of software tools for modeling languages for business models.

Information systems: Especially two subdisciplines of IS research hold value for BMML research: modeling language research (as already noted) as well as research on creativity support/electronic brainstorming systems, which promises to support developing software tools for BMMLs (for reviews on creativity support systems, see Seidel et al. 2010; vom Brocke et al. 2011; Wang and Nickerson 2017; for a review on electronic brainstorming systems, see DeRosa et al. 2007). The relevant contributions of modeling language research include, for example, concepts and terminology for analyzing modeling languages (see our background section), theoretically grounded guidelines for the design of visual notations (Moody 2009), approaches for the semantic analysis of modeling languages (Wand and Weber 2006), and comprehensive guidelines for the evaluation of modeling languages (e.g., Burton-Jones et al. 2009; Gemino and Wand 2004; Siau and Rossi 2007). Creativity support systems/electronic brainstorming systems research, in turn, can provide design knowledge for designing software tools (e.g., Müller-Wienbergen et al. 2011) for BMMLs and can facilitate identifying relevant reference theories (e.g., Wang and Nickerson 2017) for developing design knowledge specifically for software tools for BMMLs.

Marketing and strategy: Some researchers within marketing and strategy research investigate how visual tools can support strategic decision making (Lurie and Mason 2007) and strategy development (Eppler and Platts 2009). As such, these disciplines are familiar with some of the challenges outlined above, especially those of the importance of the social context of using a visualization (pragmatic perspective) and the fuzziness of the subject matter. In reply to these challenges, marketing and strategy researchers have, among others, relied on workshop-based action research (Eppler and Platts 2009) and observational field studies (Kaplan 2011). Additionally, strategy researchers have proposed to employ *visual analysis*, which involves the analysis of "visual evidence of artifacts as they are used and as they change over time", to understand the actual rather than the intended use of strategy tools (Jarzabkowski and Kaplan 2015, p. 553). Given the similarities between BMMLs and visual approaches in strategy and marketing, we expect that empirical studies on BMMLs would benefit from drawing on the methodological expertise from strategy and marketing research.

7. Conclusion

In a global survey among 3,000 executives, 60% admit that their "difficulty to define an effective business model […] is a challenge killing the ability to innovate" (GE 2014, p. 40). Likewise, business model researchers have called for more research on "tools and methods" for supporting firms in their business model innovation efforts (Schneider and Spieth 2013, p. 23). Modeling languages for business models are such a tool, and given calls for future research (Osterwalder and Pigneur 2013; Veit et al. 2014) and the fascinating success of at least one of their exemplars, the Business Model Canvas, BMMLs seem to carry great potential for supporting business model innovation. Nonetheless, while considerable research efforts have been made in developing new modeling languages for business models, these efforts have so far largely been made in isolation, leading to a fragmented and tentative state of knowledge. In reply to this issue, and to lay the foundation for more cumulative research, we make three contributions: First, we provide a comprehensive, cross-disciplinary identification of the languages that in various disciplines have been proposed for modeling business models. Second, based on modeling language research, which defines semantics, syntax, and pragmatics as the main perspectives for analyzing modeling languages, we provide an analysis framework that can standardize and hence facilitate future analyses and discussions of BMMLs. Third, following recommendations by Schryen (2013) and Rowe (2014), we provide guidance to future researchers by identifying research gaps, research challenges, and future research directions.

We devoted considerable effort to the comprehensive identification and analysis of research on modeling languages for business models. Nonetheless, there are at least three directions that future research could pursue to create a more comprehensive synthesis. First, in line with prior research (e.g., Webster and Watson 2002), for identifying relevant contributions, we relied on a combination of approaches, including keyword search, reference chasing, and the analysis of existing literature reviews. Our identification strategy could, however, be made more comprehensive by including other databases in addition to the ones we used (EBSCO and Google Scholar). Second, for our keyword search we employed the term that we suggest (i.e., *business model modeling language*) and the most popular terms from prior research (i.e., *business model representation* and *map of business models*). Given that prior research has not come up with a unified terminology, a broader set of keywords might lead to the identification of additional BMMLs. Third, for developing our analysis framework, we mainly relied on contributions from modeling language research, because that field has a natural fit to our context (given its devotion to visual languages for representing information in specific contexts). Nonetheless, additional value may lie in extending our framework with contributions from strategy visualization (Eppler and Platts 2009) and visualization research in psychology (Tversky 2011). The long-term goal of such research efforts, as well as of following our research agenda, should be that a well-accepted set of BMMLs is available, which means that the strengths and weaknesses of the approaches have been theoretically understood and empirically validated. This would allow giving meaningful guidance to practitioners as to what language to use for what purposes in what contexts, and thereby would contribute to making firms more successful in innovating their business models.

8. References

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2.2. Why Fit Leads to Surprise: An Extension of Cognitive Fit Theory to Creative Problems

Why Fit Leads to Surprise: An Extension of Cognitive Fit Theory to Creative Problems

Completed Research Paper

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Abstract

Cognitive fit theory (CFT) provides guidance for how best to represent information that is relevant for solving a given problem. CFT is widely established in information systems research and its validity has been demonstrated in a great variety of contexts. However, of the two major types of problems that exist (i.e., routine and creative problems) prior CFT research has addressed only one: routine problems. Creative problems, despite their importance, have been left unaddressed. Therefore, based on the visual sketching model of problem solving, we propose an extension of CFT and thereby demonstrate that cognitive fit can promote problem solving performance also for creative problems. In doing so, we extend the boundary of CFT and add to creativity research a previously unknown cognitive mechanism for promoting creative performance: cognitive fit. Moreover, we contribute to general problem solving research by bridging the gap between problem solving in creativity and information systems research.

Keywords: Cognition/cognitive science, creativity, problem-solving, theory building

> *"Human information processing is highly sensitive to the exact form information is presented to the senses: apparently minor changes in visual appearance can have dramatic impacts on understanding and problem solving performance." (Moody 2009, p. 758)*

Introduction

Problems are a central part of human life, making problem solving a permanent necessity (Davidson and Sternberg 2003). Cognitive fit theory (CFT) facilitates problem solving by providing guidance for how to represent information that is relevant for solving a given problem (Vessey 1991). CFT has received wide recognition in the information systems (IS) discipline (Moody 2009, p. 758), and its validity has been demonstrated in a great variety of contexts, including conceptual modeling (Khatri et al. 2006), multiattribute decision making (Umanath and Vessey 1994), social network analysis (Zhu and Watts 2010), and website design (Hong et al. 2004). Consequently, CFT has been claimed to be *"one aspect of a general theory of problem solving"* (Vessey 2006, p. 141).

The diversity of the above-mentioned problem solving contexts indeed suggests a rather general validity of CFT. However, at a higher level of abstraction it becomes clear that previous research on CFT, without exception, has addressed only one specific type of problems: *routine problems*. In doing so, prior CFT research has neglected the other type of problems with substantial importance: *creative problems*. Routine problems can be solved through existing knowledge (Lubart and Mouchiroud 2003), for example, when a piece of information needs to be inferred from a diagram or table (Vessey 1991), or a shopping item needs to be found on a web page (Hong et al. 2004). For routine problems, a firm foundation for the validity of CFT has been established that allows explaining and predicting how problem representations need to be designed to increase problem solving performance. In contrast, creative problems comprise the problems that cannot solely be solved through existing knowledge, but rather require new knowledge to be generated (Lubart and Mouchiroud 2003). This problem type includes, for example, designing a new company logo, a new business model or an information systems (IS) architecture. Creative problems are of paramount importance in today's business reality. Creativity is considered a key enabler to organizational problem solving (Reinig et al. 2007), and a driver of the performance and competitiveness of firms (Amabile 1996). In line with this, a global study by IBM (2010) found that 60% of the 765 surveyed chief executives give creativity the top priority among the most important managerial competences.

To develop CFT towards a truly general theory of problem solving, there is a need to determine whether and how cognitive fit can enhance performance not only for solving routine, but also creative problems. However, there are key differences between these problem types. As noted above, routine problems can be solved with existing knowledge, while creative problems require new ideas to be generated. Moreover, the corresponding problem solving processes differ. Routine problems are solved in a convergent fashion, that is, by collecting the necessary information and integrating it to derive a solution. In contrast, solving creative problems typically involves a divergent phase first, in which a variety of solution candidates is developed, only thereafter is the corresponding information narrowed down by convergent thinking (Lubart 2001; Mumford et al. 1991). Against the background of these differences, we aim to answer the following research question: *Can the mechanism of cognitive fit be employed to increase problem solving performance for creative problems?*

Answering this question is important theoretically because a positive answer would imply a substantial extension of the boundary of CFT. Moreover, from the perspective of creativity research, it would involve identifying a so far unknown cognitive mechanism for promoting creativity, namely, cognitive fit. Answering this question is important practically because it could lead to better visual aids for 'pen and pencil' idea generation and better user interfaces for IT-based creativity support tools. It is important methodologically too, because it would suggest relevant controls for future creativity studies. While in previous work we outlined ideas for an extension of CFT to creative problems (John and Kundisch 2015), in this work we demonstrate that, by extending CFT, it is indeed possible to apply the mechanism of cognitive fit to creative problems. Moreover, we explicate the cognitive background and boundary conditions of our argument, and illustrate how the extended model can be applied to a variety of problems.

Theoretical Background

Cognitive Fit Theory

In the following, we review the problem solving model of CFT. We organize our review along the three constituents of theories, namely constructs, propositions and boundaries (Mueller and Urbach 2013), complemented by a brief overview of the available empirical evidence. The works we review refer to problems also as *tasks* or *problem solving tasks*. For ease of exposition, and because tasks in our context always involve the presence of a problem to be solved, we use the terms problem, problem solving task, and task interchangeably.

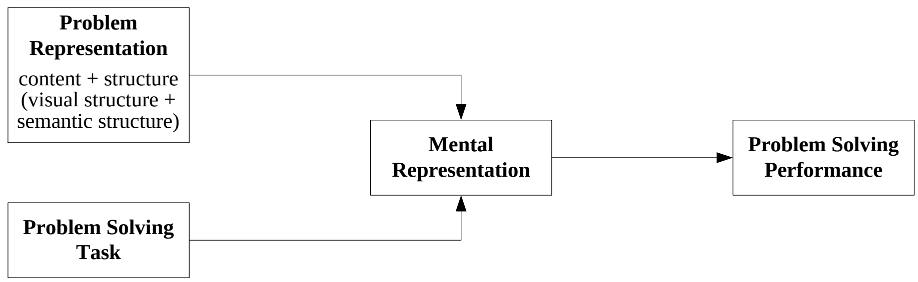

Figure 1. Problem solving model of the theory of cognitive fit, adapted from Vessey (1991)

Constructs

CFT posits that *problem solving performance* results from the interplay of a *problem representation* and a *problem solving task*. The interplay between representation and task takes place in the *mental representation* that problem solvers form in working memory while working on a task (see Figure 1). The problem solving task defines the concrete question(s) to be answered based on the information that is contained in the problem representation. For example, *"What was the company's net income for the past year?"* or *"Between the years 1100 and 1438 whose earnings increased most rapidly, those of the wool, silk or Calimala merchants?"* (Vessey 1991, p. 226). Generally speaking, tasks within the scope of CFT include extracting certain information from the problem representation and comparing different pieces of information with each other.

A problem representation can, for example, take the form of a graph, a map, a table, or any other kind of visualization. As such, each problem representation comprises two conceptual layers, namely structure and content. The content comprises the concrete information that is relevant for solving a given task. It determines *what* concrete information is represented. The structure, in turn, prescribes *how* the information is presented. The structure is subdivided into the semantic structure and the visual structure, with the semantic structure capturing patterns in the task-relevant information, and the visual structure providing a visualization that is tailored to these patterns. This distinction between content and structure is similar to the distinction between a modelling language and model that is invoked in conceptual modelling research (Wand and Weber 2002). It is implicitly contained in any problem representation in CFT research, but is rarely made explicit.

To illustrate the notion of the problem representation, look at Figure 2. The corresponding study by Hong et al. (2004) explores which problem representation (a matrix or a list layout) is better suited for online shopping tasks. The relevant tasks are to *browse* the product information (with the aim of getting an overview of available products) or *search* the information (with the aim of finding a specific product). In that context, the content (i.e., the *what*) comprises the concrete products and the corresponding information (e.g., the product name *"Sensation Generation Facial Tissues"* and the corresponding price and picture). At a higher level of abstraction, the semantic and the visual structure determine *how* that content is represented. The semantic structure defines that for every product three pieces of information need to be represented, namely, the product's name, price and picture. The visual structure defines that the information that belongs to each product can be visualized either in a matrix or a list layout. The question arising is whether the matrix or the list layout leads to better problem solving performance.

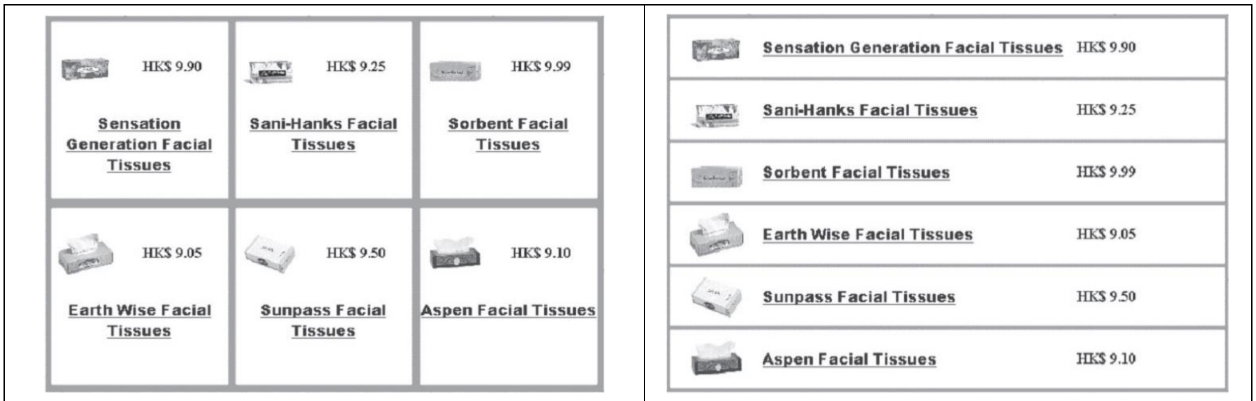

Figure 2. Alternative problem representations for product information in a web shop (Hong et al. 2004)

To give another example, we use the foundational question of CFT, which addresses whether information should better be provided in a graphical or a tabular representation (Vessey 1991). Let us assume that a problem solver is given a table (i.e., a problem representation) with information on the past financial performance of a given company in certain regions. The performance data themselves (e.g., the concrete numbers) constitute the content that is depicted through the table. The semantic structure of the information is evident through the columns defined in that table (e.g., year, region, profit). The corresponding visual structure comprises the choice of a table as the overall presentation format, and the definition of which type of information goes into which column (e.g., first column: year, second column: region, third column: profit). While a table can easily capture the relevant information, it is also possible to construct a graphical problem representation that is equivalent to the table in terms of the information being contained. That representation could, for example, present profit for each combination of year/region through a bar, with the height of the bar denoting profit. The corresponding problem solving tasks could involve, for example, *symbolic tasks* (with the aim of extracting a single piece of information) and *spatial tasks* (with the aim of comparing different pieces of information). Given that a table or a graph could be used for representing the information relevant for solving a given task, for a problem solver the question arises as to which representation leads to a higher level of problem solving performance – a graph or a table.

Proposition

CFT builds upon the assumption that human problem solving is achieved through mental operations that are performed in working memory, and that problem solving performance increases with more working memory capacity being available for these problem solving operations. In contrast, performance decreases if the amount of working memory that is available for problem solving operations is restricted, for example, by other, unproductive mental operations (i.e., operations that consume working memory capacity, but are not devoted to problem solving). Some problem representations have more potential for decreasing the share of unproductive mental operations for a given task than others, implying that one problem representation can lead to higher problem solving performance than another (for a given task).

In the process of problem solving, humans form a mental representation of the problem in working memory, and they derive this mental representation by integrating characteristics of the problem representation and the problem solving task (see Figure 1). If a problem representation is employed that emphasizes information other than the information that is emphasized by the task, then additional mental operations are needed to transform the information from the problem representation into a form that is consistent with the task's requirements. These additional operations are not directly involved in problem solving. However, because they still require capacity in working memory, they negatively affect problem solving performance (see Figure 3, case a). If both, the representation and the task, emphasize the same type of information, then working memory capacity can solely be devoted to mental operations that directly aim at solving the problem at hand (see Figure 3, case b). In that case, when the problem representation and the task emphasize the same type of information, the problem representation is said to exhibit *cognitive fit* with the task. This leads to the following proposition of CFT (Vessey 1991):

Proposition 1: Problem solving performance can be increased by employing a problem representation that exhibits cognitive fit with the corresponding problem solving task.

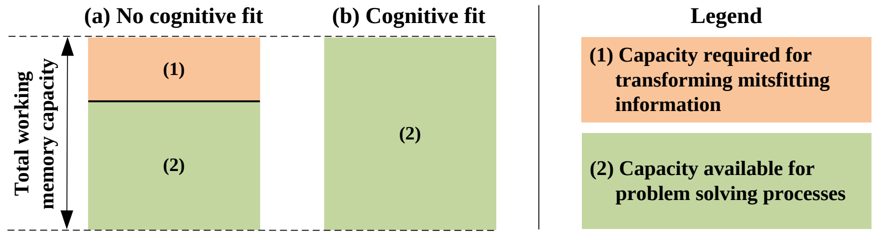

Figure 3. Working memory allocations that correspond to proposition 1

To illustrate the proposition, we come back to the question of whether information is better represented through a graph or a table. The answer of CFT (or more precisely, a contextualization of its general problem solving model to the graph versus table context) is that neither a graph nor a table is superior by its very nature. Rather, the superiority of a graph or a table in terms of resulting problem solving performance depends on the characteristics of the given task. In the graph versus table context, as noted earlier, tasks can broadly be classified to emphasize either symbolic information (i.e., extracting single data values) or emphasize spatial information (i.e., relating multiple data values). Graphs emphasize spatial information, while tables emphasize symbolic information. Consequently, graphs lead to higher problem solving performance than tables when the task involves relating multiple data values (i.e., spatial information), while they lead to lower problem solving performance when the task involves extracting single data values (i.e., symbolic information, Vessey 1991). Revisiting the web shop example, the recommendation of CFT (or more precisely, a contextualization of its general problem solving model to the web shop context) is that browse tasks are better supported by the matrix problem representation, while search tasks are better supported by the list problem representation. Put differently, the matrix problem representation exhibits cognitive fit with browse tasks, while the list problem representation exhibits cognitive fit with search tasks (Hong et al. 2004).

In summary, CFT explains at the cognitive level why different problem representations can lead to different levels of problem solving performance. The proposition of CFT is at a context-independent level, implying that contextualization is needed to make predictions in a specific context. In other words, CFT explains why problem representations that exhibit cognitive fit with a task (i.e., representation and task emphasize the same type of information) lead to higher problem solving performance than representations that do not exhibit cognitive fit with a task. However, contextualization is needed to define what information is emphasized by a given task and a given problem representation.

Boundaries

Boundary 1 – task complexity (very simple problems are beyond the boundary of CFT): This boundary arises from the fact that the mechanism of cognitive fit becomes only effective once a problem solver's working memory capacity is reached. Consequently, as long as working memory is still available, mental operations employed for transforming information into a form that is consistent with the task's requirements are not detrimental for problem solving performance (Zhu and Watts 2010).

Boundary 2 – organizational level (CFT applies to the individual and the group level): In the problem solving model of CFT, there is a single problem solver (as implied by a single mental representation) and a single problem representation, which implies the applicability of CFT is constrained to the individual (rather than the group) level. However, CFT is applicable to virtually any kind of problem solver because CFT *"appl[ies] to generalized human cognition"*. That is, the mechanism of cognitive fit resides at the cognitive level rather than being dependent on past experience and expertise (Zhu and Watts 2010, p. 342 building on Besuijen and Spenkelink 1998). This implies that, when multiple persons jointly work on the same task, each of these persons, irrespective of the individual background, would benefit from using a problem representation that exhibits cognitive fit with that task. While this is not to say that the benefit experienced by each of these persons is of equal degree, all of them would experience a benefit at least to a certain degree, which leads to increased problem solving performance not only at the individual, but also at the group level. Consequently, CFT is not constrained to the individual level, but rather effective at the group level as well (note that previous research explicitly applying CFT at the group level is rare, see Van der Land, Sarah et al. 2013, for an exception).

Empirical Evidence

After initially addressing the context of graphs versus tables, the validity of CFT has been demonstrated for a wide range of tasks, such as the search tasks of online shoppers presented earlier (Hong et al. 2004), social network analysis (Zhu and Watts 2010) or understanding conceptual models (Khatri et al. 2006). Having reviewed the empirical literature on CFT, Vessey (2006) concludes that the findings largely support the theory. Only in very simple tasks the fit between problem representation and task seems to be dominated by the preferences and experience of the problem solver (Vessey 2006).

Positioning Cognitive Fit Theory on the Routine vs. Creative Problem Continuum

The overall motivation for our work is predicated on the assumption that the focus of previous CFT research is on routine problems. To better illustrate that focus, we go on to describe more thoroughly the continuum between routine and creative problems (while we introduced these problems as two discrete types, they rather represent the extreme cases of a continuum). We then delineate the range that the CFT model covers on that continuum. In doing so, we add a boundary to the ones outlined above, however, one which is central to our overall argument, and therefore is dealt with separately.

Routine vs. Creative Problem Continuum

Routine and creative problems differ along four dimensions that address the structure of the two problem types and the processes for solving them (see Figure 4, Lubart 2001; Mumford et al. 1991):

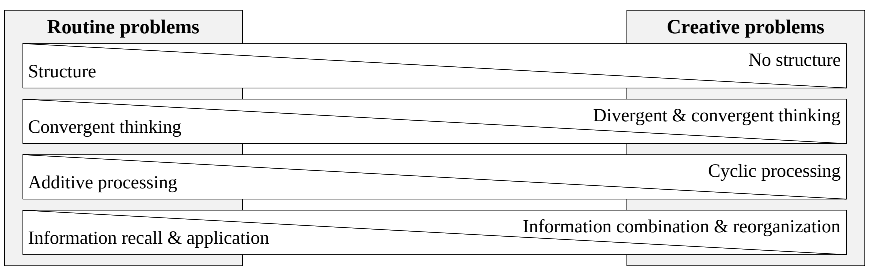

Figure 4. Characteristics of routine and creative problems (based on Lubart 2001; Mumford et al. 1991)

(1) *More problem structure vs. less problem structure:* Creative problems, in contrast to routine problems, are rather less structured. This means that the corresponding goals (i.e., the criteria by which to judge the utility of a solution), relevant information and resources are less clearly specified.

(2) *Convergent thinking only vs. divergent & convergent thinking:* For solving creative problems, divergent thinking is of paramount importance for generating alternative solutions. Thereafter, these solutions are evaluated concerning their utility for the given problem through convergent thinking. In contrast, solving routine problems emphasizes convergent thinking only.

(3) *Additive vs. cyclic processing:* For routine problems, the path to solution is mostly clear, rendering the progress towards a satisficing solution rather additive in nature. Solving creative problems in contrast is performed in cycles of divergent and convergent thinking, because initial approaches to the solution may turn out inappropriate or may need further refinement.

(4) *Information recall & application vs. information combination & reorganization:* Solving routine problems involves recalling existing, previously learned information. For solving creative problems, that information does not suffice. Creative problem solving rather involves the combination and reorganization of the available knowledge to generate novel solutions.

Each of these dimensions describes a continuum rather than a dichotomy, and the creative or routine character of a problem is defined through the problem's characteristics along all four dimensions. To make the problem types less abstract, recall the information acquisition tasks used earlier to illustrate CFT. The symbolic tasks, which refer to the identification of correct values within a given amount of data, are examples of purely routine problems. They are routine, because (1) they possess considerable structure (it is clear that the goal is to obtain the single correct solution, available inputs are also clear), (2) they involve convergent thinking only (it is clear how the solution can be obtained with no need to search for alternatives), (3) they involve additive processing (in a pile of data, the problem solving process involves to continuously narrow down the position of the relevant information) and (4) involve recalling and applying known information (e.g., for making sense of the presented information). To give an example of a purely creative problem, think of designing a company logo. This problem is creative, because (1) it has little structure (there is no single correct solution and no readily identifiable set of inputs), (2) it involves divergent thinking in the sense that a number of different logos need to be created, which are thereafter shortlisted by convergent thinking, (3) it involves cyclic processing (if a given set of generated logo candidates does not contain a satisfactory solution, another cycle of divergent thinking needs to be invoked), and (4) it involves information combination and reorganization (at least in the likely case that the logo should not just imitate an existing one).

Positioning Cognitive Fit Theory on the Continuum

CFT is not applicable to creative tasks because the problem representation is assumed to be a mere source of information, and is not able to capture new information: Information can be transferred from the problem representation into the mental representation, but not the other way round (see Figure 1). Capturing new information, however, is precisely what is required by creative tasks. In line with this reasoning, the seminal article of CFT maintains that the theory's focus is on *"information acquisition and fairly simple information evaluation tasks"* (Vessey 1991, p. 220) that involve *"processes to extract information from the problem representation"* (Vessey 1991, p. 221). Extensions to the original problem solving model of CFT are not concerned with creative problems either. The literature review on CFT research by Vessey (2006) does not identify studies that address the question of whether cognitive fit can increase performance in solving creative problems. The only study identified as being devoted to a creative problem (referred to as *"ill-defined"* by Vessey (2006), conducted by Shaft and Vessey (2006)) does not investigate whether cognitive fit between a problem representation and a problem solving task increases performance, but rather whether the fit between two interrelated tasks increases performance (in that context, the two interrelated tasks are software comprehension and software modification). We verified this finding within the more recent literature by performing a keyword search in the ISI Web of Science. Until the end of 2014, a total of 277 publications had cited the foundational paper of the CFT (Vessey 1991). A search for *creativity OR creative OR ideation OR "idea generation" OR "ill-defined" OR wicked* within those 277 articles yielded six articles, however, each of these treats only marginally either CFT or creativity. Taken together, this suggests a third boundary:

Boundary 3 – problem type (CFT applies only to routine problems): Concerning the continuum between routine and creative problems (see Figure 4), CFT addresses problems that are at the leftmost extreme of the continuum, and are (not even partially) creative in nature.

Possible Foundations for Extending Cognitive Fit Theory Along the Routine vs. Creative Problem Continuum

Having established why the model of CFT is not capable of dealing with creative problems, we now go on to identify potential foundations for an extended model. For deriving the extended model, we employ *theory blending*, which refers to *"[theories] from two domains [being] merged to produce new insights"* (Oswick et al. 2011, p. 328). That is, we identify theoretical approaches that, in a broader sense, employ visual representations (i.e., problem representations) in the context of creative problems. We evaluate these approaches concerning their compatibility with the problem solving model of CFT to determine whether any of these approaches can be integrated into the model, and thereby can serve to extend CFT towards creative problems. The variant of theory blending that we use is *horizontal theory blending*[1],

[1] Whetten et al. (2009) distinguish between horizontal and vertical theory *borrowing*, rather than theory *blending*. However, as theory blending is a logical extension of theory borrowing (Oswick et al. 2011), the horizontal-vertical distinction can be applied to theory blending analogously.

which *"involves taking a theory about one context and applying it to another context, while maintaining a consistent level of analysis"* (Whetten et al. 2009, p. 552). This variant is especially suited when in two contexts there is a similar kind of phenomenon and when one of the contexts already has a theory for explaining that phenomenon in some way, while the other does not (Whetten et al. 2009).

The similar phenomenon in our setting is the use of a problem representation, with the two contexts being those of routine and creative problems. In the context of creative problems, theoretical foundations for problem representations have already been developed. These foundations, however, have not yet been assimilated by cognitive fit research, which has focused on the context of routine problems. The level of analysis to be maintained when extending CFT is the cognitive level. While we stated above that CFT is applicable at the individual and group level, the mechanism of cognitive fit itself operates at the cognitive level (the resulting performance benefits, however, materialize at the individual and the group level). To summarize, in the following we review existing approaches that employ problem representations for solving creative problems. We do so with the aim of identifying an approach that is compatible with CFT, whereas compatibility means that the theoretical mechanism underlying that approach operates at the same level as the mechanism of CFT, that is, at the cognitive level.

Table 1. Theories/theoretical frameworks for enhancing performance in solving creative problems by using problem representations

Name, source discipline, representative source	Means for representing information that is relevant for problem solving	(Hypothesized) Mechanism	Maturity	Level[2] of underlying mechanism
Boundary object theory, innovation management (Carlile 2002)	2d or 3d sketches or prototypes, formalized or non-formalized, that capture intermediate ideas in group contexts	Make implicit knowledge explicit and thereby improve communication processes in groups	Well-established	Group
Visual sketching, design studies (Goldschmidt 2014)	2d or 3d sketches, non-formalized, that capture intermediate ideas in individual contexts[3]	Relieve working memory	Well-established	Cognition
Workarts, organization studies (Barry and Meisiek 2010)	2d or 3d pieces of (non-formalized) art-like artifacts that capture information specific to a given problem context or detached from such context	Increase creative awareness, facilitate experimentation with ideas	Tentative[4]	Idiosyncratic to the workarts approach employed

A number of disciplines are devoted to the use of problem representations for the purpose of increasing creative problem solving performance (see Table 1). The conceptualizations of a problem representation are remarkably different, as are the (hypothesized) underlying mechanisms, and the maturity of the respective approaches. Broadly speaking, two classes of approaches can be distinguished: First, there are theories/theoretical frameworks that seek to provide a theoretical foundation for implementing specific problem representations. Second, there are specific problem representations that have mostly been

[2] Typical levels of analysis are the cognitive/individual/group level (Amabile and Hennessey 2010).

[3] Sketches can also have the role of a communication aid during group work (Stigliani and Ravasi 2012). However, in that sense they would fall into the scope of boundary object theory, therefore in our context we refer to sketches only as thinking aids which are used by an individual problem solver.

[4] The workarts approach seems to be promising for increasing creative performance, but is still rather at the infancy stage. A review of the corresponding literature concludes that *"Everything we have noted around how the workarts and their analogous artifacts do and don't work is still highly conjectural and based mostly on anecdotal evidence"* (Barry and Meisiek 2010, p. 1522).

developed in an ad-hoc fashion, that is, without their design being deliberately grounded in theory (e.g., causal mapping (Öllinger et al. 2015) or mind mapping (Buzan 1991)). The specific problem representations are not suited for extending CFT because they are instances of potentially underlying theoretical principles rather than theories themselves. Concerning theories/theoretical frameworks, only one approach is available that draws on a mechanism that operates at the cognitive level, and therefore is compatible with CFT on the grounds of our horizontal theory blending approach: the *visual sketching* model of problem solving (Goldschmidt 2014), which we describe in the following.

Selected Foundation: The Visual Sketching Model of Problem Solving

(Visual) sketches are *"quickly made depictions that facilitate visual thinking"* (Johnson et al. 2008). Designers have been sketching their design ideas for centuries, in fact, since paper has become widely affordable (Goldschmidt 2014). Also, ordinary people intuitively start producing sketches when being presented with a task that requires creativity. The wide applicability of sketching has raised the attention of a variety of disciplines, including cognitive science (Pearson and Logie 2015), creativity (Goldschmidt 1991), engineering design (Bilda and Gero 2007) and human-computer interaction (Johnson et al. 2008). This widespread attention has led to a rather fragmented state of knowledge (Johnson et al. 2008), however, the cognitive mechanisms of visual sketching that we present in the following seem to be unanimously accepted across the different disciplines.

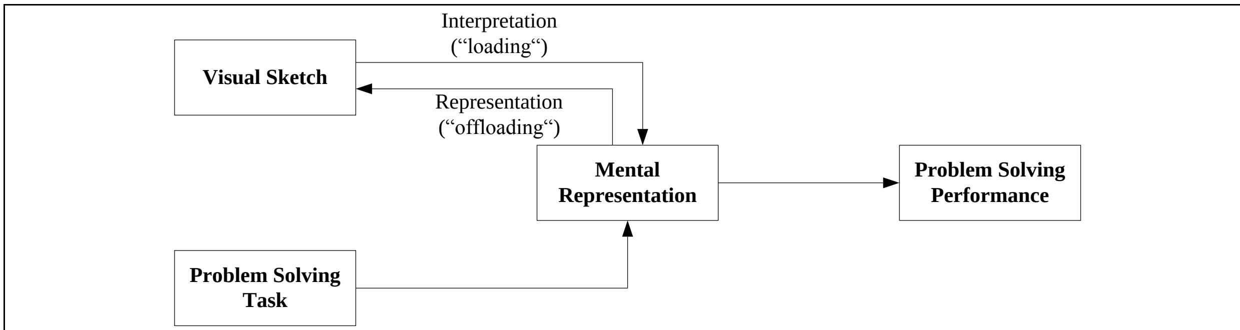

Figure 5. Problem solving model of visual sketching, based on Bilda and Gero (2007); Goldschmidt (2014)

Constructs

A *visual sketch* captures ideas in a preliminary form. Its primary function is to allow people to represent ideas quickly, with a minimum of effort. Sketches are not bound to specific rules except for those imposed by the problem solver (Goldschmidt 2014). Moreover, a sketch is not static, *"it is a proposal that can be modified, erased, built upon"* (Johnson et al. 2008, p. 2). Put differently, a visual sketch is basically every representation that a problem solver finds useful for capturing (intermediate) ideas during a given problem solving endeavor (see Figure 6 for examples). As such, a sketch is idiosyncratic to a given prob-

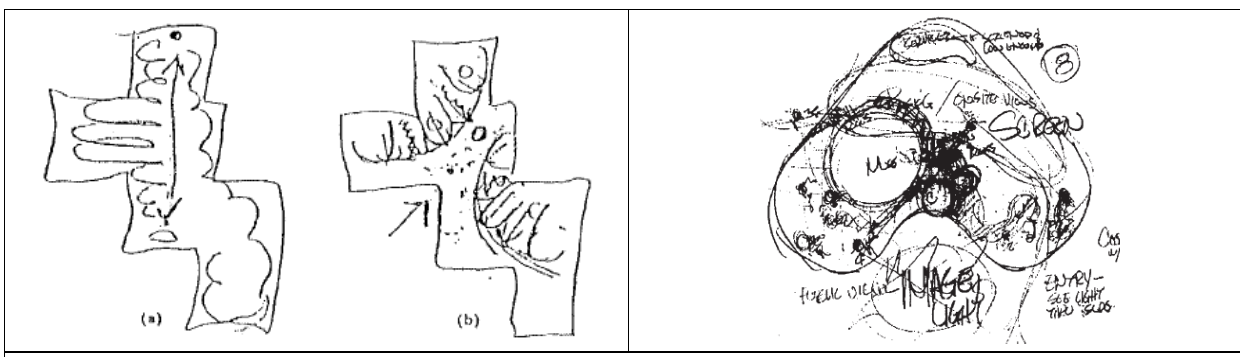

Figure 6. Alternative problem representations created when designing a building layout from scratch (left: Goldschmidt 1991, right: Kavakli and Gero 2001)

lem solver. Coming back to the distinction between structure and content made earlier, this implies that a sketch captures content, but does not have a pre-defined structure (i.e., it has neither pre-defined patterns that structure the task-relevant information nor a corresponding, pre-defined visualization).

According to the visual sketching model of problem solving, the information available for problem solving is distributed over an *'internal memory'* (the *mental representation*) and an *'external memory'* (the *visual sketch*). Consequently, at a given moment during solving a *problem solving task*, the sketch and the mental representation together contain all information that is available to the problem solver. Obviously, a problem solver has also access to information stored in long-term memory and other information sources he/she seeks to consult. However, the interaction with those sources of information is not crucial for explicating the cognitive rationale of visual sketching. Therefore, in the context of the visual sketching model of problem solving, the visual sketch and the mental representation together determine the resulting *problem solving performance* for a given task (see Figure 5).

Proposition

From an intuitive perspective, sketching can be described as follows. When thinking creatively, once a certain amount of (intermediate) ideas has been generated, people feel the need to *"relief"* their mind. They start sketching, for example, on a whiteboard or a sheet of paper, because they feel that having documented some ideas through a sketch allows them to better focus on being creative. During problem solving, they occasionally refer to their sketch and the information therein may give rise to new thoughts. These thoughts in turn translate into new ideas that they may employ to refine their sketch or extend it. The *"dialogue"* between the mind and the sketch stops once the problem solver has generated a satisfactory solution. This is not to imply that the dialogue stops once a first (somehow) satisfactory solution is derived (in the sense of a *"satisficing"* strategy). Rather it means that the dialogue stops once the problem solver deliberately decides to stop problem solving activity because for the time being he/she is satisfied with the achieved result (or stops the activity because no further progress is expected).

From a cognitive perspective, while performing problem solving activity, a mental representation is formed in working memory. That representation captures the currently available set of information, that is, the (intermediate) ideas that form the basis for deriving a solution for the task at hand. Storing these ideas requires capacity in working memory. At the same time, mental operations need to be performed to generate new ideas. These operations, for example, conceptual combination or analogical reasoning, are cognitively demanding and require substantial resources in working memory (Mumford and Gustafson 2007). The two parts of the problem solving activity, storing (intermediate) ideas and creating new ideas, compete for working memory capacity. This means that an increase in allocated working memory capacity for one subtask can only be realized at the expense of capacity allocated to the other (see Figure 7, case a).

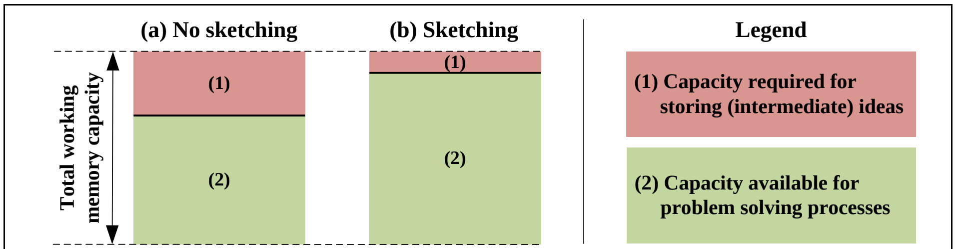

Figure 7. Working memory allocations that correspond to proposition 2

To overcome the working memory limitation, a problem solver can create an external memory to which some of the information is *"offloaded"*. In the sketching context, this offloading is performed by representing information in a visual sketch (see Figure 7, case b). During subsequent problem solving activity, the information represented in the external memory may be *"loaded"* into working memory again. This means that the information is re-evaluated, re-used and re-interpreted. Subsequently, when new thoughts have been generated, these can be offloaded again into the visual sketch to increase the amount of working memory capacity that is available for the mental processes that are directly involved with problem solving. The cyclic interaction between working memory and the external memory (i.e., the visual sketch) ends once a satisfactory idea has been generated (e.g., Bilda and Gero 2007; Goldschmidt 2014). In sum, the visual sketching model of problem solving suggests the following proposition:

Proposition 2: Problem solving performance can be increased by engaging in visual sketching.

Boundaries

Boundary 1 – task complexity (very simple problems are beyond the boundary of visual sketching): Concerning task complexity, the reasoning presented in the context of CFT applies analogously: As long as working memory is available (as in the case of very simple problems), refraining from sketching does not impair problem solving performance. Hence, sketching is only beneficial to solving problems that exhibit a certain degree of complexity.

Boundary 2 – organizational level (visual sketching applies to the individual level, not the group level): In the problem solving model of visual sketching, there is a single problem solver (as implied by the single mental representation) and a single visual sketch, implying the applicability of visual sketching is constrained to the individual (rather than the group) level. One might suspect that the benefits of sketching also exist at the group level, because the assumption of limited working memory capacity applies to any problem solver, hence, the mechanism of offloading from working memory should analogously provide benefits to any problem solver also in a group context. However, it is inherent in the definition of a visual sketch that the sketch is idiosyncratic to a given problem solver, which implies that a sketch that is beneficial for one problem solver could be detrimental for another. Hence, the model of visual sketching is limited to being applied at the individual level (note that we limited the role of visual sketches to that of thinking aids rather than communication aids, see footnote 3).

Boundary 3 – problem type (visual sketching applies to problems that are at least partially creative): Concerning the continuum between routine and creative problems (see Figure 4), visual sketching addresses problems that are at least partially creative, that is, problems that are not at the leftmost extreme of the continuum. The reason is that only when there is the need to create new ideas (i.e., new information), which implies the need to store intermediate ideas during problem solving, the offloading mechanism behind visual sketching can promote performance. Moreover, a sketch is idiosyncratic to the problem solver, that is, it has no predefined structure. This contradicts the assumption behind routine problems that for this problem type some information can be identified as more important than another, and thus needs to be emphasized by the problem representation.

Empirical Evidence

Evidence for the model of visual sketching has been provided by protocol studies in a variety of domains, such as architecture, arts and engineering (for a review, see Purcell and Gero 1998), and experimental studies (e.g., Verstijnen et al. 1998). Reservations, however, have been made regarding simple problems (Bilda et al. 2006; Bilda and Gero 2007).

Comparing the Cognitive Fit and Visual Sketching Models of Problem Solving

The two problem solving models introduced above originate from rather disconnected streams of research. The stream that promotes cognitive fit is broadly engaged in the design of user interfaces. In doing so, it addresses the question of how existing information can be presented to a decision maker to best enable that decision maker to make proper inferences. The stream that promotes visual sketching, notwithstanding its fragmentation, is broadly engaged in finding ways to make people more creative in contexts when the information necessary for solving a task has not yet been gathered, or even worse, does not even exist yet. In summary, concerning the problem solving model of CFT, we have established the following (see also Table 2): For routine problems, the model is capable of explaining why using a problem representation that exhibits cognitive fit with a task translates into higher problem solving performance than using a representation that does not. However, the model is not capable of addressing creative problems because of its assumption that the problem representation remains unchanged during problem solving. Concerning the visual sketching model of problem solving, we have established the following: The visual sketching model is capable of explaining why, for creative problems, sketching translates into higher problem solving performance than not sketching. However, the visual sketching

Table 2. Comparison of the cognitive fit and the visual sketching problem solving model

Model	**Cognitive Fit**	**Visual Sketching**
Constructs		
Problem solving task	Equivalent meaning	
Mental representation	Equivalent meaning	
Problem solving performance	Equivalent meaning	
Problem representation: Structure	Available	Not available
Problem representation: Content	Unchangeable	Changeable
Proposition		
Level of analysis	Cognition	
Boundaries		
(1) Task complexity	Moderate to high complexity	
(2) Organizational level	Individual, group	Individual
(3) Problem type	Routine (not even partially creative)	(At least partially) Creative

model is not capable of addressing routine problems because sketching requires the need to generate new information to become effective, and sketching assumes that the problem representation is idiosyncratic to a given problem solver. Finally, we have established that the mechanisms underlying both problem solving models operate at the cognitive level, which suggests that it is possible to combine both models to extend CFT to creative problems by applying horizontal theory blending.

Theoretical Development

Defining the extended problem solving model

Constructs

The extended model of CFT is shown in Figure 8. The *problem solving task*, the *mental representation*, and *problem solving performance* are retained from the original models; the *problem representation* construct is adapted to the creative context. We first describe the rationale for retaining some constructs without changes, and then establish the rationale for changing the problem representation construct.

Both the original models assume there is a specific *problem solving task* to be accomplished. Moreover, both the models employ a *mental representation* that captures the problem solver's understanding of the problem solving task and the corresponding (intermediate) solutions in working memory. Likewise, the original models capture the quality of the solution in a construct *problem solving performance*. In sum,

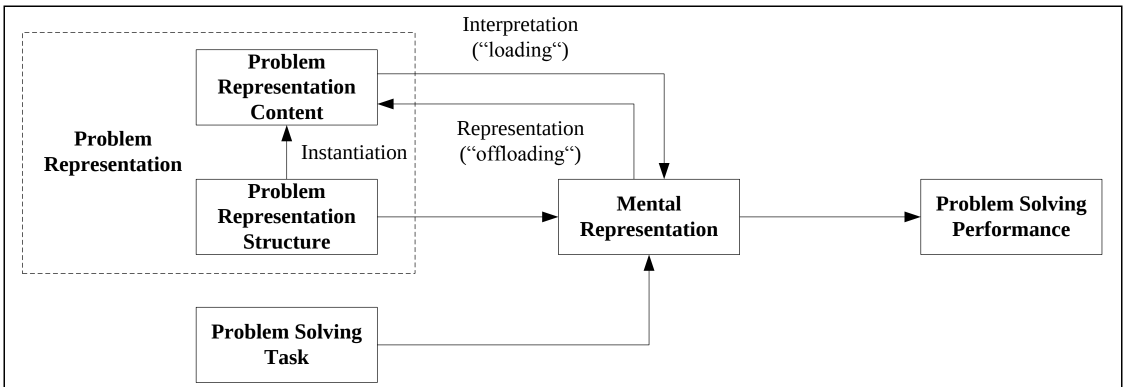

Figure 8. Extended problem solving model

the two original models both employ with equivalent meanings the constructs of the problem solving task, the mental representation, and problem solving performance. Therefore, we retain these constructs without changes in the extended model.

We now turn to the problem representation construct. Ideally, in the extended model we would like to maintain the benefits of the cognitive fit as well as the visual sketching mechanism. However, the mechanisms underlying the original models place different (even contradictory) requirements on the problem representation. This implies that changes are necessary to the problem representation construct for allowing both mechanisms to be effective also in the extended model.

The different requirements placed on the problem representation concern the role of structure and that of content (see also Table 2). Concerning structure, the cognitive fit mechanism requires a problem representation to have its structural properties (i.e., its semantic and visual structure) defined before problem solving starts. Only if this is the case, it is possible to determine whether that problem representation emphasizes the information that is emphasized by the task or, put differently, exhibits cognitive fit. In contrast, the visual sketching mechanism deliberately refrains from defining such structures, and leaves their definition to the problem solver. Concerning content, the cognitive fit mechanism assumes the relevant content to be available at the outset of problem solving, and to remain unchanged during problem solving. In contrast, the visual sketching mechanism assumes the content to be missing at the outset, and to be created during problem solving. Moreover, only if content is created during problem solving, the offloading mechanism behind visual sketching can become effective.

Given these requirements, we define two conceptually different problem representations, with each of them allowing one of the mechanisms of the original models to materialize (see Figure 8). We define a *problem representation structure* that first, captures the semantic structure of the information necessary for solving a given problem, and second, defines the corresponding visualization. In addition, we define *problem representation content* that captures the actual information that is necessary for problem solving. The problem representation content is represented (i.e., instantiated) through the prescriptions of the problem solving structure. While the problem representation structure remains unchanged during problem solving, the problem representation content is allowed to be changed. This means that problem solving performance in the extended model is affected by first, the cyclic interaction between problem representation content and mental representation (analogously to the visual sketching model) and second, the interaction between problem representation structure and problem solving task (analogously to the cognitive fit model). Note that, through the lens of conceptual modeling research, the problem representation structure would be analogous to a modeling language. The problem representation content, when represented through the structural prescriptions of the problem representation structure, would be equivalent to a model that is instantiated using a modeling language.

To illustrate the distinction between problem representation structure and problem representation content, we take the example of business model idea generation using the visual template shown in Figure 9. According to that template, which is known as the Business Model Canvas (BMC, Osterwalder and Pigneur 2010), a business model consists of nine components, which include a value proposition, the customer segments that are addressed by the value proposition, and channels that bring the value proposition to the customers. The semantic structure (the nine components) and the visual structure (how these components are visually arranged in the template) are defined prior to problem solving (and hence correspond to the problem representation structure). The content of the nine components is defined during problem solving. Put differently, the assumption behind the BMC is that the nine components exhaustively define the scope that a business model's content can have (and therefore need not be changed during problem solving). The way these components are laid out visually remains unchanged as well. However, the concrete customer segments, value propositions etc. obviously need to be defined by the problem solver during problem solving, and cannot exhaustively or definitely be determined before.

Taking another example, building a class diagram with the notation prescribed by the Unified Modeling Language assumes that the information relevant in the class diagram context can be captured by classes and associations (i.e., the semantic structure), which are visualized through boxes and lines (i.e., the visual structure). Taken together, these form the problem representation structure. However, the concrete classes and associations relevant in a given context (i.e., the content) need to be defined by the problem solver. Moreover, the concrete classes and associations might be changed a number of times during problem solving.

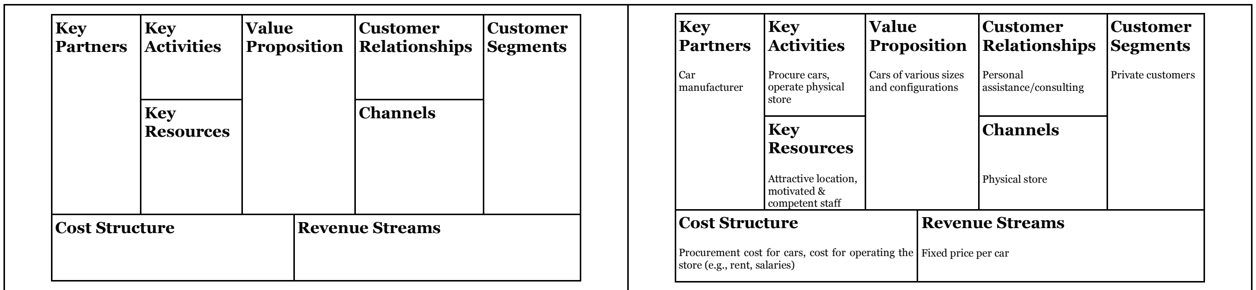

Figure 9. Visual template for business model idea generation by Osterwalder and Pigneur (2010), own example, left: structure only, right: structure including sample content

Proposition

To derive the proposition for the integrated model, it is necessary to analyze how the two cognitive mechanisms of the models of cognitive fit and visual sketching relate to each other: whether the corresponding benefits add to each other, whether they cancel each other out, or whether their co-occurrence even lowers problem solving performance. Recall that problem solving proceeds by performing mental problem solving operations in working memory, and that problem solving performance increases when more working memory capacity is available for problem solving operations. According to the mechanism of cognitive fit, a problem representation that emphasizes the same information as the task increases available memory capacity. It does so by lowering the need to allocate memory capacity to operations that transform misfitting information. According to the mechanism behind visual sketching, available memory capacity is increased by offloading information that (at a certain moment) is not needed in working memory into the visual sketch. In other words, while the mechanism behind sketching reduces the overall amount of information needed to be held in working memory, the cognitive fit mechanism allows more efficiently interpreting the information that needs to be transferred into working memory from the problem representation. This suggests that the two mechanisms operate independently from each other, and hence that the corresponding benefits add to each other. This leads to the following proposition:

Proposition 3: When engaging in sketching, problem solving performance can be increased by employing a problem representation structure that exhibits cognitive fit with the corresponding problem solving task.

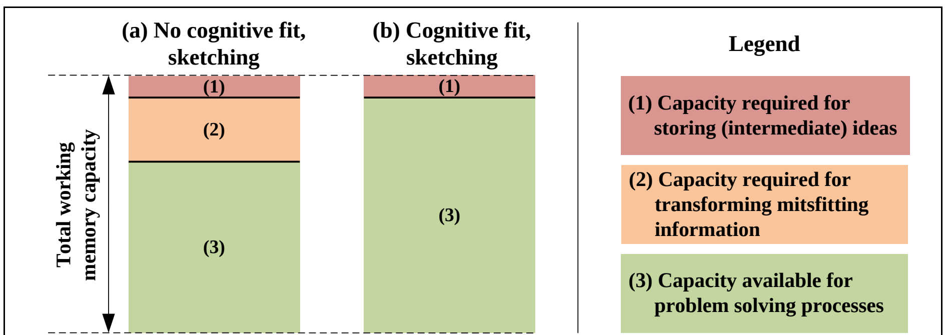

Figure 10. Working memory allocations that correspond to proposition 3

Figure 10 illustrates the working memory allocation corresponding to this proposition. The underlying assumption is that sketching is useful for solving a creative problem (as described in the context of the original visual sketching model). Proposition 3 suggests that representing content through a problem representation structure that exhibits cognitive fit (Figure 10, case b) leads to higher problem solving performance compared to representing the content through a problem representation structure that does not exhibit cognitive fit (Figure 10, case a). The performance advantage is created by the greater amount of working memory capacity that is available for actual problem solving processes in case (b). This greater amount of working memory capacity, in turn, is available because every time when information needs to be interpreted (i.e., loaded) into working memory from the problem representation, the cognitive fit representation saves mental effort for transforming information into a form that is consistent with the task's requirements.

Boundaries

For our extended model, the boundaries concerning task complexity and organizational level emerge directly from the original models. As with the original models, and for the same reasons, simple tasks that do not exhaust working memory capacity are outside the boundary of our model (boundary 1). Concerning the organizational level (boundary 2), recall that cognitive fit is effective at group level because it applies to any problem solver independent of the problem solver's background. Because any content that is created during problem solving is represented using the same problem representation structure, the resultant representations should also either benefit from the inter-subjective benefits of cognitive fit, or suffer from a lack thereof (at least as long no additional idiosyncratic notation, also referred to as *secondary notation* (Petre 1995), is used). This implies the extended model applies not only to the individual, but also the group level.

Positioning the Extended Model on the Routine vs. Creative Problem Continuum

We described the difference between routine and creative problems as a continuum. This means that the difference between these problem types is a question of degree, rather than kind, which complicates determining the problem type boundary of the extended model. On the one hand, the extended model can obviously handle problems at the routine end of the continuum. For such problems, the possibility to change the problem representation content would simply not be used, and the problem representation would remain unchanged during problem solving. On the other hand, the extended model does not apply to problems at the creative end of the continuum. These problems have no inherent structure whatsoever. Consequently, there is no basis for defining a problem representation structure, which means for such problems there is no basis to apply the mechanism of cognitive fit. As apparently the extended model applies to problems at the routine and of the continuum, but does not apply to problems at the creative end of the continuum, the question arises as to what part of the continuum the extended model actually covers. To answer that question, in the following we refine the continuum by defining discrete levels on it, and then define the boundary of the extended model with regards to these levels.

Table 3. The extended model positioned on a refined continuum from routine to creative problems

Refined continuum from routine to creative problems			
High-level problem types (e.g., Lubart 2001; Mumford et al. 1991)	**Routine**		**Creative**
Problem representation structure	Available	Available	Not available
Problem representation content	Unchangeable	Changeable	-
Refined problem types (e.g., Maher and Tang 2003; Simon 1973)	**Well-structured**	**Ill-structured**	**Wicked**
Is the model applicable to the given problem type? (boundary 3)			
Original cognitive fit model	Yes	No	No
Extended cognitive fit model	Yes	Yes	No

Within our context, two criteria suggest themselves for refining the continuum: First, whether the structure of a problem is already known (as this allows deriving a problem representation structure), and second, whether the content to be represented in the problem representation structure is already known (which allows the problem representation to remain unchanged). Using these criteria, three types of problems can be distinguished (see Table 3): well-structured, ill-structured, and wicked problems. While for well-structured problems there is no need to create new knowledge, such need exists for ill-structured and wicked problems. Hence, well-structured problems align with the notion of problems that are at the routine end of the continuum. Wicked problems align with the notion of problems at the creative end of the continuum. Ill-structured problems are partially routine (concerning their structure) and partially creative (concerning their content). Well-structured/routine problems lie within the boundary of the original and the extended model of CFT. Ill-structured problems, in turn, lie within the boundary of the extended, but not the original model of CFT. Wicked problems are beyond the boundary of both models, because the problem structure for such problems only emerges during problem solving, thus making the ex-ante definition of a problem representation structure impossible.

Note that rather than constituting a definite taxonomy, the three emerging problem types are intended to make the extended boundary of CFT more accessible. The problem types, their terminology and the underlying understanding originate from and are compatible with those defined by Simon (1973, 1996); Simon and Newell (1971) (concerning well-defined and ill-defined problems), and Maher and Tang (2003); Rittel and Webber (1973) (concerning wicked problems). While these problem types seem to be accepted by a substantial share of problem solving researchers, we need to acknowledge that there still is considerable debate as to which problem classification best captures the multiplicity of problems that exist (to illustrate, a recent review by Li and Belkin (2008) identifies 11 classifications alone).

Discussion and Implications

CFT has shaped the understanding of how information contained in IS can best be presented to users in a given problem solving task. It initially resolved a long-lasting controversy over the relative superiority of graphical and tabular representations (Vessey 1991). Since then it has been shown to apply to a great variety of contexts, culminating in the statement that it constitutes *"one aspect of a general theory of problem solving"* (Vessey 2006, p. 141). While the range of tasks addressed in prior cognitive fit studies is impressive, taking a broader perspective on task types reveals that an even wider range of tasks is still waiting to be addressed. On the continuum of purely routine to purely creative tasks, cognitive fit research has indeed tapped only one of the extremes, and has left aside all problems whose nature is at least partly creative. Given the importance of creative problems in practice (IBM 2010) this is rather unfortunate, and we seek to contribute a step towards rectifying this situation.

While CFT is the benchmark for employing problem representations for routine tasks, the visual sketching model is its fraternal twin for creative problems. Giving due consideration to each model's boundaries and assumptions, we took both models as a starting point for our theory development. We illustrate that the notion of cognitive fit is applicable to problems as long as they exhibit a certain degree of low-level structure, or more specifically, as long as they are either well-defined or ill-defined (i.e., not wicked). Thereby we argue that cognitive fit is applicable to a vast range of problems that are at least partly creative in nature, an insight that has profound implications from theoretical, practical and methodological perspectives.

From a theoretical perspective, our work extends the boundary of CFT from routine problems to problems that are at least partly creative (i.e., ill-defined problems). This further amplifies the role of CFT as a central theory for developing information representations in IS research. Moreover, we thereby provide a theoretical foundation for better solving a wide range of tasks relevant for IS, but previous neglected by CFT research. Just take the example of developing an IS architecture or that of reengineering a business process using a corresponding modeling language. Obviously, both tasks require some degree of creativity as long as appropriate solutions cannot be derived from previous reference models. Based on previous research it would be justified to apply the cognitive fit mechanism to the final outcome of such endeavors, that is, to the task of understanding the resulting models. Intuitively, it would seem reasonable to assume that the mechanism of cognitive fit applies not only to the task of understanding models, but also to the task of creating them. With our extended model, we provide a theoretical foundation for this intuition, and thereby provide a theoretical foundation for future studies that seek to better understand how model development, rather than model understanding can be promoted.

While from a cognitive fit perspective our work extends the boundary of a well-established theory, from the perspective of creativity research we provide a completely new cognitive mechanism for increasing problem solving performance. Researchers with a cognitive perspective on creativity have identified a number of cognitive mechanisms that promote creativity and consequently can serve as a starting point for developing creativity techniques. These mechanisms include, for example, decomposing a given problem, applying analogies, changing perspective or conceptually integrating varying perspectives (e.g., Mumford and Gustafson 2007; see Smith 1998 for a review of cognitive mechanisms and others beyond the cognitive level). With cognitive fit we add to that list a previously unknown mechanism. However, previously identified cognitive mechanisms take a content-centric perspective on creative problem solving (i.e., what content to employ, which procedures to apply to the content). Cognitive fit, however, does not address the *content* itself, but rather the *form* of how this content is represented (see Moody 2009 for a discussion on the difference between form and content). Consequently, from a creativity perspective, we do not only add to an already extensive list of cognitive mechanisms, rather we identify a mechanism that is orthogonal to the existing ones, and thereby potentially able to complement and augment the existing ones at a level previously neglected.

From a methodological point of view, we demonstrate that due consideration should be given in creativity studies to the potential impact of cognitive fit on problem solving performance. Cognitive fit is of no concern for all studies that provide equivalent amounts of content to their treatment groups, and vary other factors such as incentives (Toubia 2006) and task framing (Grant and Berry 2011), or investigate individual differences (Grant and Berry 2011). However, cognitive fit acts as a potential confound in studies that vary the amount of content given to problem solvers. Revisiting the example of the BMC, it could be worthwhile to study whether applying the cognitive mechanism of problem decomposition (as is realized through the nine components of the BMC) provides a benefit over a more aggregated definition of a business model (i.e., with less components). In this context, however, we would expect the effect that results from decomposing the problem into nine components to interact with how these components are visually arranged (e.g., in the Canvas layout or in a mere list) – because one of these visual arrangements may exhibit more cognitive fit with the task of developing a business model idea than the other. Therefore, to not confound the results, the effect of cognitive fit on problem solving performance needs to be controlled for. Comparable confounding effects may be present also in other studies that systematically vary the level of task decomposition, or vary the amount of content made available to study participants in other ways. With our work we provide a foundation for systematically addressing such confounds.

From a practical point of view, our work could possibly lead to better tools for supporting practitioners in model development (i.e., the design phase of IS), by providing modeling languages that exhibit cognitive fit with specific tasks. From a creativity perspective, we hope our work leads to better visual templates for idea generation. Moreover, at the intersection of IS and creativity, our work could aid in developing IT-based creativity support systems (for a review, see Seidel et al. 2010), because developing such systems constantly involves the challenge of developing user interfaces that allow users to employ creativity support systems with a minimum of cognitive effort.

The arguments presented in our article suggest a number of research directions at the theoretical as well as the empirical level. First, our theoretical argument rests on the assumption that the benefits of cognitive fit and visual sketching add to each other at least to some extent. While this argument seems justified given the nature of both mechanisms, future research should seek to establish whether there are boundary conditions to this assumption. Second, as defined in this article, our extended model seems to neatly align with the problem models of visual sketching and cognitive fit. As our model integrates both original models while retaining many of their original properties, it seems it has the potential for being considered an overarching model for the use of representations for solving problems along the creative to routine continuum. That is, the extended model could substitute the original models, treating purely routine and purely creative tasks simply as special cases. Future research should investigate whether there is merit in this viewpoint. Third, the arguments presented in this article are theoretical in nature. While we have chosen theoretical models that are well-recognized in their respective fields, and have integrated them only after having carefully examined their respective boundaries and underlying assumptions, the proposition of our extended model needs to be validated empirically.

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2.3. Why Use the Canvas for Idea Generation? A Design Theory and First Evidence

Why Use the Canvas for Idea Generation? A Design Theory and First Evidence

Abstract

The Business Model Canvas (or Canvas) has achieved tremendous popularity in research, practice, and education. However, despite its popularity, we know virtually nothing about what makes it more effective than competing approaches. To address this issue, we build theory that explains how the Canvas' visual template affects idea generation performance at the cognitive level. Our theory predicts that using the visual template of the Canvas leads to better ideas than a naïve benchmark: a simple list. To test that prediction, we employ a mixed-methods design that includes a scenario-based survey, three experiments and a participatory observation with altogether more than 700 participants (including pilot studies). While the scenario-based survey supports our prediction, in the experiments the idea quality of Canvas users is worse than that of the list users. We reconcile these conflicting results through insights from our participatory observation and subsequent reanalysis of the experimental data. From a theoretical perspective, our work is a first step towards the theoretically grounded design of visual tools for business model idea generation. From a methodological perspective, we extend prior business model research concerning idea evaluation and controlled experiments.

Keywords: Business model innovation, business model idea generation, creativity, cognitive fit

1. Introduction

A business model describes a firm's mechanisms for value creation, value delivery, and value capture (Teece 2010), and as such is a detailed description of a firm's strategy (Adner et al. 2014; Casadesus-Masanell and Ricart 2010). The interest in business models and business model innovation is enormous – from researchers and practitioners alike. A recent global survey of some 3,000 executives in 26 countries finds that a majority of 60% consider *"defin[ing] an effective business model"* a major challenge in their firms' innovation activities (GE 2014). Likewise, IBM's global CEO studies (IBM 2006, 2008, 2010, 2012) consistently underline the importance of business models, with each study drawing on interviews with several hundreds to nearly 2,000 CEOs. In line with the interest among practitioners, academic attention to business models has increased rapidly in disciplines as varied as information systems (IS), innovation management, and strategy (Zott et al. 2011). Moreover, research emphasizes the importance of business model innovation not only for established, but also for entrepreneurial firms (George and Bock 2011; Zott and Amit 2007).

Given the huge interest in business models, not surprisingly there is an equally huge interest in tools for business model development. Of these tools, the *Business Model Canvas* (or, simply, *Canvas*, Osterwalder and Pigneur 2010) is arguably the most important. It defines business models to consist of nine components, and presents these components through a visual template to facilitate generating and communicating business model ideas. The Canvas has had tremendous impact on research, practice, and education. Its impact on research is evident, for example, in that the corresponding book (Osterwalder and Pigneur 2010) according to *Google Scholar* has received more than 2,700 citations in just about five years. This is more than three times of what the most-cited papers in the leading management and IS journals have received within the same time frame[1]. In practice, the Canvas has become the quasi-standard for describing business models and is widely used for idea generation. The corresponding book has sold about one million copies (Strategyzer 2015), and the Canvas' popularity has led to the proliferation of supporting software tools and workshop offers[2]. In addition, the Canvas is widely taught in business schools. For example, Chesbrough, who with his *Xerox* case study (Chesbrough and Rosenbloom 2002) was one of the founding fathers of business model research, states that *"the Business Model Canvas is now taught to every fulltime MBA student at our school [Berkeley]. It has become the standard for describing and designing business models"* (Strategyzer 2015, p. 29). Also McGrath, who was recently voted into the top 10 of the leading global management thinkers[3], confirms that *"the Business Model Canvas [...] has completely transformed how we teach planning for new businesses"* (Strategyzer 2015, p. 29). So, in summary, the success of the Canvas is impressive by virtually every conceivable popularity metric.

Despite the prevalent use of the Canvas, at a theoretical level we know virtually nothing about what makes the Canvas potentially more effective than competing tools, such as the numerous other component-based business model conceptualizations (for a review, see Krumeich et al. 2012). That is, we have little to no *justificatory knowledge* (Gregor and Jones 2007) that could illuminate (1) how (and whether) the design of the Canvas makes it more effective than competing tools, (2) that could aid in designing other tools for business model development, or (3) that could constitute the foundation for improving the Canvas or other tools even further. Next to this theoretical lack of knowledge, a methodological lack of knowledge seems to exist regarding the evaluation of the Canvas. On the one hand, as noted above, the Canvas' adoption in practice has been impressive, implying that its utility has been sufficiently demonstrated. On the other hand, the only experiment that so far has sought to evaluate the Canvas yields contradictory

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[1] For example, *Academy of Management Journal*: 634 (Zhang and Bartol 2010), *Information Systems Research*: 303 (Tsai et al. 2011), *Management Science*: 340 (Brynjolfsson et al. (2011); *MIS Quarterly*: 814 (Venkatesh et al. 2012) (most-cited papers in the corresponding journals as of 3rd October, 2015).

[2] A recent survey identifies more than 20 software tools specifically addressing business model development with the Canvas (Strotmeyer 2015). A Google search for *workshop AND "business model canvas"* returns more than 100,000 results (as of 3rd October, 2015).

[3] Thinker50.com, as of 17th November 2015.

results. Eppler et al. (2011) hypothesized that employing the Canvas would increase users' creativity compared to the *PowerPoint* control condition. However, the authors find that *"the results are significant, but in the opposite direction of our predictions. Subjects who use the interactive template [Canvas] perceive themselves as significantly less creative"* (Eppler et al. 2011, p. 1334). One possible interpretation is that the Canvas does indeed impede rather than aid its users, which would further emphasize the need to better understand the underlying theoretical mechanisms. Another interpretation is that our methodological knowledge is insufficient, and that for this reason evaluation results contradict real world observations. It is not clear which interpretation is more valid, especially given that Eppler et al. (2011) acknowledge that their *"significance testing is conducted with illustrative aim, due to the limited number of subjects, rather than with the purpose of generalization"* (Eppler et al. 2011, p. 1333). Nonetheless, that both interpretations are equally undesirable suggests the need to further explore the issue of evaluation. Against this background, our article addresses two research questions. First, from a theoretical perspective: What characteristics (if any) inherent in the Canvas make it useful for generating business model ideas? Second, from a methodological perspective: How can the usefulness of the Canvas for idea generation (and thereby the corresponding theoretical predictions) be evaluated?

We focus on the Canvas' role in business model idea generation because idea generation is crucial for successful business model development (e.g., Ende et al. 2015; Martins et al. 2015), and idea generation is one of the main purposes for using the Canvas in practice (based on a survey with 1,300 Canvas users, Strategyzer 2015). To further scope our research, we focus on the visual template of the Canvas, and do so on the assumption that the visual template is crucial for the Canvas' usefulness (this assumption seems justified because the visual template is what distinguishes the Canvas from the majority of other component-based business model conceptualizations – these do not prescribe a visual template and have not experienced comparable success; for a review, see Krumeich et al. 2012).

Creative cognitive fit theory (John and Kundisch 2015) is the overall theoretical foundation for our work. The theory explains the relationship between visual templates and idea generation performance. In so doing, it maintains that the value of a visual template cannot be determined per se – but needs to be determined by evaluating the extent to which the characteristics of a visual template and the characteristics of a given task exhibit cognitive fit (i.e., they match each other). Therefore, we first identify the constitutive characteristics of the Canvas' visual template, and those of the task of business model idea generation. We then go on to evaluate to what extent their characteristics exhibit cognitive fit, and do so by drawing on additional theories of human visual perception and information processing. Taken together, these theories suggest that the Canvas' visual template exhibits more cognitive fit with the business model idea generation task than the naïve benchmark that we employ: a simple list (see Figure 1). Therefore, we predict that using the Canvas' visual template leads to higher idea generation performance than using the list. We evaluate that prediction through a *mixed-methods* design (Venkatesh et al. 2013) that includes a scenario-based survey, three experiments, and a participatory observation – and including the pilot studies draws on more than 700 participants.

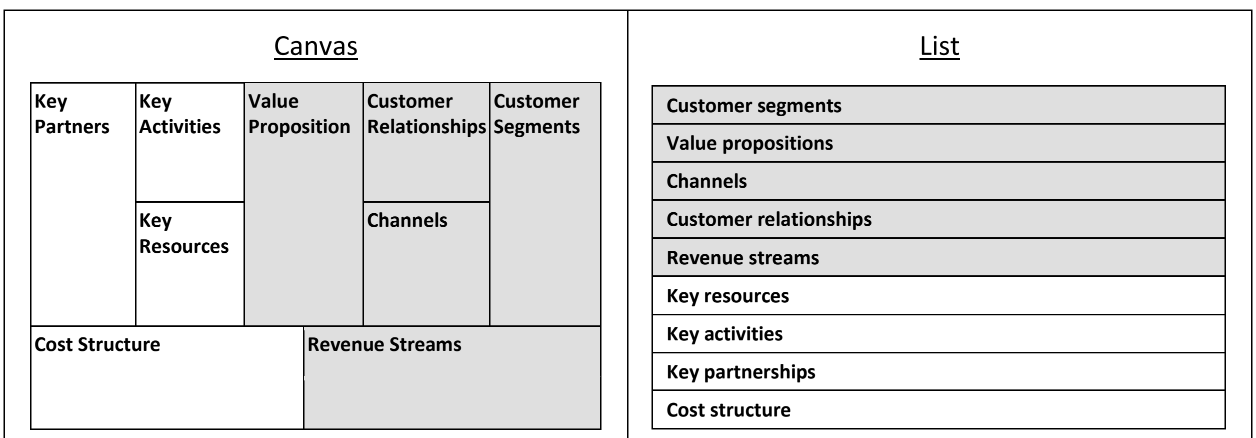


Figure 1. Alternative visual templates for the nine business model components of the Business Model Canvas (shaded in grey: demand-side components, white background: resource-side components)

In support of our prediction, participants of the scenario-based survey indicated that the Canvas leads to a higher degree of fit with business model idea generation (compared to the list). However, contrary to our prediction, in our experiments that higher fit did not translate into higher idea generation performance – in fact, the Canvas users produce ideas whose quality is lower than the quality of the list users' ideas. To better understand this surprising result, we performed a participatory observation of a business model idea generation workshop, which yielded the insight that non-experts tend to be overwhelmed by the complexity of the business model idea generation task. Therefore, they are hardly able to invoke an integrated and holistic perspective on the business model components (which would likely be conducive to idea generation performance; a point we explore later in this article). Equipped with that insight, we revisited our experimental data and, indeed, secondary analysis of our data revealed that a considerable share of participants was seemingly overwhelmed, and did not invoke a holistic and integrated perspective on the components. Rather, they approached the business model components in the order prescribed by their natural reading direction (left to right and top to bottom), which made list and Canvas users approach the components in different orders. Our secondary analyses showed that these different strategies in approaching the components were the reason for that the list users outperformed the Canvas users in terms of idea generation performance. More specifically, following the reading direction in the list leads to an emphasis of the demand-side components (e.g., customer segments, value proposition) over the resource-side components (e.g., key resources, key activities), because demand-side components are laid out in the upper half of the list and hence are approached first. In contrast, following the reading direction in the Canvas leads to an emphasis of the resource-side components over the demand-side components, because resource-side components are approached first. Secondary analyses of our data showed that participants who emphasized the resource-side components tended to underperform compared to those that emphasized the demand-side. As a considerable share of Canvas users (consistent with their reading direction) emphasized the resource-side components, average idea quality for Canvas users is lower than for list users.

From a theoretical perspective (i.e., the first research question), our main contribution is a *design relevant explanatory/predictive theory* (Kuechler and Vaishnavi 2012) that describes what characteristics of the Canvas' visual template contribute to making the Canvas useful for idea generation, and through what theoretical mechanisms these characteristics become effective (under the assumption that its user is able to invoke a holistic and integrated perspective on the components of the Canvas). Our theory is a first starting point for the theory-driven design of visual tools for business model idea generation, and as we will discuss can serve the same purpose for visual tools for strategy making.

Concerning the evaluation of the Canvas (i.e., the second research question), we make two methodological contributions. First, we introduce a new approach for measuring idea quality into business model research. While prior research on business model idea generation has relied on self-rated creativity (Eppler et al. 2011), we provide evidence that business model ideas can validly be evaluated by expert raters, which is a widely established approach in general innovation and creativity research (e.g., Amabile 1996; Kornish and Ulrich 2014). Expert-based evaluation is superior to self-ratings because self-ratings can be substantially biased, and hence can deviate from the quality that experts assign to an idea (Sellier and Dahl 2011). As a second methodological contribution, we further develop the method of idea generation experiments in the context of business models. That is, through our series of experiments we derive a number of suggestions for the training and incentivation of non-expert participants, which aids other researchers in setting up future business model idea generation experiments.

We organize the remainder of the article as follows. First, we briefly describe the conceptual background of our research, that is, the characteristics of the business model idea generation task and the characteristics of the visual template of the Canvas. Thereafter, we present the theoretical background and outline how creative cognitive fit theory contributes to explaining how visual templates affect performance in idea generation tasks. We then turn to our design theory, and based on our theoretical background derive the prediction that the Canvas' visual template carries benefits for business model idea generation. We then describe the empirical work we carried out to test that prediction, and finally discuss the implications of our study for business model, strategy, and creativity research.

2. Conceptual Background: Business Model Idea Generation

No generally accepted definition of business models is yet available (Wirtz et al. 2015). However, *attributional* definitions, which define a concept by enumerating its attributes or constituents (Bagozzi 1984)[4], account for a major share of available business model definitions. In the business model context, such definitions operationalize the business model concept by defining so-called *components*, which serve as a *'checklist'* for describing the content of a business model. At least 34 different component-based business model definitions have been proposed, which each comprise between three and 20 components (Krumeich et al. 2012). The Canvas, for example, prescribes the following nine components to describe a business model: (1) *value proposition*, (2) *customer segments*, (3) *channels*, (4) *customer relationships*, (5) *revenue streams*, (6) *key resources*, (7) *key activities*, (8) *key partners*, and (9) *cost structure* (Osterwalder and Pigneur 2010).

When using these components in the business model idea generation task, it is important to note that business models are typically meant to provide an integrated, holistic perspective on a firm's economic logic. This is evident, for example, in that business models integrate upstream and downstream perspectives on a firm or, put differently, that business models *"by their very nature and scope, [...] integrate the resource and demand sides of the strategy equation"* (Priem et al. 2013, p. 481). Moreover, business models are said to *"draw from and integrate a variety of academic and functional disciplines"* (Chesbrough and Rosenbloom 2002, p. 533). Similarly, business models have been described as *"a concise representation of [.] an interrelated set of decision variables"* (Morris et al. 2005, p. 727) and to *"consist of [.] interlocking elements, that, taken together, create and deliver value"* (Johnson et al. 2008, p. 52). From these statements, the following general characteristics of the business model idea generation task emerge:

- *Importance of an integrated and holistic perspective on the business model components:* To leverage the strengths of the business model concept, idea generation should involve an integrated and holistic perspective on all business model components. To clarify this characteristic, the opposite of this would be to focus only on one business model component during idea generation, and to ignore the others.
- *Importance of considering interdependencies between business model components:* It is not enough to have an integrated and holistic perspective on the business model components. Rather, it is also important to consider the effects of potential interdependencies between these components.

Having defined the characteristics of the business model idea generation task, we now turn to the question of how the components can be visually arranged to support idea generation. Obviously, one way to arrange the components is through the visual template of the Canvas. In addition, a naïve alternative would be to simply arrange the components in a list, one component below the other (which arguably is the simplest way of visually arranging the components, see Figure 1). When comparing the Canvas representation with the list, and analyzing how the components are arranged in the Canvas, two constitutive characteristics of the Canvas become apparent:

- *Matrix-like structure:* The Canvas lays out the components in a two-dimensional, matrix-like grid (in contrast to the unidimensional presentation in a list).
- *Semantic proximity:* The Canvas does not lay out the components arbitrarily, rather it positions components that are somewhat similar (in terms of their content) closer to each other than components that are somewhat dissimilar. For example, the components that define the parts of a business model that concern the demand side (i.e., are relevant for decisions that customers make for or against a given business model) are positioned at the right-hand side, the components that refer to the resource side (i.e., are not relevant for customers' decisions) are positioned at the left-hand side.

So in summary, the Canvas prescribes a business model to consist of nine components. When using these components in a business model idea generation task, two task characteristics are evident: First, to have an integrated and holistic perspective on the components and second, to consider interdependencies

[4] Attributional definitions are one of three major kinds of definitions. The other two are *dispositional* definitions that define an entity by specifying its purpose, and *structural* definitions that define an entity by specifying its relations to neighboring entities (Bagozzi 1984).

between the components. Moreover, two characteristics of the Canvas' visual template are evident: First, a matrix-like structure and second, semantic proximity. Next, we provide the theoretical background that later will allow us to determine how the characteristics of the Canvas' template affect performance in business model idea generation tasks. In so doing, as a benchmark we use a list, which arguably is the simplest alternative to the Canvas for visually arranging the nine components. For ease of exposition and to maintain consistency with the original sources, in the following we use creativity and idea generation performance interchangeably.

3. Theoretical Background: Visual Templates and Idea Generation

Before we are able to specifically determine how the Canvas' visual template affects its users' creativity, we first need to generally determine how visual templates affect their users' creativity and, more importantly, how different templates can lead to different levels of creativity. For this purpose, based on John and Kundisch (2015), in the following we outline *creative cognitive fit theory (CCFT)*, which explains for creative tasks how different ways of representing information (i.e., different visual templates) translate into different levels of problem solving performance (i.e., creativity). To illustrate the intuition behind CCFT, we first sketch how humans approach idea generation without visual templates, and then sketch how they approach idea generation with visual templates (in our case, the Canvas). We then go on to describe the cognitive arguments that underlie CCFT and the resultant proposition.

Let us consider idea generation without a visual template first (imagine, for example, how you arrived at your last paper title). In that context, when trying to be creative, we typically engage in intense thinking to produce a number of new ideas (e.g., provisional paper titles). We generate, explore, and extend these ideas without committing to any of them. Then, after some time of intense thinking, and having generated a certain number of ideas, we typically have the feeling that our *'head is full'*, and that generating additional ideas is virtually impossible without losing track of the ideas that we have already generated. Therefore, we start storing ideas outside our head (henceforth referred as *sketching*), for example, on a whiteboard or a sheet of paper, because we feel that storing some ideas outside our head allows us to better focus on being creative. During further idea generation, we occasionally refer to our sketch and the information therein may give rise to new thoughts, which in turn translate into new ideas that we may employ to refine our sketch or extend it. The *'dialog'* between our mind and our sketch stops once we have generated a satisfactory solution, which is not to imply that the dialogue stops once a first (somehow) satisfactory solution is derived (in the sense of a *'satisficing'* strategy). Rather it means that the dialogue stops once we deliberately decide to stop generating ideas because for the time being we are satisfied with the achieved result (or do not expect further progress).

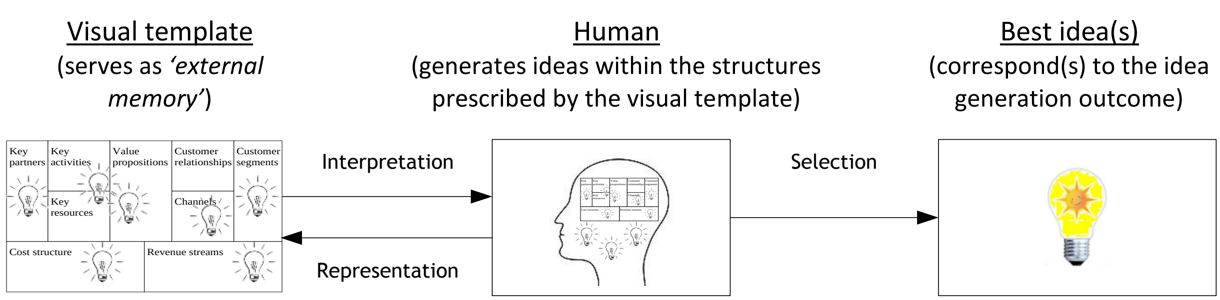


Figure 2. Intuition behind using visual templates (using the example of business model idea generation with the Business Model Canvas)

When we try to support our idea generation activity with a visual template, the dialog between the mind and an external sketch evolves similarly to what we described above (see Figure 2). Again, after having generated a certain amount of ideas, we start representing some of these ideas externally in a sketch. We also then occasionally refer to the ideas we have stored in our sketch to stimulate further ideas. However, unlike what we described in the without-template context, when using a template we are not free in how we think about our ideas and how we represent them. Rather, the visual template inevitably shapes our thinking. Additionally, we do not represent our ideas in an arbitrary way, but rather within the prescriptions of the visual template. To illustrate, when we take the Canvas, its nine components and the corresponding visual template inevitably shape our understanding of suitable ideas, and determine how we represent our ideas externally.

Having outlined the intuition of using visual templates, we now turn to the statements of CCFT concerning such templates (see Figure 3 for the problem solving model of CCFT). First of all, CCFT defines a *problem solving task* that captures the characteristics of the task at hand (e.g., the characteristics of the business model idea generation task). Moreover, drawing on research on visual sketching (e.g., Bilda and Gero 2007; Goldschmidt 2014) and cognitive fit (Vessey 1991), CCFT assumes that during problem solving, humans form a *mental representation* of the problem in working memory (akin to that our thinking is shaped by the Canvas when we use it). In addition, CCFT defines a *problem representation*, that is, an external representation that (akin to the Canvas) captures the information that is relevant in a given problem solving context. The problem representation consists of a *'changeable'* and an *'unchangeable'* part, which is a distinction that is also relevant in the Canvas context: Recall that some parts of the Canvas remain unchanged during problem solving, namely the nine components and the visual template for these components. Other parts, in contrast, are only created during problem solving and undergo continuous change, namely the concrete business model ideas that the user of the Canvas represents in the visual template. Accordingly, CCFT distinguishes between a *problem representation structure* that captures the (unchangeable) structures that a problem representation provides for generating possible solutions, and *problem representation content* that captures the (changeable) content of actual solutions (or solution candidates). Put differently, a problem solver uses the problem representation structure and produces actual solutions or solution candidates that comply with the problem representation structure (akin to that a human idea generator produces business model ideas through the prescriptions of the Canvas). In the following, we will describe how the described constructs (problem representation structure/content, problem solving task, and mental representation) interact to determine the resulting problem solving performance, or in our context, the resulting idea generation performance (i.e., creativity, see also Figure 3).

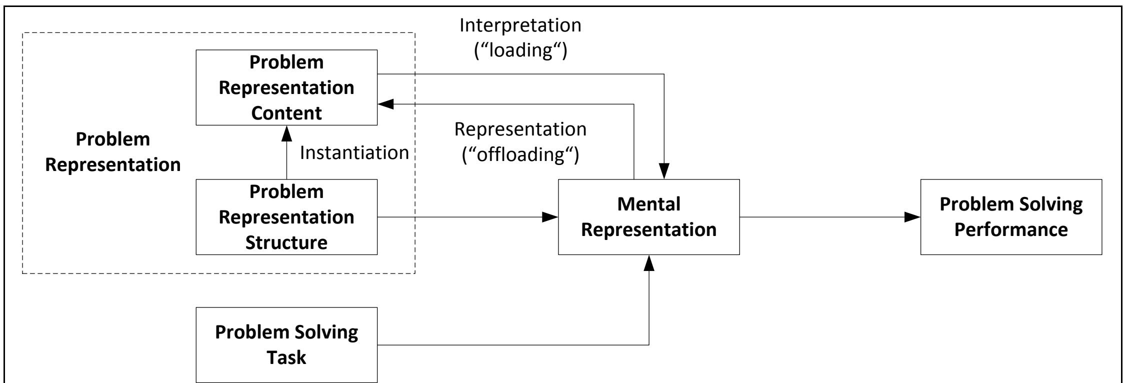


Figure 3. Problem solving model of creative cognitive fit theory (John and Kundisch 2015)

Creativity results from mental operations that are cognitively demanding and require substantial resources in working memory (Mumford and Gustafson 2007). Hence, freeing up working memory (i.e., making more working memory capacity available for creative mental operations) increases creative performance. Consequently, for understanding the link between problem representations and creativity, it is necessary to explore through which mechanisms problem representations can contribute to freeing up working memory capacity, and the resulting answer is twofold: First, problem representations in general act as a memory aid that relieves working memory. Second, problem representations – depending on how they are designed – can make the interpretation step of the dialog between the problem representation and the human mind more or less efficient, which corresponds to that the interpretation step requires more or less capacity in working memory.

Concerning the memory aid mechanism, note that during idea generation, people simultaneously perform two mental activities that both require capacity in working memory. First, they perform mental operations for generating new ideas. Second, they store (intermediate) ideas in working memory to have these ideas available for later refinement or extension. These two activities, storing (intermediate) ideas and generating new ideas, compete for working memory capacity. Hence, relieving working memory by storing some of the ideas externally (i.e., the sketch in the problem representation) increases creativity (e.g., Bilda and Gero 2007; Goldschmidt 2014).

Concerning the design of a problem representation, or more specifically, a problem representation structure (e.g., the Canvas' visual template), drawing on Vessey (1991), CCFT maintains that such structure is not beneficial or detrimental to problem solving performance per se. Rather, the value of a problem representation structure can only be determined for a given problem solving task (e.g., business model idea generation) – because different tasks may have different requirements for the problem representation structure. When both, the representation structure and the task, emphasize the same type of information, then working memory capacity can solely be devoted to mental operations that directly aim at solving the problem at hand. In that case, when the problem representation structure and the task emphasize the same type of information, the problem representation is said to exhibit *cognitive fit* with the task (see Figure 4, case b). However, when a problem representation structure is employed that emphasizes information other than the information that is emphasized by the task, then additional mental operations are needed to transform the information from the problem representation into a form that is consistent with the task's requirements. These additional operations are not directly involved in problem solving. However, because they still require capacity in working memory, they negatively affect problem solving performance (Zhu and Watts 2010, see Figure 4, case a). This leads to the following proposition of CCFT (John and Kundisch 2015):

> *Proposition: When engaging in sketching, problem solving performance can be increased by employing a problem representation structure that exhibits cognitive fit with the corresponding problem solving task.*

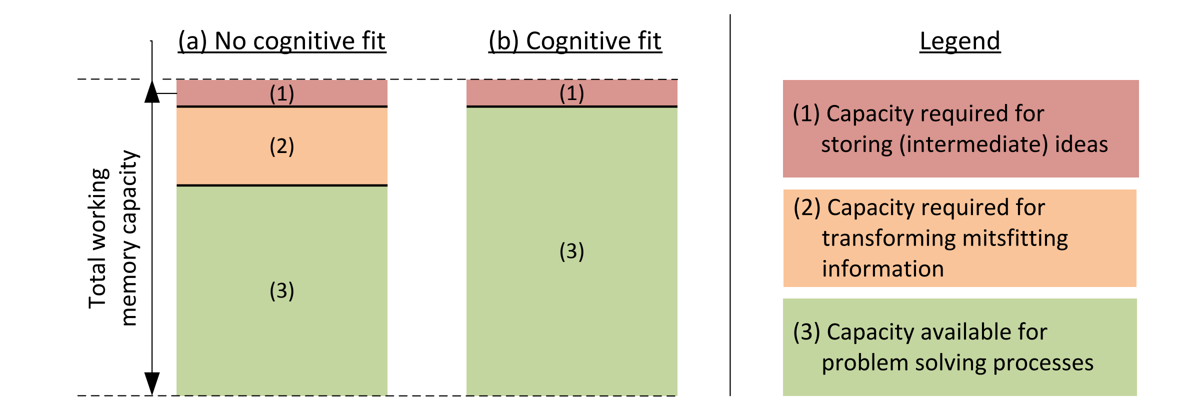


Figure 4. Working memory allocations that correspond to proposition 3 (John and Kundisch 2015)

In summary, CCFT explains at the cognitive level why different problem representation structures, and accordingly different visual templates, can lead to different levels of problem solving performance (or more specifically, idea generation performance). The proposition of CCFT is at a context-independent level, implying that contextualization is needed to make predictions in a specific context. In other words, CCFT explains *why* problem representations that exhibit cognitive fit with a task (i.e., representation structure and task emphasize the same type of information) lead to higher problem solving performance than representations that do not exhibit cognitive fit with a task. However, contextualization is needed to define *what* information a given task and a given problem representation structure emphasize.

4. Theoretical Development: The Canvas' Visual Template and Business Model Idea Generation

While CCFT provides the overall theoretical foundation for our research, it cannot tell us to what extent and whether at all the Canvas exhibits cognitive fit with the task of business model idea generation, and hence to what extent and whether at all the Canvas leads to better ideas than competing approaches. Therefore, in the following we contextualize CCFT to the context of *business model idea generation with* *the Canvas*. For doing that, recall that the task of business model idea generation is characterized through first, the importance of an integrated and holistic perspective on the business model components and second, the importance of considering interdependencies between the components. Recall also that our problem representation structures can be characterized through whether they have a matrix-like structure and whether they exhibit semantic proximity (for a summary, see Figure 5). The question now is: Do the characteristics of the Canvas or those of the list exhibit a higher level of cognitive fit with the characteristics of the business model idea generation task?

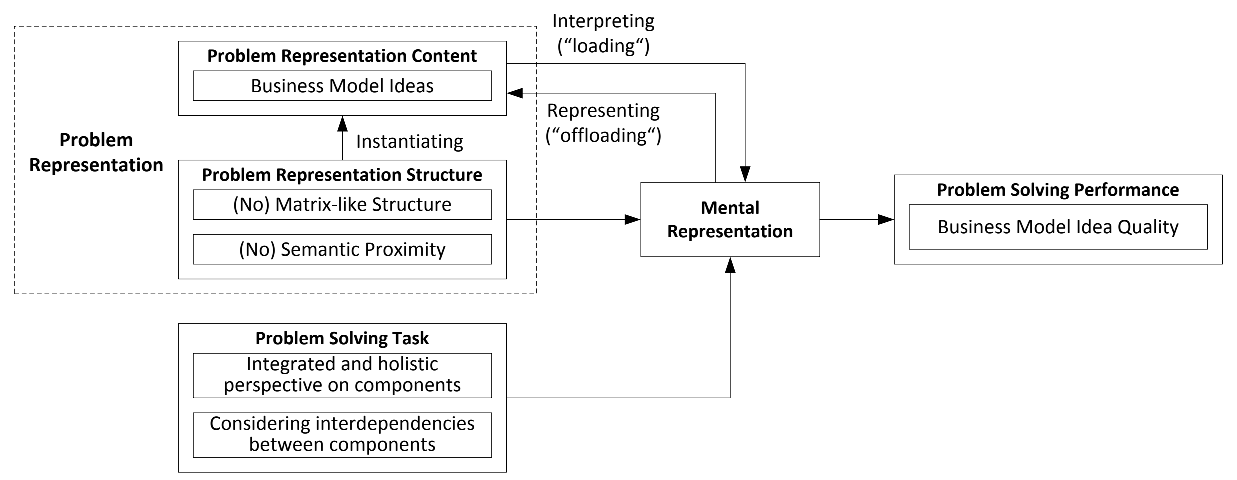


Figure 5. Contextualized problem solving model of creative cognitive fit theory

Towards answering this question, we need to examine three properties of each visual template, which together determine to what extent the template allows having an integrated and holistic perspective, and to what extent it allows considering interdependencies: First, how does the visual template affect the probability that any given component receives attention? Second, how does the visual template affect the ease with which one can shift attention from one attended component to another? And third, how does a visual template affect the ease with which one can devote attention to more than one component concurrently? These properties correspond to the three basic actions that a user can perform on a template: devote attention to a specific component, switch attention from one component to another, and devote attention to multiple components concurrently. The following three theories help to determine for each of these properties whether the Canvas or the list exhibits more cognitive fit with our task: *competition-for-attention theory* (Janiszewski 1998), *scanpath theory* (Groner et al. 1984), and the *proximity compatibility principle* (Wickens and Carswell 1995)[5]. Competition-for-attention theory allows predicting how the visual layout that lays out the components influences the attention devoted to the individual components, scanpath theory allows predicting how easily one can shift attention from one component to another, and the proximity compatibility principle allows predicting how easy it is for users to devote attention to multiple components concurrently. In the following, we introduce the theories in more detail and, for the sake of understandability, deliberately do not separate between presenting the theories' background and their application to our context. Figure 6 provides an overview of our theoretical arguments and the resulting research model.

[5] We draw the overall idea to combine cognitive fit with competition-for-attention and scanpath theory from Hong et al. (2004), who invoke these three theories to determine how online shoppers gather information on websites that have either a matrix or a list layout. In some cases, we also draw on their ideas for transferring specific statements from these theories into our context, we reference this accordingly.

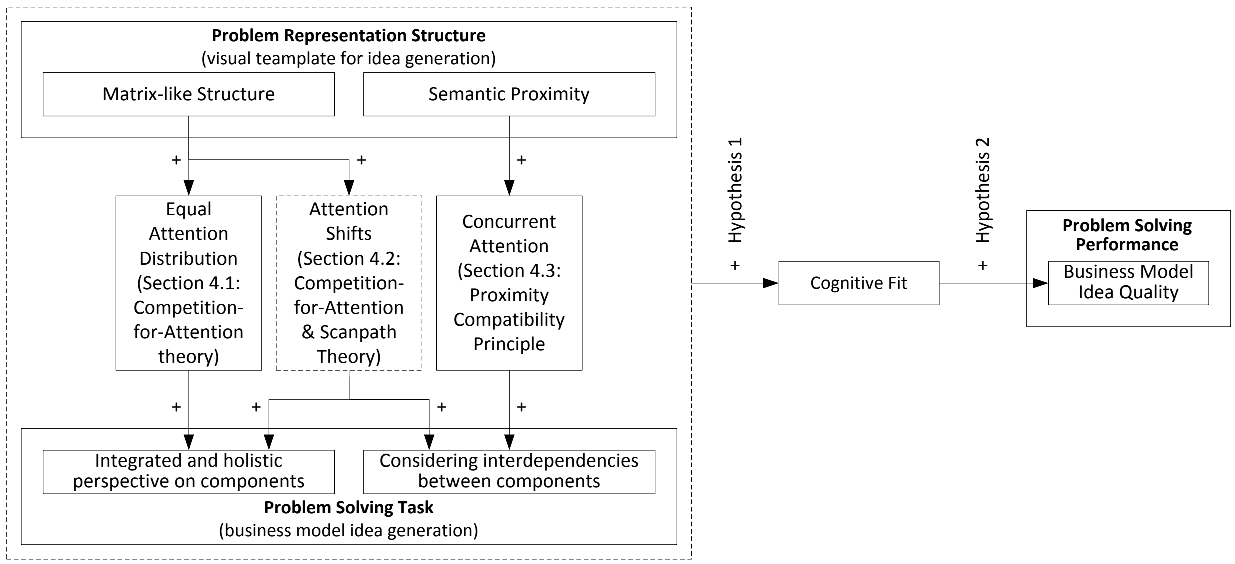


Figure 6. Overview of the proposed design theory and research model

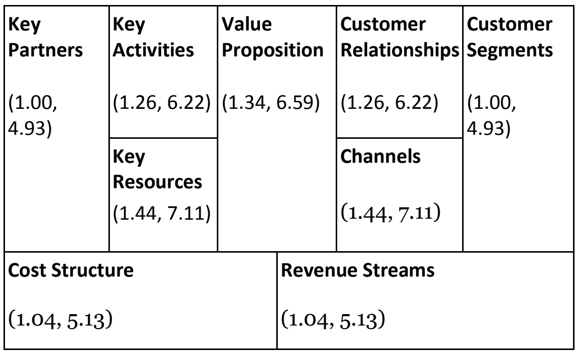
4.1. Competition-for-Attention Theory: Visual Templates and Attention Distribution

Competition-for-attention theory allows to determine how attention is distributed over a visual screen, depending on the layout that the screen has. The premise of competition-for-attention theory is that a visual screen contains a variety of objects that each compete for attention with one another. That is, when a focal object is under attention, all other objects will pressure the eye to shift attention. The salience of competing objects decreases with their distance to the focal area, which means that the further away an object is from the focal area, the less chance that object has to capture attention (unless an increase in distance is compensated by an increase in size). Given that the received attention depends on distance and size, the amount of competition that a competing object exerts can be calculated as the square root of the size of the competing object divided by its distance to the focal object. For a given object, summing the competition-for-attention (scores) of the competing object provides an indication of how much attention that object is likely to receive (Janiszewski 1998).

To illustrate, Figure 7 shows the competition-for-attention scores for the Canvas and the list based on a roughly A4 formatted template (in normalized and non-normalized numbers, see Appendix A for details on the calculations). To take an example, the topmost component of the list (i.e., customer segments) has a competition-for-attention score of 10.62, which is the sum of all competition of the other eight components (each determined by taking the square root of the size and dividing by the distance to the customer segment component). The customer segment's competition-for-attention score is substantially lower than, for example, the score of the revenue streams, which means that it is easier for a user to devote attention to the customer segments than the revenue streams.

Recall that one characteristic of business model idea generation is to have an integrated and holistic perspective on the business model components. To allow for an integrated and holistic perspective, it is helpful if a visual template does not gear one's attention towards specific components but rather facilitates spreading attention evenly over the components. While it is arguably impossible for a visual template to give exactly equal emphasis to all components, the more a representation has this characteristic, the better it supports an integrated and holistic perspective. Hong et al. (2004), who compare competition-for-attention for a list and an ideal matrix (i.e., a matrix with objects that all have the same size), show that competition-for-attention is more evenly distributed for a matrix than a list. This is also what we observe when comparing the list (standard deviation of competition-for-attention scores SD = 2.11) and the Canvas (SD = 0.86). Consequently, regarding the task characteristic of an integrated and holistic perspective, competition-for-attention theory suggests that the Canvas exhibits a higher level of cognitive fit with the business model idea generation task than the list.

Canvas



List

Customer segments	(1.00, 10.62)
Value propositions	(1.32, 14.04)
Channels	(1.45, 15.44)
Customer relationships	(1.51, 16.09)
Revenue streams	(1.53, 16.28)
Key resources	(1.51, 16.09)
Key activities	(1.45, 15.44)
Key partnerships	(1.32, 14.04)
Cost structure	(1.00, 10.62)

Figure 7. Normalized and original competition for attention scores for each business model component in the list and Canvas representation (normalized, non-normalized); non-normalized totals: 128.67 (list), 53.35 (Canvas)

4.2. Scanpath Theory: Visual Templates and Attention Shifts

As stated above, to allow for an integrated and holistic perspective, it is helpful that a representation supports spreading attention equally. In addition, for an integrated and holistic perspective it is helpful that a visual template allows shifting attention easily from one component to another. This is because if attention shifts are hampered, then undue emphasis would be given to the component(s) that first receive attention. Furthermore, being able to easily shift attention also facilitates considering interdependencies between components, because considering interdependencies requires moving attention back and forth between several components. Hence, the better a visual template facilitates attention shifts, the better it supports business model idea generation.

While competition-for-attention theory alone allows to determine how attention is expectedly distributed over the business model components, together with scanpath theory it also allows to determine how easy it is to shift attention. The underlying reasoning is that high and low competition-for-attention-environments (i.e., templates with high or low overall competition-for-attention scores) favor different patterns of eye movements, or scanpaths (Groner et al. 1984; Hong et al. 2004). In high-competition-for-attention environments, the eyes are under constant pressure to shift attention to some nearby objects. In contrast, in low-competition-for-attention environments the eyes can move more freely over the visual template, which means that low cognitive effort is needed to (re)direct attention to certain areas within the template (Hong et al. 2004; Janiszewski 1998).

Consistent with what Hong et al. (2004) find when comparing a list and an ideal matrix, the total competition-for-attention for the Canvas (53.53) is less than half that of the list (128.67). Given that low-competition-for-attention environments facilitate attention shifts, the Canvas facilitates attention shifts from one component to another better than the list. As described, this benefits both characteristics of business model idea generation, the integrated and holistic perspective as well as the consideration of interdependencies.

4.3. Proximity Compatibility Principle: Visual Templates and Concurrent Attention

Recall that a characteristic of the business model idea generation task is the importance of adequately considering interdependencies. It is arguably impossible for a visual template not to emphasize interdependencies between some business model components more than between others (as a visual template only has two dimensions to lay out these components). However, then at least a template should emphasize interdependencies between components that are likely to exhibit such interdependencies, rather than ones that are unlikely to do so. For example, the business model components that address the demand side of a business model are more likely to have interdependencies among each other than with the resource side (interdependencies with the resource side obviously exist as well, but to a lesser degree). To illustrate, revenue streams and value propositions are more likely to have interdependencies than, say, revenue streams and key activities.

The premise of the proximity compatibility principle (Wickens and Carswell 1995) is that tasks may have different levels of proximity: High-proximity tasks require the integration of information from various sources (as is the case for business model idea generation), while low-proximity or independent tasks pertain to rather nonintegrative processing of independent information. Likewise, displays may have different levels of proximity. In low-proximity displays, information items are clearly separate, while high-proximity displays make use of proximity manipulations to increase the visual proximity between information items. Such proximity manipulations may, for example, include the use of spatial proximity or of similar colors or contours. The proximity compatibility principle states that high-proximity displays increase performance in high-proximity tasks (i.e., in tasks that require information integration), and low-proximity displays increase performance in low-proximity tasks (Wickens and Carswell 1995).

The Canvas places semantically similar components in spatial proximity, that is, places components in spatial proximity that are likely to exhibit interdependencies. Therefore, the semantic proximity characteristic of the Canvas makes the Canvas more suitable for business model idea generation compared to that the components were not laid out adhering to semantic proximity. Put differently, the semantic proximity characteristic of the Canvas reinforces the cognitive fit created by the matrix-like layout. In addition, when deriving our hypotheses, in the following we assume that the Canvas exhibits at least as much semantic proximity as the list, because in the list the components are proximal to at *most* two components, while in the Canvas they are proximal to at *least* two components.

4.4. Design Theory and Hypotheses

In the following, we synthesize the presented theoretical arguments into the aspired *design relevant explanatory/predictive theory* (Kuechler and Vaishnavi 2012). That theory in a first step, at the prescriptive level, identifies the constitutive characteristics of the Canvas' visual template and the constitutive characteristics of the business model idea generation task. In a second step, at the explanatory level, our theory identifies the theoretical mechanisms that allow explaining and predicting how the characteristics of the Canvas affect creative performance in the business model idea generation task[6] (for a summary, see Figure 6).

At the prescriptive level, we identified that the constitutive characteristics of the Canvas are first, its matrix-like structure and second, the semantic proximity it prescribes for its components. We also identified that the constitutive characteristics of the business model idea generation task are first, the importance of an integrated and holistic perspective on the components and second, of considering interdependencies between the components.

At the explanatory level, we identified CCFT as the overall theoretical foundation for our research. CCFT states that when the characteristics of a problem representation structure and a problem solving task match (i.e., they exhibit cognitive fit), this leads to higher problem solving performance than if there is a mismatch between problem representation and task. However, CCFT cannot tell us to what extent and whether at all the Canvas exhibits cognitive fit with the task of business model idea generation. Therefore, we draw on competition-for-attention theory, scanpath theory, and the proximity compatibility principle. First, competition-for-attention theory states that a matrix structure leads to more equally distributed attention than a list, which is conducive to an integrated and holistic perspective. Second, competition-for-attention theory together with scanpath theory states that a matrix structure, compared to a list,

[6] Design theories can have three maturity levels (Kuechler and Vaishnavi 2012): The first (and least mature) level includes only an *artifact* whose usefulness has been demonstrated by thorough evaluation. The second level includes an evaluated *artifact* and *prescriptive* knowledge that identifies what characteristics make that artifact useful. The third and highest level of maturity includes an *artifact*, *prescriptive* knowledge, and *explanatory* knowledge that identifies how the characteristics of an artifact make that artifact useful.

facilitates attention shifts, which is conducive to an integrated and holistic perspective as well as to considering interdependencies. Third, the proximity compatibility principle states that semantic proximity facilitates devoting attention to multiple components (i.e., integrating information), which is conducive to considering interdependencies between components. Moreover, the Canvas exhibits at least as much semantic proximity as the list (based on the argument that in the list the components are proximal to at *most* two components, while in the Canvas they are proximal to at *least* two components). Taken together, these considerations lead to the following hypothesis:

> *Hypothesis 1: Using the Canvas leads to a higher level of cognitive fit with the business model idea generation task than using the list.*

In addition, in the context of the proposition of CCFT – that higher levels of cognitive fit lead to higher levels of problem solving performance – the following hypothesis can be derived:

> *Hypothesis 2: Business model idea quality is higher when using the Canvas than when using the list.*

5. Testing Whether the Canvas' Visual Template Leads to Cognitive Fit (Study 1)

For testing our first hypothesis, that is, whether the Canvas leads to a higher level of cognitive fit with business model idea generation than the list, we conducted a scenario-based online survey on the crowdsourcing platform Crowdflower.com. Recent research shows that scenario methods can produce comparable results to direct interventions (e.g., Cremer and van Knippenberg 2004; van Knippenberg and van Knippenberg 2005). Moreover, in the context of visualizations, crowdsourcing-based data collection has been shown to favorably compare to other data collection methods (e.g., (Heer and Bostock 2010), and therefore is well-accepted in recent visualization research (e.g., Rodgers et al. 2015; Yang et al. 2014).

5.1. Sample and Procedures

We recruited 103 participants who received $0.40 in exchange for their participation. Participants received brief descriptions of what a business model is and how visual templates can be used to support business model idea generation. We showed them the list and Canvas visual templates and asked them to read the following scenario:

> *Please take a moment and for each visualization try to imagine that you would be generating ideas with that visualization. That is, you would (as described above) record many partial ideas in the various components, would frequently shift attention between partial ideas, and continually extend/modify the ideas.*

We then asked participants to answer a number of questions on how they perceived the visual templates and how confident they were in their answers. We measured cognitive fit with the business model idea generation task through two items that correspond to the two characteristics of the task described earlier (*"The matrix-like [list-like] visualization makes it easy for me to consider the business model components in an integrated and holistic fashion," "The matrix-like [list-like] visualization makes it easy for me to consider interdependencies between the business model components")*. Cronbach's alpha for these items was 0.88 for the matrix and 0.83 for the list. Hence, we averaged the items for further analysis. To capture the extent of manipulation achieved with the visualizations, we added *"I was confident in answering the questions"* and *"I was well able to imagine how to use the visualizations"*. All items were measured on seven-point scales (where 1 equaled *not at all accurate*, and 7 equaled *very accurate*). To eliminate potential order effects, we randomly assigned to participants either a survey that showed the Canvas above the list, or a survey that showed the list above the Canvas (we switched the order of questions accordingly). Moreover, we asked participants to indicate whether they had already heard of the term *"Business Model Canvas"* (for the full instructions, see Appendix B).

5.2. Results and Discussion

We eliminated the responses from participants who indicated they had already heard of the Canvas, which yielded a final sample of 81 participants (for 41 participants the Canvas was shown above the list). A Shapiro-Wilk test of normality indicated that the cognitive fit measure for the Canvas was significantly non-normal ($W = 0.94$, $p = 0.001$). Therefore, we used a Wilcoxon matched-pairs signed-rank test for comparing reported levels of cognitive fit for the Canvas and the list. Self-rated cognitive fit for the Canvas ($Mdn = 5.5$) was significantly higher than that of the list ($Mdn = 4.5$), $z = 3.32$, $p = 0.001$. Moreover, the average self-reported scores for answer confidence and the ability to imagine actual use of the visualizations were rather high, which indicates that the participants felt well able to evaluate the two visualizations (answer confidence: $M = 5.92$, $Mdn = 6$, $SD = 1.18$; imagination: $M = 5.28$, $Mdn = 6$, $SD = 1.47$). Taken together, this provides support for our first hypothesis that the Canvas leads to a higher level of cognitive fit with the business model idea generation task than the list. Therefore, next we turn to our second hypothesis, that is, we explore whether the higher level of cognitive fit of the Canvas actually translates into higher levels of business model idea quality.

6. Testing Whether the Canvas' Visual Template Increases Business Model Idea Quality (Studies 2-5)

When testing whether using the Canvas actually increases business model idea quality compared to the list (i.e., hypothesis 2), we encountered a number of unexpected results, which caused our empirical strategy to be rather emergent than planned. Therefore, in the following we outline the resulting empirical strategy for testing the second hypothesis, and do so to orient the reader through the detailed description that follows.

6.1. Overview of the Empirical Strategy

As experiments are an established method in research on creativity (e.g., Dahl and Moreau 2002; Goldenberg et al. 1999) and cognitive fit (e.g., Khatri et al. 2006; Zhu and Watts 2010), we investigated the link between the Canvas and idea generation performance through an experimental approach. We conducted individual pretests and four pilot studies to arrive at experimental materials and procedures that promised to adequately address the intricacies of our context. Following the pretests and pilot studies, we had initially planned to conduct only one experiment in which participants were asked to complete a business model idea generation task. Participants worked on that task in one of two between-subject conditions – list or Canvas – and idea quality was determined through blind-rating by expert raters. However, the results of study 2 were in the opposite direction of our theoretical prediction. That is, idea quality was significantly higher for users of the list than users of the Canvas, which triggered a series of further studies. To explore the robustness of our finding, with study 3 we conducted a replication study. That study affirmed the finding of study 2, as again idea quality was significantly higher for users of the list than users of the Canvas.

As a potential explanation for our results, in study 4 we explored whether the list's emphasis of customer segments and value proposition had led to our results: The good list emphasizes both, the value proposition and the customer segment component (this is indicated by the comparably low competition-for-attention scores that these components have in the list, see Figure 7), and preliminary analyses of the participants' ideas and of our evaluators' rating sheets had made us suspect that well-evaluated ideas had put more emphasis on these two components. To explore this explanation, in study 4 we let participants complete the idea generation task either with the original list (*'good list'*), or a list that we adapted to deemphasize the customer segment and value proposition components (*'bad list'*). We constructed the bad list by moving the five topmost components from the good list to the bottom (without changing the order), which results in the value proposition and customer segment components being in the middle, that is, being deemphasized by their high-competition-for-attention position (see Figure 7 and 8). However, the results of study 4 could not illuminate the prior findings, as the quality of the ideas from the good and bad list were not significantly different. Nonetheless, caution is needed for interpreting that finding because the diversity of ideas in study 4 was low compared to studies 2 and 3, which led to a comparably low reliability of the idea quality measure (our approach to idea quality assessment involved letting experts determine the quality of ideas relative to other ideas, which is difficult to achieve reliably when ideas are rather similar).

Good list	Bad list
Customer segments	**Key resources**
Value propositions	**Key activities**
Channels	**Key partnerships**
Customer relationships	**Cost structure**
Revenue streams	**Customer segments**
Key resources	**Value propositions**
Key activities	**Channels**
Key partnerships	**Customer relationships**
Cost structure	**Revenue streams**

Figure 8. Good list and bad list visual templates

Taken together, the experiments had indicated that in our context factors might be at play that are difficult to capture through a quantitative approach alone. Therefore, next we conducted a qualitative study in the form of a small-scale participatory observation within a field context. This choice seems reasonable given that qualitative studies are suggested to explain and expand upon the understanding derived in quantitative studies, and as such have *"great potential to illuminate context effects"* (Johns 2006, p. 402). The participatory observation in study 5 yielded the main insight that non-experts are overwhelmed by the complexity of the business model idea generation task. Therefore, they are not necessarily able to invoke the holistic perspective that would be conducive to business model idea generation. Rather, non-experts tend to consider the components individually.

With the findings from the participatory observation in mind, we revisited the results of the experimental studies. Indeed, manual inspection of the visual templates indicated that some participants did not invoke a holistic perspective but rather approached idea generation following their natural reading direction (left-to-right and top-to-bottom). This post-hoc insight corroborated the results of our qualitative study. More importantly, secondary analysis of the experimental data demonstrate that the different idea generation strategies of our participants (according to natural reading direction or otherwise) can explain why list users outperformed Canvas users in terms of idea quality. Having outlined our empirical strategy, we next describe our studies and the corresponding results in more detail.

6.2. *Experimental Studies (Studies 2-4)*

6.2.1. Overview of the Experimental Study Design

Laboratory experiments are established in creativity research for evaluating creativity techniques (e.g., Dahl and Moreau 2002; Goldenberg et al. 1999) and also in IS research for testing predictions that are grounded in cognitive fit theory (e.g., Khatri et al. 2006; Zhu and Watts 2010). As the Canvas is a creativity technique and our prediction is grounded in cognitive fit theory, we pursue an experimental approach for testing the prediction that the Canvas leads to higher business model idea quality than the list. However, notwithstanding the similarities with prior creativity and cognitive fit studies, our context comes with key methodological challenges that mainly arise out of the nature of the business model idea generation task and the widespread use of the Canvas in practice. Therefore, we devoted considerable effort to developing and refining the experimental materials and procedure. For that purpose, we conducted individual pretests with 13 participants and four pilot studies with altogether 346 participants with and without prior business model knowledge (see Table 1 for an overview). In the following, we describe our final study design(s) and justify the design decisions by making reference to the corresponding pilot studies.

Table 1. Overview of the studies conducted towards testing hypothesis 2 (shaded in grey: final study design)

Study	Method	Condition(s)	Training: Framing	Training: Example(s)	Task: Framing	Task: (Sample) Product	Incentivation	#Subjects
Pilot 1	Idea generation experiment	Canvas vs. *'good list'*	None	Several	*"be creative"*	Data glass	Extra course credit	62
Pilot 2			*"work hard during training"*					54
Pilot 3					*"be creative, no purchase-only"*			191
Pilot 4				One, structurally analogous to task	*"be creative"*	Perfume	Bonus + *Amazon* gift card	39
Main 2							Extra course credit	70
Main 3								89
Main 4		*'Good list'* vs. *'bad list'*						96
Main 5	Participatory observation	Canvas	not applicable	Several	not applicable	Flight drone	not applicable	2

∑ 603

Design and Procedure

We employed a between-subjects design with two conditions (in studies 2 and 3: Canvas vs. list; in study 4: *'good list'* vs. *'bad list'*). The experiment consisted of two parts: a *training* part to provide participants with the necessary knowledge on business models, and the actual *task* of idea generation (see Figure 9). The training part included a description of the nine components that the Canvas prescribes, a sample business model to illustrate the components, and a short questionnaire that asked participants to indicate how well they had understood the presented information. In the task part, participants were asked to generate creative business model ideas for the product *perfume*. For this task, as a point of departure, we provided them with a description of the business model of a traditional offline perfumery. Moreover, we gave them a prestapled bundle of five visual templates (*'scratch paper'*) for recording intermediate ideas, and a questionnaire for recording background information. The time permitted was 20 minutes for the training part and 35 minutes for the task part. Five minutes before task completion, we asked participants to select their best idea and copy that idea to a designated sheet within the task materials. After task completion, participants were asked to complete a questionnaire on background information without time constraints (for the content, see control variables). In pilot study 1, a lack of participant activity during the training part revealed that participants had not properly understood how important the training part was for the subsequent idea generation task. That is why from study 2 on we heavily emphasized the importance of the training part when introducing the experimental session.

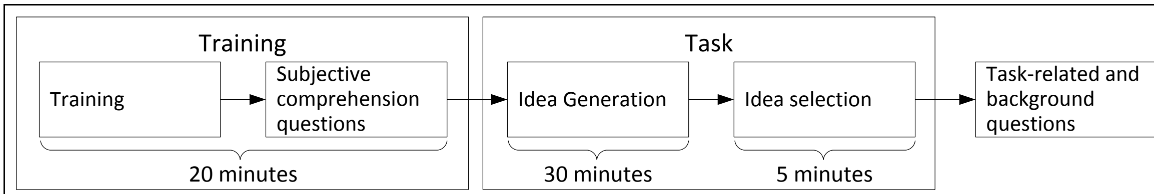


Figure 9. Experimental procedure

Materials

Participants were provided with two sets of materials that we each describe in turn: task and training materials. The task materials initially included the description of the product *data glass* (similar to *Google Glass*) rather than perfume. We had made that decision because we wanted to use a product that was likely to grasp participants' interest and curiosity. However, the resulting business model ideas were comparably uncreative, that is, a major share of the participants' ideas simply referred to selling the data glass online or offline. Given that constraints can increase creativity (Scopelliti et al. 2013), in pilot study 3 we introduced an additional constraint by framing the task differently. We did so by including the statement that *"due to the high price of the data glass (> 500 €), it would not be reasonable to simply sell that product. Rather, other revenue streams need to be identified"*. This indeed seemed to increase creativity to some extent. However, the resulting ideas mainly involved additional services/applications that the data glass could provide, which in many cases constituted ideas for product innovation rather than business model innovation. Moreover, participant feedback indicated that knowledge of the data glass was quite heterogeneous. While some participants stated they barely believe in the feasibility of the product, others indicated that they had already read reports about it multiple times. Hence, from pilot study 4 on we changed the product to be *perfume*, mainly for the following two reasons: First, perfume is an everyday product, which lowers the risk that prior knowledge is heterogeneous among participants. Second, perfume is a *'closed'* rather than an *'open'* product compared to the data glass. By this we mean that the data glass is a kind of platform, which inevitably invites thinking about product innovation in terms of additional services/applications. Perfume in contrast is rather used *'standalone'*, which gears creativity away from product innovation thinking and more towards business model innovation. In addition, the choice of the product perfume allowed us to provide participants with the description of a well-known existing business model (that of a traditional offline perfumery). We then instructed participants to take that business model as a starting point and deliberately try to innovate it – which compared to the data glass studies made it clearer to participants that they were not supposed to generate just any business model, but rather were supposed to be creative when developing their business model.

Concerning the training materials, for providing our participants with the necessary business model knowledge, we used a shortened version of the original description of the nine business model components from Osterwalder and Pigneur (2010, p. 18-41). For illustrative purposes, we complemented that description with the example of a *car dealer* business model that was structurally equivalent to the business model of the actual task (i.e., all information on revenue streams, channels etc. was the same as in the perfumery of the task materials, only the product was *cars* instead of *perfume*). We had initially refrained from providing a concrete example, because examples are likely to induce cognitive fixation and thereby limit creative performance (e.g., Jansson and Smith 1991). However, the individual pretests prior to our pilot studies had indicated that the rather abstract nature of the business model concept requires illustratory examples to adequately prepare participants for the task. Therefore, in pilot studies 1-3, we provided a number of sample business models that we presented through the nine business model components. The sample products were cars (with the business models car sharing and car rental) and movies (with the business models online and offline video rental). We chose the examples first, to illustrate to participants that business models can be substantially different from a simple *'sell a product for a given price'*. Second, using a variety of examples promised to reduce the risk that participants get fixated to any of them. To further reduce the risk for fixation, as suggested by Chrysikou and Weisberg (2005), we stated in the task description that participants should deliberately try to detach from the provided examples and from other (already existing) business models they know. Nonetheless, for pilot studies 1-3, a considerable share of ideas seemed rather similar to one of the examples. Hence, in pilot study 4 and the main studies we did not provide the mentioned examples. Rather, we presented one example only, which, as stated above, was structurally equivalent to the perfumery business model given as the starting point in the task.

Training and task materials were informationally equivalent across the experimental conditions. The only difference was that (depending on the experimental conditions) the materials included different visual templates for illustrating the example(s), and for recording intermediate ideas and the final idea (see Appendix C for the materials).

Participants and Incentivation

One specificity of our context is that participants without prior knowledge in business models would not be able to meaningfully work on the business model idea generation task. In that sense, in contrast to the vast majority of tasks in prior idea generation experiments, our task is not readily understandable for non-experts[7]. The natural choice then would be to use experts rather than non-experts, that is, to use participants that do have prior business model knowledge. However, given the great popularity of the Canvas among practitioners, prior exposure of expert participants to the Canvas would be highly likely, which would confound the results in the list conditions. Moreover, even if we identified potential experts that have not been exposed to the Canvas, this would rather question someone's expert status than make him or her better suited for our context. That said, from the business model perspective using expert participants was no reasonable option. Therefore, we had to revert to non-expert participants (which in our context meant that we recruited students) and train them in developing business models. From the perspectives of creativity and cognitive fit research, this is unproblematic as it is well-accepted practice to employ student participants (for cognitive fit, e.g., Khatri et al. 2006; Zhu and Watts 2010; for creativity, e.g., Baer et al. 2010; Girotra et al. 2010). Particularly in cognitive fit-based studies, the theoretical rationale for using students is strong because the mechanisms underlying cognitive fit *"apply to generalized human cognition"* rather than past experience and expertise (Zhu and Watts 2010, p. 341, building on Besuijen and Spenkelink 1998), and hence are valid rather independently from an individual's background. Consequently, for our studies we recruited students from undergraduate courses whose content includes business models. The participants' background mainly lies in business administration and related majors (e.g., information systems, international business studies).

To incentivize participation, the experiments were part of a series of assignments that covered course contents and, when completed, endowed students to earn 5% extra course credit. As part of the protocol, after participants had finished, we asked them for feedback on the task. Many reported that the task was interesting and that they wish more such assignments. Hence, while showing up for the experiment was mainly driven by course credit, actual task completion seemed to be driven by intrinsic motivation. Nonetheless, given the low levels of creativity we observed in pilot studies 1-3, and given that creativity-contingent rewards tend to increase creative performance (Byron and Khazanchi 2012), in pilot study 4 we offered *Amazon* gift cards worth 50 € for the best three ideas. However, this unfortunately made participants suspect that we conduct the experiment for commercial, rather than educational or scientific reasons. For example, already while we were distributing the experimental materials in pilot study 4, one participant exclaimed *"We get 50 € and you become millionaires?!"*. The written feedback echoed that worry. Hence, for the main studies we reverted to incentivizing participants through extra course credit only.

Measurement of Control Variables

Prior research suggests a number of individual-level characteristics that are related with the creativity of one's ideas and one's performance in using visual modeling approaches. In our study, we specifically consider *personal creativity* (following (Franke et al. 2013)), *method knowledge* (i.e., prior knowledge of the business model concept) and *domain knowledge* (i.e., prior knowledge of the modeling domain) (following Gemino and Wand 2004). First, to measure personal creativity, we use the four-item scale developed by (Franke et al. 2013) (*"I enjoy spending time looking beyond the initial view of the problem," "I enjoy working on ill-defined, novel problems," "I enjoy stretching my imagination to produce many ideas," "I like to work with unique ideas"*; Cronbach's alpha = 0.83). Second, we measured method knowledge concerning business models/the business model components using two items adapted from Bera et al. (2011) (*"To what extent do you know business models [the business model components]?," "To what extent do you have experience in using business models [the business model components]?"*). We provided these items in multiple variations to cover (1) the knowledge that participants had prior to the experiment, (2) after training but before task completion, and (3) after task completion (Cronbach's alphas were consistently above 0.8). Third, we measure domain knowledge using a four-item scale

[7] Prior creativity studies typically employ tasks that non-experts can readily understand, such as developing ideas for sleeping mattresses (Goldenberg et al. 1999), for eating safely in a moving vehicle (Dahl and Moreau 2002), for sporting goods (Girotra et al. 2010), skating equipment (Franke et al. (2013), or technologies for classroom use (Kornish and Ulrich 2011).

adapted from Chang (2004) (*"I know a lot about perfume," "I would consider myself an expert in terms of my knowledge of perfume," "I know more about perfume than my friends do," and "I usually pay a lot of attention to information about perfume products"*; Cronbach's alpha = 0.90). All items were measured on seven-point scales (where 1 equaled *not at all accurate*, and 7 equaled *very accurate*) and items for these variables were averaged for further analysis. In addition, concerning method knowledge, we asked participants how many business models they had developed during the preceding two years (in general and specifically using the nine components). Finally, we asked participants how many months they had worked in retail so far, and used a number of items that addressed the ways and intensity in which participants had used their scratch paper.

Measurement of Idea Quality

For determining the quality of the generated ideas, we recruited three mentors from our university's entrepreneurship center and one senior in-house consultant from a large corporation. Through their professional backgrounds, all of them were skilled in developing and assessing business models. While the mentors are responsible for counseling academic founders concerning their efforts of developing viable business models, the consultant had that responsibility in the context of corporate innovation projects. Hence, the qualifications of our experts compare favorably with those reported in prior research (e.g., Baer et al. 2010; Scopelliti et al. 2013). One expert evaluated ideas in all three studies, the other three evaluated ideas in one study, which for each study yielded independent evaluations from two experts.

Before evaluating the ideas, the experts were given a brief introduction in which they were informed about the evaluation criteria and the rating scales. The aim of this introduction was that all experts had a comparable understanding of the task and of the rating standards to be applied. The experts were blind to the source condition of each idea and to the purpose of the experiment. Following Amabile (1996), we instructed the experts to rate the ideas relative to each other rather than to rate them against some absolute standard. Furthermore, an idea was considered creative to the extent that it was both novel and useful (following, e.g., Amabile 1996; Baer et al. 2010). As is typical in idea generation studies in innovation research, we asked experts to determine idea quality from the customer perspective rather than the firm perspective. The is because in early innovation phases the primary focus should be on generating ideas that appeal to customers (Kornish and Ulrich 2014) – because without customer interest, firm-specific considerations, such as the amount of effort needed to implement an idea, are irrelevant. This is in line with business model research, which argues that *"value creation comes first – the business model starts by creating value for the customer"* (Massa et al. 2017, p. 91). Finally, we instructed the experts to try determining the *'intrinsic'* creativity of the ideas, that is, disregard any language-related weaknesses they might observe.

As the experts had to rate a large number of ideas, and as the ideas were comparably complex, we took a number of measures to reduce rater fatigue and ensure a consistent application of the criteria throughout the rating task. Above all, the experts were provided as much time as they wanted and were encouraged to take breaks to avoid fatigue. Moreover, they were advised to adhere to the following three-step procedure of (1) familiarize, (2) evaluate, and (3) reevaluate. In the first step, they were instructed to read through all ideas to familiarize themselves with the ideas' content. For this step, the experts were also asked to highlight the parts of the ideas that drove their creativity evaluation. This allowed them to go through subsequent steps more efficiently, and allowed us to better understand how the experts determined their ratings. In the second step, the experts were asked to read through the ideas again and rate each idea using a scale ranging from *"not at all creative"* (1) to *"very creative"* (7) (following prior research, e.g., Baer et al. 2008; Silvia 2011). In the third step, raters were asked to group their ideas according to the assigned quality evaluation (i.e., 1, 2 etc.), and then to go through all ideas again. In this final step, they were instructed to check whether idea quality within the groups (i.e., within the ideas rated with 1, within the ideas rated with 2 etc.) was in fact comparable, and to adjust ratings if necessary.

The resulting interrater reliabilities were satisfactory for studies 2 and 3 (Cronbach's alpha = 0.79 for study 2 and 0.77 for study 3) and questionable for study 4 (Cronbach's alpha = 0.57) (according to the rules of thumb suggested by George (2003), values > 0.9 are excellent, > 0.8 are good, > 0.7 acceptable, > 0.6 questionable, > 0.5 poor, and < 0.5 unacceptable). We averaged the expert evaluations for further analysis, and discuss the implications of the low interrater reliability of study 4 evaluations in the context of that study. Examples of ideas evaluated as highly creative included *selling perfume through parties with friends at home* (akin to *Tupperware* parties), *offering workshops in which customers can learn* *how to produce perfume themselves* and using these workshops as a source of new perfume ideas, *selling subscription packages* that include monthly payment and delivery of a selection of perfumes in small package sizes, and *addressing corporate customers that may want to have a standard fragrance for their sales staff or buildings*. Ideas evaluated as less creative included *opening an online shop*, *redesigning the sales rooms* to be more appealing to customers, *offering only expensive perfumes*, and *giving perfume samples to customers for free*.

6.2.2. Studies 2 & 3: Canvas vs. Good List

Participants and Procedure

In study 2, 70 students from an undergraduate e-business course participated. We eliminated the data from six participants because their ideas indicated they had not taken the task seriously (the ideas did not address perfume) and from five others because of their prior method knowledge, which may have confounded the results (they indicated they had already developed at least one business model using the nine components). This yielded a final sample of 59 participants (M_{age} = 20.54, SD_{age} = 2.13). In study 3, 91 students from an undergraduate course on IT business value participated, of whom we eliminated the data of seven because they had not taken the task seriously (as indicated by the content of their ideas or by missing responses in the questionnaires) and of 26 because of their prior method knowledge. This yielded a final sample of 58 participants (M_{age} = 22.86, SD_{age} = 1.96). In study 3, the high share of participants with prior method knowledge was due to some students being enrolled in both courses, and therefore taking part in the experiment for the second time. In both studies, participants were randomly assigned either to the Canvas or the good list condition; the other aspects of our experimental setting were implemented as described above in our overview of the experimental study designs.

Results and Discussion

In study 2, contrary to the prediction of hypothesis 2, idea quality for the good list (M = 4.26, SE = 0.21) was higher than for the Canvas (M = 3.63, SE = 0.28), $t(57) = 1.75$, $p = 0.09$. Study 3 replicates this result, as idea quality for the good list (M = 4.65, SE = 0.22) was again higher than for the Canvas (M = 4.08, SE = 0.23), $t(56) = 1.77$, $p = 0.08$. When pooling the data from studies 2 and 3, idea quality for the good list (M = 4.45, SE = 0.15) was significantly higher than for the Canvas (M = 3.86, SE = 0.18), $t(115) = 2.40$, $p = 0.02$. This result is rather surprising, given that our theoretical prediction was the exact opposite of this result, and given that in contrast to the list the Canvas is widely used and appreciated in practice. To identify potential reasons for this unexpected result, we focused mainly on three potential issues: (1) the effectiveness of our randomization procedure, (2) the validity of our idea quality measure, and (3) the effectiveness of our manipulation (as intended through our materials).

(1) Randomization: It seems that participant characteristics were adequately balanced across conditions, which suggests that the results are not driven by inadequate randomization. Table 2 (next page) shows that for study 2 participant characteristics are statistically identical for all variables that we measured (e.g., age, prior domain knowledge). For study 3, with age there is one exception, which is also significant when data from studies 2 and 3 are pooled together. However, the imbalance in participant age does not affect our results because age is seemingly unrelated to idea quality. The p-value of the hypothesis that age has no effect on idea quality is 0.78 (SE = 0.13) if estimated for all three experiments, and 0.57 (SE = 0.18) if estimated for studies 2 and 3 (based on regression with robust standard-error estimates).

(2) Idea quality measure: Concerning the validity of our idea quality measure, one could question its validity in general, and more specifically could conjecture that the list possibly was unduly favored by our evaluation procedure (which included presenting the ideas through lists). To shed light on the general validity of our idea quality measure, both authors performed additional evaluations of the ideas. This seemed justified given that both authors are knowledgeable in business models, and hence a reevaluation that is consistent with the experts' evaluations would give further credibility to the idea quality measure. Accordingly, both authors reevaluated the ideas using the same procedure as the experts. Both authors evaluated the ideas of study 2; the first author also evaluated the ideas of study 3. These evaluations did support the general validity of the employed creativity measure from at least two angles. First of all, interrater reliabilities of the authors' and the experts' evaluations were considerably high (Cronbach's alpha = 0.84 for study 2 for four evaluators, and 0.79 for study 3 for three evaluators). Second, the results

of the hypothesis tests remained qualitatively the same, irrespective of the evaluators that individual evaluations are drawn from.

Table 2. Randomization checks for participant characteristics

Variable	Study 2			Study 3			Study 2 and 3			Study 4		
	M	SD	p-value	M	SD	p-value	M	SD	p-value	M	SD	p-value
Demographics (age)	20.54	2.13	0.19	22.86	1.96	0.01[1]	21.67	2.34	0.02[2]	21.93	1.52	0.46
Demographics (semester)	2.17	0.60	0.19	6.12	1.60	0.37	4.13	2.32	0.13	5.25	1.51	0.13
Prior domain knowledge (perfume)	2.38	1.52	0.75	2.58	1.28	0.30	2.49	1.17	0.37	3.02	1.48	0.61
Prior domain knowledge (months worked in retail)	5.03	10.34	0.60	13.16	42.56	0.93	9.05	30.99	0.63	5.00	10.13	0.69
Prior method knowledge (business models)	2.43	1.34	0.85	2.63	1.22	0.15	2.53	1.28	0.43	3.28	1.15	0.19
Prior method knowledge (business model components)	1.93	1.06	0.89	2.11	1.27	0.41	2.02	1.17	0.65	2.90	1.32	0.84
Prior method knowledge (developed business models)	0.26	0.74	0.48	0.29	0.99	0.37	0.28	0.87	0.22	0.35	0.81	0.79
Creative personality	5.44	1.02	0.89	4.91	0.95	0.28	5.17	1.02	0.56	4.98	1.11	0.66

Notes: For each study, the first two columns show the means and standard deviations; the last column contains the p-value for the null hypothesis of perfect randomization (Wilcoxon rank sum test, shaded in grey: $p \leq 0.1$). [1] Canvas: M=23.53, good list: M=22; [2] Canvas: M=22.23, good list: M=21.06.

After having confirmed the general validity of our idea quality measure, we further explored whether the list was potentially favored by how we presented the ideas to the experts. We had no reason to assume that the form of idea presentation (list or Canvas) plays a role in the evaluation process. Thus we had opted for presenting all ideas to our experts through lists due to lesser administrative effort for this format. Furthermore, we had explicitly asked the experts to determine the *'intrinsic'* creativity of the ideas, and to disregard any aspects that concern how the ideas are presented (we made specific reference to language-related weaknesses). However, to corroborate our assumption that the format of idea presentation is irrelevant, the first author reevaluated the ideas from study 2 with the ideas being presented through the Canvas. Test-retest reliability was considerably high (Cronbach's alpha = 0.92) and also with the Canvas-based idea evaluation the results of the corresponding hypothesis test remained qualitatively the same. This supports the notion that the presentation format does not confound our results. Learning effects are unlikely to drive test-retest reliability because the two evaluations were made three months apart. Nonetheless in hindsight it would have been better to provide half of the experts with evaluation sheets in the Canvas format right away.

(3) Manipulation: Having established the effectiveness of our randomization and the validity of our dependent variable, we investigated to what extent our materials had effectively manipulated how participants approached the business model idea generation task (see Table 3). Self-reported method knowledge did not differ between experimental groups in any study, indicating that the experimental materials were indeed equivalent and did not provide an advantage to either of the groups. Moreover, average self-reported method knowledge was consistently higher than five (on a seven-point scale), which suggests that participants on average were well-prepared for their tasks. Another potential confound could be that list users realize that the list does not well-support their task and refrain from using it. This would imply that list users are not better because they *do* use the list, but rather because they *do not* use it. However, differences in subjective measures of usage intensity of the scratch paper are all insignificant. Only for study 2, our objective measure of usage intensity indicates that participants in the list group used more sheets of the scratch paper (we coded a sheet as *'used'* if a participant had produced content on it – regardless of the amount of content). However, this is unlikely to drive our results as within the pooled data this variable does not even approach significance. Last but not least, we checked to what extent participants engaged in a perspective conducive to business model idea generation. That is, to what extent they felt they had invoked an integrated and holistic perspective, and to what extent they had considered interdependencies between the components. Surprisingly, participants in the list group are better at least concerning the interdependency characteristic of the business model idea generation task, which sharply contrasts our results from our scenario-based survey in study 1.

Taken together, studies 2 and 3 yield results that in terms of idea quality are highly consistent with each other, but contradictory to the predictions of our hypotheses and the results of study 1. Moreover, secondary analysis of our data provided no indication that our experimental setting suffered from apparent validity concerns. Nonetheless, through evaluating the ideas ourselves, we received the impression that the nine components might not be equally important. Rather, we had the impression that the customer segments and the value proposition components were more important as sources of creativity than the other components. This would contribute to explaining the results of studies 2 and 3 because the list emphasizes both components, the value proposition and the customer segments component (as indicated by the comparably low competition-for-attention scores that these components have in the list, see Figure 7). Study 4 therefore seeks to shed light on this alternative explanation.

Table 3. Manipulation checks

Variable	Study 2			Study 3			Study 2&3			Study 4		
	M	SD	p-value	M	SD	p-value	M	SD	p-value	M	SD	p-value
In-experiment method knowledge (after training)	5.25	1.32	0.86	5.45	0.90	0.31	5.35	1.08	0.62	5.25	1.27	0.75
In-experiment method knowledge (after task)	5.64	1.03	0.76	5.51	1.11	0.17	5.58	1.07	0.42	5.45	0.88	0.71
Subjective sheet use (*"I used the sheets intensively"*)	4.47	1.44	0.31	4.46	1.83	0.21	4.67	1.63	0.12	4.42	1.29	0.99
Subjective sheet use (*"I used many sheets"*)	3.05	1.63	0.18	2.91	1.65	0.60	2.98	1.63	0.18	2.81	1.54	0.55
Subjective sheet use (*"the sheets helped me"*)	4.51	1.71	0.92	4.07	1.68	0.52	4.29	1.70	0.67	4.21	1.59	0.85
Objective sheet use (number of sheets with notes on)	2.09	0.88	0.08[1]	2.00	1.06	0.96	2.04	0.97	0.19	2.14	1.11	0.70
Cognitive fit (averaged)	5.19	1.04	0.49	4.69	1.28	0.11	4.94	1.19	0.43	4.62	1.10	0.27
Cognitive fit (integrated and holistic perspective)	5.10	1.34	0.27	4.61	1.45	0.24	4.85	1.14	0.90	4.63	1.30	0.91
Cognitive fit (interdependencies)	5.27	1.13	0.44	4.77	1.49	0.06[2]	5.03	1.33	0.05[3]	4.61	1.33	0.09[4]

Notes: For each study, the first two columns study show the means and standard deviations; the last column contains the p-value for the null hypothesis of no difference (Wilcoxon rank sum test, shaded in grey: p≤0.1). In-experiment method knowledge refers to the business model components. [1] Canvas: 1.90, good list: M=2.28; [2] Canvas: M=4.44, good list: M=5.20; [3] Canvas: M=4.77, good list: M=5.31; [4] good list: M=4.90, bad list: M=4.32.

6.2.3. Study 4: Good List vs. Bad List

Participants and Procedure

To explore the explanation that the superior idea quality of list users in studies 2 and 3 was driven by the list's emphasis of value proposition and customer segments, we constructed an alternative list representation that deemphasized these two components. We constructed the alternative list representation (*'bad list'*) by moving the five topmost components from the original list (*'good list'*) to the bottom, without changing their order. This results in the value proposition and customer segment components being in the middle of the list, and therefore being deemphasized by their high-competition-for-attention position (see Figure 7). In study 4, participants were then randomly assigned either to the good list or the bad list condition; the other aspects of our experimental setting were implemented as in studies 2 and 3.

In study 4, 96 students from an undergraduate entrepreneurship course participated. We had to eliminate the data from three participants because their ideas indicated that they had not taken the task seriously (the idea did not address perfume) and from 36 others because of their prior method knowledge (they had already developed at least one business model using the nine components). This yielded a final sample of 57 participants (M_{age} = 21.93, SD_{age} = 1.52). Again, the high share of participants with prior method knowledge was caused by some students being enrolled in our other courses, and therefore not taking part in the experiment for the first time.

Results and Discussion

While we had expected the good list to outperform the bad list, this time there was no significant difference in idea quality between the two conditions: good list (M = 3.33, SE = 0.22), bad list (M = 3.36, SE = 0.19), $t(55) = 0.10$, $p = 0.92$. To explore potential reasons for this (once again) surprising result, as with our earlier studies, we investigated the effectiveness of our randomization procedure, the validity of our idea quality measure, and the effectiveness of our manipulation (as intended through our materials). Our randomization did not raise any concerns (see Table 2), as did the majority of our manipulation checks (see Table 3). Regarding the latter, it is only noteworthy that participants in the good list condition tended to consider interdependencies more intensely than participants in the bad list condition ($p = 0.09$). However, the third aspect, that of idea quality, raised concerns because the interrater reliability for study 4 was rather poor (Cronbach's alpha = 0.57). As the evaluation procedure was the same as in studies 2 and 3, and one expert was the same in all three studies, potential reasons for the low reliability include the characteristics of the second expert and the nature of the ideas (that for whatever reason might impede reliable evaluation). To shed light on the idea quality issue, the first author reevaluated all ideas from study 4 using the same procedure as the experts. However, in contrast to studies 2 and 3, the resulting interrater reliabilities were rather low (Cronbach's alpha = 0.60 with the first and 0.61 with the second expert), which suggests that the reason for the low interrater reliability of the experts lies rather within the ideas than the experts. A potential explanation is that participants in study 4 generated ideas that were rather similar to each other. That is, the diversity in idea content and quality was apparently lower in study 4 than in studies 2 and 3, which makes the evaluation hard to perform reliably. However, this interpretation is highly conjectural, as it is solely based on the subjective impression gained by the first author and one of the experts. This impression cannot be substantiated quantitatively, as the evaluation procedure involved determining idea quality relative to the overall quality of ideas in a given study rather than against some absolute standard (i.e., on a seven-point scale, the most creative idea within a given study is judged seven, regardless of how that idea would be evaluated relative to the most creative ideas of the other studies).

To summarize, the results of study 4 did not help to illuminate the results of the previous studies. Moreover, unfortunately for study 4 it is not even clear whether its results are surprising but at least valid, or whether the results themselves are invalid. Consequently, the results should be interpreted with caution. In the following, we focus our presentation on further illuminating the results of studies 2 and 3, which were consistent and seemingly valid. Nonetheless, that the results of these studies are so hard to reconcile with our theoretical predictions, suggests that in our context factors might be at play that are difficult to capture through a quantitative approach alone. Therefore, next we conducted a qualitative study in the form of a small-scale participatory observation within a field context.

6.3. Participatory Observation (Study 5)

To better understand how non-experts approach idea generation with visual templates, the first author conducted a participatory observation at a business model idea generation workshop in a field context. The workshop was part of a public-private research project on business models for cyber-physical systems, and had the aim of developing business model ideas for a commercial aerial drone[8]. A workshop setting was suitable for illuminating how templates are used in practice because a major share of strategy making and business model development takes place in meetings and workshops (Johnson et al. 2010). Moreover, it is typical for business model development and strategy making that they require people from different organizational functions to collaborate (Jarzabkowski and Kaplan 2015), and the workshop included people with different functional backgrounds. We implemented the observation through an exploratory single-case study design, which is well-suited when it is not yet clear which phenomena are most important, and open-ended information search is needed rather than information search based on predefined protocols (Yin 2013).

Participants and Procedure

Apart from the first author, the workshop group consisted of two project managers with an engineering background (henceforth, *engineers*) and three research assistants with a marketing background (henceforth, *marketers*, of whom one acted as facilitator during group work). On the first workshop day, the facilitator gave a brief introduction into business models, which was followed by a brief presentation

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[8] For details on the project *GEMINI - Business models for Industry 4.0*, see http://www.autonomik40.de/en/1883.php, last accessed: 25th November, 2015.

and discussion of our experimental results. Then, in a 3-hour session, participants collaboratively developed an understanding of the so far intended value proposition and the to-be-addressed customer segments. Prior to the workshop, the marketers had not been familiar with aerial drones, and the engineers had not been familiar with business models. Hence, developing a joint understanding of the value proposition and customer segments involved numerous questions by the marketers to elicit domain knowledge from the engineers, and questions from the engineers concerning the business model concept. For this workshop session, each participant had a sheet with the *Value Proposition Canvas* (Osterwalder et al. 2014) for recording intermediate ideas (the Value Proposition Canvas is complementary to the Business Model Canvas, and is intended to facilitate focusing on the value proposition and customer segments, see Appendix D for an illustration). The facilitator kept track of all ideas on a separate Value Proposition Canvas sheet.

On the second workshop day, in another 3-hour session, participants collaboratively worked on generating business model ideas. To capture intermediate ideas, participants were provided with scratch paper that showed a Canvas-like visual template for business model idea generation: That visual template, akin to the Canvas, laid out the nine business model components in a matrix-like fashion and considering semantic proximity. However, the employed template had two additional components: One captured the *organizational form* chosen to implement a business model, the second captured the *products/services* that are offered through a business model (and hence in that template are captured separately from the value proposition, see Appendix D for an illustration of the template). As on the first day, the facilitator kept track of all ideas on a separate sheet.

The first author participated in both workshop sessions and at times was actively involved in the discussions. Still it was possible at any point in time to cease active participation and take notes. These notes broadly covered the general progress of the idea generation activity as well as specific utterances of participants (utterances that allowed making inferences of the participants' perception of the task). The key insight taken away from the workshop (see below) was rather obvious because participants repeatedly made corresponding remarks. Still, to enhance the credibility of the study, the interpretation of these remarks was triangulated through post hoc discussion with the facilitator.

Results and Discussion

All participants were highly motivated and the discussions were invariably constructive. This includes also that the questions that the marketers had concerning the aerial drone domain and the questions that the engineers had concerning business models were answered in a constructive manner. However, one issue repeatedly became evident during the business model idea generation task on the second day: The engineers were not able to invoke an integrated and holistic perspective on the components. Rather, after some time they felt overwhelmed by the complexity of the business model concept. This was evident in that they repeatedly commented that the task is quite demanding and that it is hard to consider so many aspects of a business model concurrently.

While our workshop setting underlies a number of limitations, which especially include the single-case design and the limited number of participants, it is still suggestive of a potential reason for our experimental results: That non-experts are not necessarily capable of invoking a holistic and integrated perspective on the business model components. Therefore, in the following we revisit our experimental results to explore whether this reason might have been at play in our experiments.

6.4. Synthesizing Experimental and Observational Results

The results of our participant observation provoked the following three questions. First, did our experimental participants also have problems in invoking a holistic and integrated perspective, and rather focused on a few components (or only one) at a time? Second, if participants had indeed focused on a few components only, did our experimental conditions influence which components they actually focused on? And third, if our experimental conditions had actually influenced which components our participants focused, is there a relationship between the components that participants focused and resulting idea quality? Answering these three questions would help to establish a link from our experimental conditions to the resulting idea quality, and thereby help to explain our experimental results. We approached these questions by revisiting the materials that our participants had produced. To preview the results, what we find is that our participants did indeed have a problem with invoking a holistic perspective on the components and rather had a selective focus. Moreover, our experimental conditions did influence which components participants actually focused, that is, some participants did not invoke a holistic perspective but rather let their natural reading direction dominate the order in which they approached the components. In the Canvas condition, this led to that participants had differing strategies. Some participants pursued *resource-focused idea generation*, that is, in line with their natural reading direction they approached resource-side components first (i.e., key activities, key resources, key partners, cost structure). Other Canvas users pursued *demand-focused idea generation*, that is, they focused on the demand-side components first (i.e., customer segments, value proposition, customer relationships, channels, and revenue streams). In contrast, participants in the list condition, in line with their natural reading direction, consistently pursued more demand-focused than resource-focused idea generation (note that the demand-side components are shown in the upper half of the good list). Finally, we do find a relationship between the components that participants focus and idea quality. More specifically, demand-focused idea generation, compared to resource-focused idea generation, increases idea quality. This helps to clarify and explain our experimental results: Given that the share of participants that pursue demand-focused idea generation is higher in the list than the Canvas condition, and given that demand-focused idea generation translates into higher idea quality than resource-focused idea generation, it becomes understandable why the average idea quality is higher in the list than the Canvas condition. Having summarized the results, we next turn to our procedure for arriving at these results.

Procedure

We followed a *visual analysis* approach that involves the analysis of *"visual evidence of artifacts as they are used and as they change over time"*, which has been proposed by strategy scholars to understand the actual rather than the intended use of strategy tools (Jarzabkowski and Kaplan 2015, p. 553). Recall that every participant received scratch papers in the form of a prestapled set of five visual templates that complied with his or her experimental condition. We inspected these scratch papers, and for those that were not completely filled we coded which components were filled and which were not (N = 22 for the Canvas, N = 19 for the good list). In so doing, our aim was to better understand with what strategy participants approached the components during idea generation (as the components that a participants starts with are likely to seem more important to that participant and/or are likely to receive more attention than components addressed later). If a participant among the five sheets had more than one partially filled sheet, we used the last of these, acting on the assumption that the last sheet would reflect the most mature state of knowledge that a participant had during the experiment. We ignored all scratch papers from participants that did not have partially filled scratch paper, as for these participants it would not be possible to post-hoc determine their strategy for approaching the components.

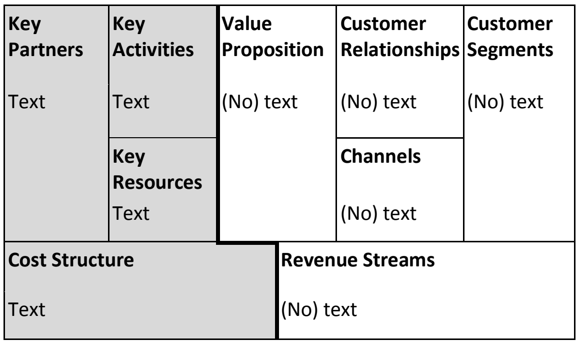
Results

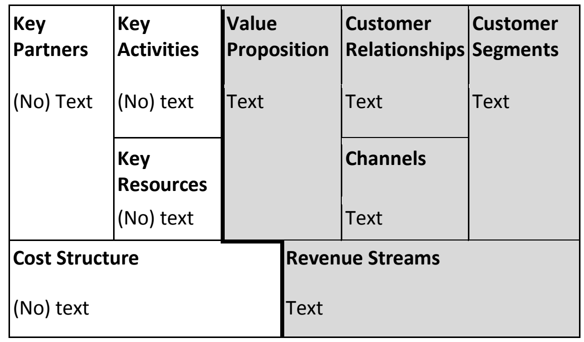
We first investigated how resource-focused idea generation in general affects idea quality compared to demand-focused idea generation. For this purpose, we considered participants as pursuing resource-focused idea generation if they had addressed all resource-side components, but had not addressed all demand-side components. We considered participants as pursuing demand-focused idea generation if they had addressed all demand-side components, but had not addressed all resource-side components (see Table 4). The results show that participants with a demand-side focus produce ideas that are of substantially higher quality than the ideas of participants with a resource-side focus, regardless of whether we look at the Canvas and good list combined, or at the Canvas only.

Second, having investigated idea generation at the aggregate level (taking together the components of the resource and the demand-sides respectively), we investigated the relation between the addressed components and idea quality at the component-level (see Table 5). Taking together participants from the Canvas and the good list conditions (case (a) in Table 5), the pattern that we observed at the aggregate level is fully replicated. That is, not addressing a component from the demand-side (which tends to indicate a resource-side focus) leads to lower idea quality, while not addressing a component from the resource-side (which tends to indicate a demand-side focus) leads to higher expected idea quality. When we focus on the participants that used the Canvas only, the results are similar but not as clear-cut (case (b) in Table 5). Again, not addressing a demand-side component leads to lower idea quality, and at least for key partners and cost structure, not addressing these resource-side components leads to higher idea quality.

Table 4. Idea quality depending on the aggregate level idea generation strategy

Resource-side-focused idea generation (= resource-side fully addressed, demand-side not fully addressed)	**Demand-side-focused idea generation** (= demand-side fully addressed, resource side not fully addressed)





Experimental groups	**Resource-focused**		**Demand-focused**	
	N	**M**	**N**	**M**
Canvas and good list	5	3.40	15	**4.60**
Canvas only	4	3.13	6	**4.17**

Notes: '*Text*' = component has been addressed, '*(no) text*' = component has or has not been addressed (but at least one of the *(no) text* components has not been addressed). M = mean idea quality, N = number of participants who could be identified to pursue the given idea generation strategy, bold: higher idea quality.

Table 5. Idea quality depending on component-level idea generation strategy

Variable	**(a) Studies 2 and 3 (Canvas and good list)**			**(b) Studies 2 and 3 (Canvas only)**		
	$\mathbf{N_{unad}}$	$\mathbf{M_{unad}}$	$\mathbf{M_{ad}}$	$\mathbf{N_{unad}}$	$\mathbf{M_{unad}}$	$\mathbf{M_{ad}}$
Customer segments	14	3.89	**4.17**	10	3.7	**3.89**
Value proposition	11	3.91	**4.16**	6	3.17	**3.94**
Channels	16	3.94	**4.16**	10	3.35	**3.96**
Customer relationships	22	3.98	**4.17**	13	3.27	**4.02**
Revenue streams	21	4.02	**4.16**	13	3.38	**3.99**
Key resources	22	**4.23**	4.12	14	3.71	**3.91**
Key activities	22	**4.39**	4.09	10	3.75	**3.88**
Key partners	26	**4.54**	4.02	10	**3.95**	3.85
Cost structure	27	**4.50**	4.03	12	**3.92**	3.85

Notes: For (A)-(B), the first column shows the number of participants who left a given component unaddressed, the second column shows mean idea quality for these participants, the third column shows mean idea quality for the remaining participants. For example, for (A) the first row reads as follows: *'The 14 participants who left the customer segments unaddressed in their last working sheet produced ideas with mean quality 3.89. The participants who did not leave customer segments unaddressed produced ideas with mean quality 4.17.'*, bold: higher idea quality.

Third, while so far we have looked at how idea quality depends on the addressed components, we now use the opposite perspective. That is, we investigate how the addressed components depend on idea quality (see Figure 10). For this we compared the number of non-addressed components for participants with ideas whose quality was above and below the midpoint of our scale. Again, the results indicate that a focus on demand-side components translates into higher idea quality. In the good list condition, the small number of cases with below-midpoint quality precludes meaningful inferences (note that this low number does not necessarily reflect the actual number of ideas with below-midpoint quality in the good list condition, because in our present analysis we neglect all participants who did not have a partially filled scratch sheet). In the Canvas condition, however, one can recognize different patterns of non-addressed components for participants with below-midpoint and above-midpoint ideas. Participants with above-midpoint ideas tended to have less unaddressed components on the demand-side (17) than the resource-side (22, which implies a focus on the demand-side). In contrast, participants with below-midpoint ideas had more than 1.5 times more unaddressed components at the demand-side (31) than at the resource-side (19, which implies a focus on the resource-side). Hence, also from this perspective a focus on the demand-side seems to lead to better business model ideas.

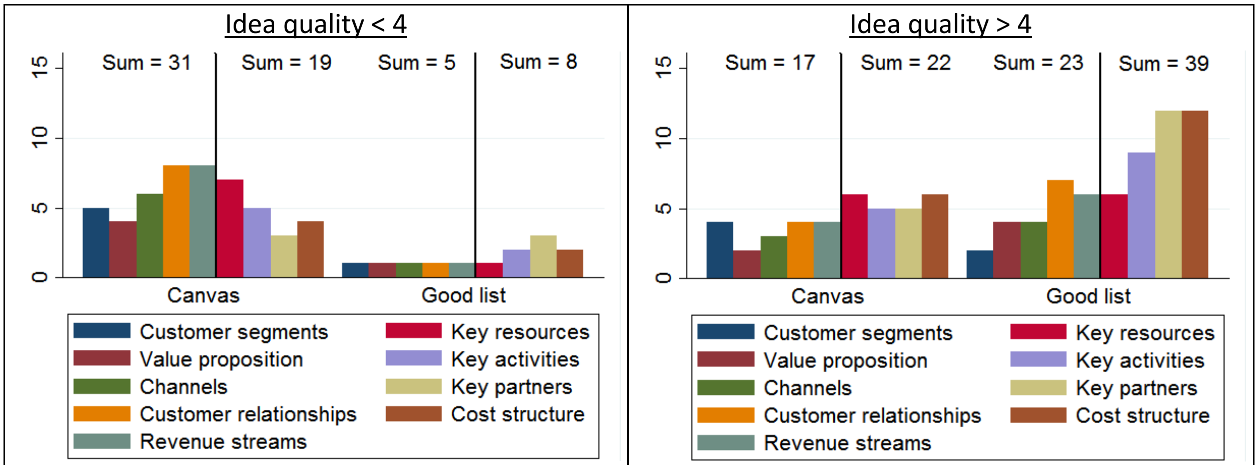


Figure 10. Component-level idea generation strategy depending on idea quality (bars indicate number of participants who left a given component unaddressed)

Discussion

In summary, we outlined several pieces of evidence that support the interpretation that the greater focus on the demand-side components is the reason for the higher idea quality of the list users. Each piece of evidence in itself is highly conjectural because we can only rely on a limited number of observations, and because at least in one case the evidence is not completely unambiguous (i.e., component-level idea generation for the Canvas only, see Table 5, case (b)). However, taken together the pieces converge into a whole that allows a number of inferences. First, our participants did on average not invoke a holistic and integrated perspective. Had that been the case, the numbers of unaddressed components would be rather evenly distributed across the components, which obviously they are not (see especially Figure 10, the above-average ideas in the good list condition). Second, our experimental conditions indeed influenced which components our participants had a focus on (this is evident in that the distributions of unaddressed components differ between experimental conditions, see Figure 10). Third, there seems to be a relationship between which of the components our participants had a focus on and the resulting idea quality: Demand-side-focused idea generation leads to higher idea quality than resource-side-focused idea generation. Given that a substantial share of participants seems to have approached the components following their reading direction, and given that the reading direction emphasizes the demand-side components for the good list but not for the Canvas, it does not any more come as a surprise that participants in the good list condition produced better ideas than those in the Canvas condition. So taken together, the observations from our secondary analysis of the experimental data seem to neatly explain our experimental results, and are also consistent with the insights that our participatory observation provided. Nonetheless, the results, unfortunately, do not allow inferences concerning our design theory. This is because one of the assumptions underlying our design theory – the task characteristic of an integrated and holistic perspective – is not fulfilled.

7. General Discussion

There is a striking imbalance between, on the one hand, the fascinating success of the Canvas in research, practice, and education – and on the other hand, the virtual absence of knowledge on what makes the Canvas potentially more useful than competing approaches. Towards resolving that imbalance, we tackled two main questions in this paper: First, from a theoretical perspective we asked: What characteristics (if any) inherent in the Canvas make it useful for generating business model ideas? And second, from a methodological perspective: How can the usefulness of the Canvas be evaluated for idea generation tasks? In the following, we discuss the contributions that we make towards answering these questions, and describe the resulting limitations and future research opportunities.

7.1. Theoretical Contributions

Our main theoretical contribution is an explanatory/predictive design theory (Kuechler and Vaishnavi 2012) for the visual template of the Canvas. For arriving at our design theory, we use creative cognitive fit theory (John and Kundisch 2015) as the overall theoretical foundation. We contextualize that theory to business model idea generation with the Canvas' visual template, and do so by drawing on competition-for-attention theory (Janiszewski 1998), scanpath theory (Groner et al. 1984), and the proximity compatibility principle (Wickens and Carswell 1995). Our design theory posits that the Canvas' visual template becomes useful for business model idea generation because it has a matrix-like structure and because it exhibits semantic proximity. These characteristics lead to cognitive fit with the characteristics of the business model idea generation task (i.e., having an integrated and holistic perspective; considering interdependencies). Therefore, compared to using a list, using the Canvas' visual template for representing the nine business model components is expected to increase business model idea generation performance. Given the general nature of the characteristics that we use to describe the business model idea generation task and the visual template of the Canvas, we expect this insight to generalize also beyond business model idea generation. This means that, regardless of the context, if the ideas one requires can be decomposed into several components, and if these components need to be considered in an integrated/holistic/interdependent fashion during idea generation, from a theoretical perspective, we would likewise expect idea generation performance to increase if a Canvas-like visual template is used (compared to a list).

We provide preliminary empirical evidence in favor of our design theory in the form of a scenario-based study. In real idea generation, however, we obtain seemingly contradictory evidence; our experimental participants produce ideas of lower quality when using the Canvas than when using the naïvely constructed benchmark of a simple list. In exploring potential reasons for this result, however, we found that our study participants to some extent failed to comply with a key assumption of our theory, that is, they failed to invoke a holistic and integrated perspective on the business model components. Hence, unfortunately, the results of our idea generation experiments do not allow inferences concerning the validity of our design theory. As a consequence, additional studies are needed to confirm whether the Canvas' visual template does indeed promote idea generation performance.

Notwithstanding the so far only preliminary empirical validation of our design theory, the underlying arguments have broader implications for research on tools for business model and strategy development[9]. Martins et al. (2015) recently introduced what they call a *cognitive view* into business model research. In line with their arguments, we maintain that one important way for better supporting practitioners in developing business model ideas is to design tools and methods that specifically catalyze their users'

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[9] The distinction between strategy and business model development may seem somewhat awkward, given that we started our article with the statement that a business model *'is a detailed description of a firm's strategy'*, and given that leading strategy scholars have voiced calls to replace traditional strategy conceptualizations with the broader perspective of the business model concept (e.g., Priem et al. 2013). Nonetheless, the convergence between business model and strategy research is far from complete. Hence, what we refer to as tools for strategy making, following Jarzabkowski and Kaplan (2015), are tools that go beyond business models, for example, Porter's five forces framework (Porter 1980) or the BCG growth-share matrix (Henderson 1979).

creative cognitive processes. Put differently, researchers should try to understand how specific characteristics of idea generation tools affect their users' cognitive efficiency and effectiveness in being creative. This allows better understanding to what extent these tools are effective and leads to a better foundation for improving these tools. In that regard, we break new ground in business model research by providing a starting point for considering at the cognitive level how visual templates for business model idea generation are related to idea generation performance – and in doing so, we focus on the by far most relevant visual template, that of the Canvas. Beyond business model research, our work has similar implications for research on tools for strategy making. For such tools it has been acknowledged that their adoption in practice *"may be influenced by the degree to which they are simple and offer clear visual representations"* (Jarzabkowski and Kaplan 2015, p. 540). However, what a *'clear'* visual representation actually is, why it is preferable to an *'unclear'* one, and how to deliberately design one has so far remained rather elusive. Drawing on creative cognitive fit theory, we illustrate how the notion of the *'clarity'* of a visual representation can be operationalized in a specific context. We show that what Jarzabkowski and Kaplan (2015) somewhat informally call a *'clear'* representation, essentially is a representation that exhibits cognitive fit with a given task. This cognitive fit allows the user to process information contained in the representation (e.g., intermediate ideas) in a cognitively efficient manner, that is, using only little capacity in working memory (compared to an *'unclear'* representation). As a result, when using a *'clear'* representation, users have more working memory capacity available for performing mental operations that in fact contribute to solving the problem at hand, which implies higher problem solving performance.

Besides research on business models and strategy, we also add to research on cognitive fit because we demonstrate how cognitive fit theory (Vessey 1991), or more specifically, its extension to creative problems (John and Kundisch 2015) can be applied to derive predictions in a specific idea generation context. Finally, beyond idea generation, our research has implications for the long-lasting debate on the relative value of different business model definitions (e.g., Al-Debei and Fitzgerald 2010; Wirtz et al. 2015; Zott et al. 2011). While the academic debate so far has sought arrive at integrated and consensual definitions in the sense of one *'common denominator'* or *'standard'*, we suggest to explore what value there is in distinguishing definitions – according to their purpose – into at least two types: *'aggregated'* definitions that facilitate idea generation (and avoid overwhelming human idea generators) and *'detailed'* definitions that facilitate communicating business models in their entirety. The question is warranted, though, whether this suggestion really involves different definitions for different purposes, or whether we rather should speak of one and the same definition, which however should allow different, mutually compatible perspectives on a business model for different purposes. We leave a clarification of this issue for further work.

7.2. Methodological Contributions

From a methodological perspective, we add to prior research in two important ways. First, we introduce expert-based idea quality evaluation into the business model domain and second, we further develop idea generation experiments. Concerning idea evaluation, prior business model research built on self-evaluation by the individuals who generated the ideas (Eppler et al. 2011). Self-evaluation, however, is not generally consistent with expert-based evaluations (Sellier and Dahl 2011). Expert evaluations in turn have been shown to be a valid measure of idea quality in a variety of creativity and innovation contexts (e.g., Amabile 1996), and are widely used in research, for example, on product innovation (e.g., Scopelliti et al. 2013), creativity (Grant and Berry 2011), and marketing (Sellier and Dahl 2011). We therefore expected expert evaluation to be well-suited also in the business model idea generation context, and at least in two out of our three experimental studies provide first evidence that experts can validly evaluate business model ideas. Hence, it seems reasonable to employ expert evaluation for future studies that explore visual templates in business model idea generation. Moreover, we expect expert evaluation to be suitable in general for evaluating tools for business model idea generation, which includes the pattern-based approaches that have been proposed (e.g., Abdelkafi et al. 2013; Gassmann et al. 2014), and other tools that in the future may, for example, follow from the cognitive view on business model idea generation that is advocated by Martins et al. (2015). Beyond idea generation, expert evaluation might also contribute to the already mentioned debate on the relative value of different business model definitions (e.g., Al-Debei and Avison 2010; Wirtz et al. 2015; Zott et al. 2011). So far, the arguments in that debate seem to have rested, at least to some extent, on the preferences and origin of the involved scholars. By introducing expert evaluation of ideas into business model research, we provide a method that promises to yield empirical arguments on the relative value of different business model definitions, at least when the definitions are used for idea generation efforts. A similar case can be made for strategy making research. For such tools, the success of using them can, for example, be defined as *"the degree to which [their] use provokes new explorations"* (Jarzabkowski and Kaplan 2015, p. 540), which could likely be determined in a fashion similar to how we employed experts.

In addition to introducing expert evaluation into business model research, our second methodological contribution is that we further develop the method of idea generation experiments to the business model context. So far, to the best of our knowledge, an idea generation experiment has only been used once in prior business model research (by Eppler et al. 2011). While that experiment employed experts as participants, the surge in popularity that the Canvas has experienced in recent years made expert participants inappropriate in our study. This is because it would have been highly unlikely to identify potential participants that do not know the Canvas, but still qualify as experts – and knowledge of the Canvas might have confounded our results. Therefore, we had to revert to non-expert participants which, in turn, complicated adequately preparing the participants for the experimental task. In fact, despite having conducted numerous pilot studies, we did not fully succeed in adequately preparing our participants, which is evident in that they did not invoke a holistic and integrated perspective. Still, we feel at least two of our design choices have implications also for future studies. First, in preparing our participants for the experiments, we found that, on the one hand, the business model concept is too abstract to be understood by if the concept is explained without examples. On the other hand, we found that the abstract nature of the business model concept leads to that examples induce fixations among participants very easily (i.e., in their idea generation efforts, it was very hard for the non-expert participants to break away from the introductory examples). Therefore, we used one example only, which was structurally analogous to the final task that the participants worked on. This likely is a reasonable choice also for future business model idea generation experiments with non-expert participants. Second, regarding incentivation, we found that in a business model idea generation experiment in a classroom setting it seems unwise to use financial incentives. While in general creativity-contingent rewards tend to increase creative performance (Byron and Khazanchi 2012), in our context the financial reward that we used in one of our pilot studies made participants suspect that we conduct the experiment for commercial, rather than educational or scientific reasons. Given this suspicion (that we potentially conduct the experiment for commercial reasons), and given the potentially high commercial value of a great business model idea, our participants perceived the financial reward that we offered as inappropriately small, which undermined their motivation to exert substantial effort during the experiment. In terms of motivation research (Heyman and Ariely 2004), offering financial rewards changed our participants' perception from being in a social context (that mainly relies on intrinsic motivation) to being in a market context (that mainly relies on extrinsic motivation). And the financial reward that we provided did not increase extrinsic motivation to an extent that compensated for the decrease in intrinsic motivation (the decrease that was caused by the perceived change from a social to a market context). We would expect this finding to generalize also to other classroom idea generation experiments in which the participants might suspect that their ideas, if of high quality, might create substantial value for the researchers conducting the idea generation experiment. As with our other contributions, we expect these methodological suggestions to also be of value for strategy researchers. As in business model research (concerning the Canvas), in strategy research it is often unclear *"why [...] certain tools become widely used and other not"* (Jarzabkowski and Kaplan 2015, p. 546). Therefore, strategy researchers have called for the broader application of experiments to better understand how these tools work and become effective (Jarzabkowski and Kaplan 2015). Our work illustrates that indeed such experiments can lead to important insights, which may well challenge conventional wisdom and thereby have the potential to lead to better tools for strategy development.

7.3. Limitations and Directions for Future Research

There are three main limitations to this research. First, we obtained only scenario-based evidence in support of our design theory – because the experimental results did not allow drawing conclusions concerning the validity of our theory (as the experimental participants, on average, were not able to invoke an integrated and holistic perspective on the business model components). One reason for the lack of an integrated and holistic perspective seems to be that our non-expert participants were overwhelmed by the complexity of the task. Using non-expert participants, as discussed earlier, seems inevitable (given the popularity of the Canvas). However, it remains open how much familiarity with business models (or, more specifically, the business model components) one needs to be able to invoke an integrated perspective (e.g., a couple of idea generation sessions or rather many years of industry experience?). Hence, future research should explore whether the usefulness of the experimental results can be increased by training the participants more extensively.

Second, besides additional empirical evaluation, the boundary conditions for our design theory need to be explored. This especially means to determine what degrees of problem complexity our theory applies to, as we would expect an inverted U-shaped (Haans et al. 2016) relationship between problem complexity (e.g., operationalized as the number of components of a task) and the benefits of cognitive fit. The reason is that cognitive fit becomes effective through a reduction of the load on working memory. This reduction, however, provides only benefits if the reduction in working memory load is indeed necessary (because working memory is full) and if that reduction is indeed noticeable (because the reduction is not only a tiny fraction of the overall working memory requirement that a task has). It seems reasonable to assume that the task of business model idea generation with the nine components of the Canvas falls between these two extremes, as working memory is said to be able of holding about seven information items (Miller 1956). However, for very simple problems (i.e., with a very small number of components), there might be enough working memory available for idea generation even with a non-cognitive fit visual template (John and Kundisch 2015; Zhu and Watts 2010). In contrast, for very complex problems (i.e., with a very large number of components), the advantage provided by a visual template that exhibits cognitive fit might be negligible. Hence, there is the need to determine in which range in terms of its complexity/number of components a task should be to benefit from visual templates that exhibit cognitive fit with the task.

Third, we employed expert evaluation for determining idea quality, and in the evaluations asked the experts to determine idea quality from the customer perspective. This is a methodological choice that might warrant further exploration in the future, as there are various arguments in favor and against adopting a customer perspective in business model idea evaluation. On the one hand, one might argue that an evaluation from the customer perspective is not appropriate for evaluating business model ideas, because a business model idea inseparably consists of a demand-side (that describes the business model's characteristics from the customer's perspective) and a resource-side (that describes how a firm implements the demand-side). Hence, one might argue, that an evaluation from the customer perspective (i.e., does a business model idea promise to create value for customers?) would unduly reward idea generation efforts geared towards the demand-side of a business model, and neglect idea generation efforts geared towards the resource-side. Following this argument, only an additional evaluation from a firm perspective would give adequate consideration also to idea generation efforts geared towards the resource side (an evaluation from a firm perspective would evaluate whether a business model idea promises to be implemented in a profitable way). In short, this would suggest that evaluating business model ideas merely from the customer perspective provides only an inadequate, limited view on idea quality. On the other hand, adopting only the customer perspective is well-justified based on a number of theoretical and practical considerations as well as the methodological practice in existing research. To start with, the aim in early-stage idea generation efforts is to generate and identify ideas that create value for customers (Kornish and Ulrich 2014; Massa et al. 2017); if an innovation idea is not valued by customers, it does not warrant further consideration. This implies that early-stage idea evaluations should adopt a customer perspective and that the firm perspective should come into play only at later stages of the idea generation process. This is also common practice in existing innovation studies that employ experts for evaluating idea quality (e.g., Scopelliti et al. 2013; Sellier and Dahl 2011). Only in very rare cases have such studies considered the firm perspective, for example, in terms of the feasibility of an idea (for such an exception, see Diehl and Stroebe 1987). In addition, the argument can be made that idea generation efforts geared towards the resource-side would not be neglected completely when evaluating from the customer perspective, because these efforts have the potential to indirectly contribute to ideas with value for customers. In the Canvas context, for example, contemplations about a specific key resource (i.e., a resource-side component) might translate into ideas for a new value proposition that is enabled by the key resource (i.e., a demand-side component). This argument is supported by research on the sources of innovation ideas (Bucherer et al. 2012; Kim et al. 2013), which argues that innovation ideas that have value for customers can originate from both, the demand-side as well as the resource-side. For understanding this argument, recall that creative ideas are characterized by being novel as well as useful (Amabile 1996): Idea generation efforts that focus the demand-side mainly contribute to the usefulness dimension of creative ideas, and do so through their focus on the needs and desires of future users (Grant and Berry 2011; Kim et al. 2013). However, also the resource-side perspective can contribute to creative ideas by contributing to the novelty of ideas. This is because a resource-side perspective implies to deliberately refrain from the customer perspective, and thereby implies being more detached from the immediate wishes of customers (Goldenberg et al. 1999; Kim et al. 2013). This suggests that an evaluation from the customer perspective, at least to some extent, also rewards idea generation efforts geared towards the resource-side. Last but not least, from a practical perspective, going beyond the customer perspective when evaluating ideas can imply some complications. For example, evaluating ideas from a firm perspective requires that experiment participants and expert evaluators have the same understanding of the firm for which business model ideas are to be generated (be it a real or an imaginary firm). Participants and experts then during idea generation/evaluation need to take into account their knowledge of the firm. However, constraining the idea generation task in that way might be detrimental to the motivation of the experimental participants and would increase the complexity of the evaluation task for the experts. Hence, taken together, these conflicting arguments suggest that future research should further explore how best to balance the advantages and disadvantages of focusing on the customer perspective when evaluating business model ideas.

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9. Appendix

Overview of the parts of the appendix:

Appendix A: Calculations of the Competition-for-Attention Scores

Appendix B: Materials for the Scenario-based Survey (Study 1)

Appendix B1: Canvas First

Appendix B2: List First

Appendix C: Materials for Idea Generation Experiments (Studies 2-4)

Appendix C1: Canvas Condition

Appendix C2: Good List Condition

Appendix C3: Bad List Condition

Appendix C4: Written Summary of Guidelines for Experts

Appendix D: Materials for the Participatory Observation (Study 5)

Appendix A: Calculations of the Competition-for-Attention Scores

The competition-for-attention was calculated for each business model component in the Canvas and the list format following the formula by Janiszewski (1998): competition for attention = (square root of the size of the competing object)/(distance between the center of the focal object and the center of the competing object). The total competition-for-attention for each component was determined by summing the competition of attention that all other components exert. The total competition for attention for a given representation was determined by summing the competition-of-attention of all components. The calculations are based on a roughly A4-sized visual template (24 cm x 14.2 cm).

Customer segments

Area	Size [cm^2]	Distance [cm]	Demand
Value proposition	38.02	1.58	3.91
Channels	38.02	3.16	1.95
Customer relationships	38.02	4.73	1.30
Revenue streams	38.02	6.31	0.98
Key resources	38.02	7.89	0.78
Key activities	38.02	9.47	0.65
Key partners	38.02	11.04	0.56
Cost structure	38.02	12.62	0.49
∑			**10.62**

Customer segments

Area	Size [cm^2]	Distance [cm]	Demand
Value proposition	49.92	9.60	0.74
Channels	24.96	5.46	0.92
Customer relationships	24.96	5.46	0.92
Revenue streams	45.60	7.96	0.85
Key resources	24.96	14.63	0.34
Key activities	24.96	14.63	0.34
Key partners	49.92	19.20	0.37
Cost structure	45.60	17.14	0.39
∑			**4.86**

Value proposition

Area	Size [cm^2]	Distance [cm]	Demand
Customer segments	38.02	1.58	3.91
Channels	38.02	1.58	3.91
Customer relationships	38.02	3.16	1.95
Revenue streams	38.02	4.73	1.30
Key resources	38.02	6.31	0.98
Key activities	38.02	7.89	0.78
Key partners	38.02	9.47	0.65
Cost structure	38.02	11.04	0.56
∑			**14.04**

Value proposition

Area	Size [cm^2]	Distance [cm]	Demand
Customer segments	49.92	9.60	0.74
Channels	24.96	5.46	0.92
Customer relationships	24.96	5.46	0.92
Revenue streams	45.60	9.30	0.73
Key resources	24.96	5.46	0.92
Key activities	24.96	5.46	0.92
Key partners	49.92	9.60	0.74
Cost structure	45.60	9.30	0.73
∑			**6.59**

Channels

Area	Size [cm^2]	Distance [cm]	Demand
Customer segments	38.02	3.16	1.95
Value proposition	38.02	1.58	3.91
Customer relationships	38.02	1.58	3.91
Revenue streams	38.02	3.16	1.95
Key resources	38.02	4.73	1.30
Key activities	38.02	6.31	0.98
Key partners	38.02	7.89	0.78
Cost structure	38.02	9.47	0.65
∑			**15.44**

Channels

Area	Size [cm^2]	Distance [cm]	Demand
Customer segments	49.92	5.46	1.29
Value proposition	49.92	5.46	1.29
Customer relationships	24.96	5.20	0.96
Revenue streams	45.60	4.66	1.45
Key resources	24.96	9.60	0.52
Key activities	24.96	10.92	0.46
Key partners	49.92	14.63	0.48
Cost structure	45.60	11.70	0.58
∑			**7.04**

Customer relationships

Area	Size [cm^2]	Distance [cm]	Demand
Customer segments	38.02	4.73	1.30
Value proposition	38.02	3.16	1.95
Channels	38.02	1.58	3.91
Revenue streams	38.02	1.58	3.91
Key resources	38.02	3.16	1.95
Key activities	38.02	4.73	1.30
Key partners	38.02	6.31	0.98
Cost structure	38.02	7.89	0.78
∑			**16.09**

Customer relationships

Area	Size [cm^2]	Distance [cm]	Demand
Customer segments	49.92	5.46	1.29
Value proposition	49.92	5.46	1.29
Channels	24.96	5.20	0.96
Revenue streams	45.60	9.77	0.69
Key resources	24.96	10.92	0.46
Key activities	24.96	9.60	0.52
Key partners	49.92	14.63	0.48
Cost structure	45.60	14.52	0.47
∑			**6.17**

Revenue streams

Area	Size [cm^2]	Distance [cm]	Demand
Customer segments	38.02	6.31	0.98
Value proposition	38.02	4.73	1.30
Channels	38.02	3.16	1.95
Customer relationships	38.02	1.58	3.91
Key resources	38.02	1.58	3.91
Key activities	38.02	3.16	1.95
Key partners	38.02	4.73	1.30
Cost structure	38.02	6.31	0.98
∑			**16.28**

Revenue streams

Area	Size [cm^2]	Distance [cm]	Demand
Customer segments	49.92	7.96	0.89
Value proposition	49.92	9.30	0.76
Channels	24.96	4.66	1.07
Customer relationships	24.96	9.77	0.51
Key resources	24.96	11.70	0.43
Key activities	24.96	14.52	0.34
Key partners	49.92	17.14	0.41
Cost structure	45.60	12.00	0.56
∑			**4.98**

Key resources

Area	Size [cm^2]	Distance [cm]	Demand
Customer segments	38,02	7,89	0,78
Value propositions	38,02	6,31	0,98
Channels	38,02	4,73	1,30
Customer relationships	38,02	3,16	1,95
Revenue streams	38,02	1,58	3,91
Key activities	38,02	1,58	3,91
Key partners	38,02	3,16	1,95
Cost structure	38,02	4,73	1,30
∑			**16,09**

Key resources

Area	Size [cm^2]	Distance [cm]	Demand
Customer segments	49,92	14,63	0,48
Value propositions	49,92	5,46	1,29
Channels	24,96	9,60	0,52
Customer relationships	24,96	10,92	0,46
Revenue streams	45,60	11,70	0,58
Key activities	24,96	5,20	0,96
Key partners	49,92	5,46	1,29
Cost structure	45,60	4,66	1,45
∑			**7,04**

Key activities

Area	Size [cm²]	Distance [cm]	Demand
Customer segments	38.02	9.47	0.65
Value proposition	38.02	7.89	0.78
Channels	38.02	6.31	0.98
Customer relationships	38.02	4.73	1.30
Revenue streams	38.02	3.16	1.95
Key resources	38.02	1.58	3.91
Key partners	38.02	1.58	3.91
Cost structure	38.02	3.16	1.95
∑			**15.44**

Key activities

Area	Size [cm²]	Distance [cm]	Demand
Customer segments	49.92	14.63	0.48
Value proposition	49.92	5.46	1.29
Channels	24.96	10.92	0.46
Customer relationships	24.96	9.60	0.52
Revenue streams	45.60	14.52	0.47
Key resources	24.96	5.20	0.96
Key partners	49.92	5.46	1.29
Cost structure	45.60	9.77	0.69
∑			**6.17**

Key partners

Area	Size [cm²]	Distance [cm]	Demand
Customer segments	38.02	11.04	0.56
Value proposition	38.02	9.47	0.65
Channels	38.02	7.89	0.78
Customer relationships	38.02	6.31	0.98
Revenue streams	38.02	4.73	1.30
Key resources	38.02	3.16	1.95
Key activities	38.02	1.58	3.91
Cost structure	38.02	1.58	3.91
∑			**14.04**

Key partners

Area	Size [cm²]	Distance [cm]	Demand
Customer segments	49.92	19.20	0.37
Value proposition	49.92	9.60	0.74
Channels	24.96	14.63	0.34
Customer relationships	24.96	14.63	0.34
Revenue streams	45.60	17.14	0.39
Key resources	24.96	5.46	0.92
Key activities	24.96	5.46	0.92
Cost structure	45.60	7.96	0.85
∑			**4.86**

Appendix B: Materials for the Scenario-based Survey (Study 1)

Appendix B1: Canvas First

Vergleich Von Zwei Visualisierungen [bitte Nicht Bearbeiten, Wenn Schon Einmal Bearbeitet. Vielen Dank.]

Instructions ▲

Das Geschäftsmodell eines Unternehmens beschreibt, wie ein Unternehmen Umsatz generiert und dadurch Gewinn erzielt. Im Folgenden möchten wir gerne herausfinden, ob verschiedene Visualisierungen dabei helfen können, Ideen für neue Geschäftsmodelle zu generieren. Dafür beschreiben wir Ihnen kurz, was ein Geschäftsmodell ist und wie man bei dessen Entwicklung vorgeht. Anschließend möchten wir gerne von Ihnen erfahren, mit welcher Visualisierung Sie lieber arbeiten würden. Vielen Dank schon einmal für Ihre Unterstützung!

Was ist ein Geschäftsmodell?

Ein Geschäftsmodell besteht aus neun Komponenten, die die **Kundenperspektive** und die **Unternehmens-interne Perspektive** umfassen:

Die **Kundenperspektive** eines Geschäftsmodells umfasst die **Wertangebote** (Produkte/Dienstleistungen, die ein Unternehmen anbietet), die mit den Wertangeboten adressierten **Kundensegmente** (also die Zielgruppen), **Kanäle** zur Ansprache der Kunden (z. B. ein Onlineshop oder eine stationäre Filiale), **Kundenbeziehungen** (z. B. persönliche Beratung) und **Einnahmequellen** (z. B. eine Grundgebühr oder ein Verkaufspreis).

Die **Unternehmens-interne Perspektive** umfasst die durchzuführenden **Schlüsselaktivitäten** (z. B. Produktion, Marketing), **Schlüsselressourcen** (z. B. Patente, Maschinen), **Schlüsselpartnerschaften** mit anderen Unternehmen und die resultierende **Kostenstruktur**.

Wie entwickelt man ein Geschäftsmodell?

Um während der Ideenfindung für neue Geschäftsmodelle (auch bekannt als Brainstorming) vorläufige Ideen zu notieren, bieten sich die unten gezeigten Visualisierungen an (= Vorlagen zur Ideengenerierung). Während der Ideengenerierung notiert man viele Teilideen in den dargestellten Komponenten, springt gedanklich häufig zwischen den Teilideen hin und her - und ergänzt/verändert diese Teilideen dabei kontinuierlich.

Wichtig: Bevor Sie die Fragen beantworten,...

...versuchen Sie bitte sich für beide Visualisierungen kurz vorzustellen, dass Sie mit Hilfe der Visualisierung selbst Ideen generieren würden. D. h. Sie würden wie beschrieben viele Teilideen in den Komponenten notieren, zwischen den Teilideen gedanklich hin- und herspringen - und dabei diese Teilideen kontinuierlich verändern und ergänzen.

Nur wenn Sie sich zunächst gedanklich in diese Situation hineinversetzen, ist es möglich, die nachfolgenden Fragen "sinnvoll" zu beantworten. Vielen Dank für Ihre Mühe!

Matrix-artige Visualisierung (linke Hälfte: Unternehmens-interne Perspektive, rechte Hälfte: Kundenperspektive):

<table>
<tr><td rowspan="2">Schlüssel-
partnerschaften</td><td>Schlüssel-
aktivitäten</td><td rowspan="2" colspan="2">Wertangebote</td><td>Kunden-
beziehungen</td><td rowspan="2">Kundensegmente</td></tr>
<tr><td>Schlüssel-
ressourcen</td><td>Kanäle</td></tr>
<tr><td colspan="3">Kostenstruktur</td><td colspan="3">Einnahmequellen</td></tr>
</table>

Listen-artige Visualisierung (obere Hälfte: Kunden-Perspektive, untere Hälfte: Unternehmens-interne Perspektive):

Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen
Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur

Die Matrix-artige Visualisierung macht es mir leicht, die Geschäftsmodell-Komponenten integriert und ganzheitlich zu betrachten.

	1	2	3	4	5	6	7	
Stimme gar nicht zu	○	○	○	○	○	○	○	Stimme voll zu

Die Listen-artige Visualisierung macht es mir leicht, die Geschäftsmodell-Komponenten integriert und ganzheitlich zu betrachten.

	1	2	3	4	5	6	7	
Stimme gar nicht zu	○	○	○	○	○	○	○	Stimme voll zu

Die Matrix-artige Visualisierung macht es mir leicht, Abhängigkeiten zwischen den Geschäftsmodell-Komponenten zu berücksichtigen.

	1	2	3	4	5	6	7	
Stimme gar nicht zu	○	○	○	○	○	○	○	Stimme voll zu

Die Listen-artige Visualisierung macht es mir leicht, Abhängigkeiten zwischen den Geschäftsmodell-Komponenten zu berücksichtigen.

	1	2	3	4	5	6	7	
Stimme gar nicht zu	○	○	○	○	○	○	○	Stimme voll zu

Ich war mir sicher beim Beantworten der vorherigen Fragen.

	1	2	3	4	5	6	7	
Stimme gar nicht zu	○	○	○	○	○	○	○	Stimme voll zu

Ich konnte mir gut vorstellen, wie man die Visualisierungen nutzt.

	1	2	3	4	5	6	7	
Stimme gar nicht zu	○	○	○	○	○	○	○	Stimme voll zu

Haben Sie schon einmal den Begriff Business Model Canvas gehört? (ja/nein)

Haben Sie noch Anregungen oder Feedback zu dieser Aufgabe? Vielen Dank noch einmal!

Appendix B2: List First

Vergleich Von Zwei Visualisierungen [bitte Nicht Bearbeiten, Wenn Schon Einmal Bearbeitet. Vielen Dank.]

Instructions ▲

Das Geschäftsmodell eines Unternehmens beschreibt, wie ein Unternehmen Umsatz generiert und dadurch Gewinn erzielt. Im Folgenden möchten wir gerne herausfinden, ob verschiedene Visualisierungen dabei helfen können, Ideen für neue Geschäftsmodelle zu generieren. Dafür beschreiben wir Ihnen kurz, was ein Geschäftsmodell ist und wie man bei dessen Entwicklung vorgeht. Anschließend möchten wir gerne von Ihnen erfahren, mit welcher Visualisierung Sie lieber arbeiten würden. Vielen Dank schon einmal für Ihre Unterstützung!

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Ein Geschäftsmodell besteht aus neun Komponenten, die die **Kundenperspektive** und die **Unternehmens-interne Perspektive** umfassen:

Die **Kundenperspektive** eines Geschäftsmodells umfasst die **Wertangebote** (Produkte/Dienstleistungen, die ein Unternehmen anbietet), die mit den Wertangeboten adressierten **Kundensegmente** (also die Zielgruppen), **Kanäle** zur Ansprache der Kunden (z. B. ein Onlineshop oder eine stationäre Filiale), **Kundenbeziehungen** (z. B. persönliche Beratung) und **Einnahmequellen** (z. B. eine Grundgebühr oder ein Verkaufspreis).

Die **Unternehmens-interne Perspektive** umfasst die durchzuführenden **Schlüsselaktivitäten** (z. B. Produktion, Marketing), **Schlüsselressourcen** (z. B. Patente, Maschinen), **Schlüsselpartnerschaften** mit anderen Unternehmen und die resultierende **Kostenstruktur**.

Wie entwickelt man ein Geschäftsmodell?

Um während der Ideenfindung für neue Geschäftsmodelle (auch bekannt als Brainstorming) vorläufige Ideen zu notieren, bieten sich die unten gezeigten Visualisierungen an (= Vorlagen zur Ideengenerierung). Während der Ideengenerierung notiert man viele Teilideen in den dargestellten Komponenten, springt gedanklich häufig zwischen den Teilideen hin und her - und ergänzt/verändert diese Teilideen dabei kontinuierlich.

Wichtig: Bevor Sie die Fragen beantworten,...

...versuchen Sie bitte sich für beide Visualisierungen kurz vorzustellen, dass Sie mit Hilfe der Visualisierung selbst Ideen generieren würden. D. h. Sie würden wie beschrieben viele Teilideen in den Komponenten notieren, zwischen den Teilideen gedanklich hin- und herspringen - und dabei diese Teilideen kontinuierlich verändern und ergänzen.

Nur wenn Sie sich zunächst gedanklich in diese Situation hineinversetzen, ist es möglich, die nachfolgenden Fragen "sinnvoll" zu beantworten. Vielen Dank für Ihre Mühe!

Listen-artige Visualisierung (obere Hälfte: Kunden-Perspektive, untere Hälfte: Unternehmens-interne Perspektive):

Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen
Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur

Matrix-artige Visualisierung (linke Hälfte: Unternehmens-interne Perspektive, rechte Hälfte: Kundenperspektive):

<table>
<tr><td rowspan="2">Schlüssel-partnerschaften</td><td>Schlüssel-aktivitäten</td><td rowspan="2">Wertangebote</td><td>Kunden-beziehungen</td><td rowspan="2">Kundensegmente</td></tr>
<tr><td>Schlüssel-ressourcen</td><td>Kanäle</td></tr>
<tr><td colspan="3">Kostenstruktur</td><td colspan="2">Einnahmequellen</td></tr>
</table>

Die Listen-artige Visualisierung macht es mir leicht, die Geschäftsmodell-Komponenten integriert und ganzheitlich zu betrachten.

	1	2	3	4	5	6	7	
Stimme gar nicht zu	○	○	○	○	○	○	○	Stimme voll zu

Die Matrix-artige Visualisierung macht es mir leicht, die Geschäftsmodell-Komponenten integriert und ganzheitlich zu betrachten.

	1	2	3	4	5	6	7	
Stimme gar nicht zu	○	○	○	○	○	○	○	Stimme voll zu

Die Listen-artige Visualisierung macht es mir leicht, Abhängigkeiten zwischen den Geschäftsmodell-Komponenten zu berücksichtigen.

	1	2	3	4	5	6	7	
Stimme gar nicht zu	○	○	○	○	○	○	○	Stimme voll zu

Die Matrix-artige Visualisierung macht es mir leicht, Abhängigkeiten zwischen den Geschäftsmodell-Komponenten zu berücksichtigen.

	1	2	3	4	5	6	7	
Stimme gar nicht zu	○	○	○	○	○	○	○	Stimme voll zu

Ich war mir sicher beim Beantworten der vorherigen Fragen.

	1	2	3	4	5	6	7	
Stimme gar nicht zu	○	○	○	○	○	○	○	Stimme voll zu

Ich konnte mir gut vorstellen, wie man die Visualisierungen nutzt.

	1	2	3	4	5	6	7	
Stimme gar nicht zu	○	○	○	○	○	○	○	Stimme voll zu

Haben Sie schon einmal den Begriff Business Model Canvas gehört? (ja/nein)

Haben Sie noch Anregungen oder Feedback zu dieser Aufgabe? Vielen Dank noch einmal!

Appendix C: Materials for Idea Generation Experiments (Studies 2-4)

Appendix C1: Canvas Condition

Geschäftsmodell-Entwicklung

Materialien für die Einarbeitung

1. Einführung: Geschäftsmodelle

Ein Geschäftsmodell beschreibt das Grundprinzip, nach dem ein Unternehmen Umsatz generiert und dadurch Gewinn erzielt. Der Erfolg eines Unternehmens hängt entscheidend von der Wahl eines geeigneten Geschäftsmodells ab. Um ein geeignetes Geschäftsmodell identifizieren zu können, ist es zunächst notwendig, eine Vielzahl von Geschäftsmodell-Ideen (= denkbare Geschäftsmodelle) zu entwickeln. Im Anschluss ist aus den entwickelten Ideen die erfolgversprechendste Geschäftsmodell-Idee auszuwählen.

Das Geschäftsmodell eines Unternehmens definiert, welche Kunden das Unternehmen adressiert. Ziel ist es, mit Produkten und/oder Dienstleistungen die Probleme dieser Kunden zu lösen bzw. deren Bedürfnisse zu befriedigen. Dafür ist zu entscheiden, wie das Unternehmen die (potenziellen) Kunden am besten über seine Produkte informiert und wie diese Produkte am besten vom Unternehmen zu den Kunden kommen. Außerdem ist festzulegen, wie intensiv ein Unternehmen den Kontakt zu seinen Kunden gestalten möchte und für welche Eigenschaften der Produkte/Dienstleistungen eines Unternehmens der Kunde bezahlen soll.

Um ein Geschäftsmodell anzubieten, muss ein Unternehmen permanent eine Reihe von Tätigkeiten durchführen und die Voraussetzungen schaffen, dass diese Tätigkeiten möglichst reibungslos durchgeführt werden können. Da ein Unternehmen alleine in der Regel nicht alles bereitstellen kann, das benötigt wird, um die Kundenwünsche zu bedienen, wird es gegebenenfalls mit anderen Unternehmen zusammenarbeiten. Weiterhin verursacht die gesamte Unternehmenstätigkeit Kosten und es ist wichtig für ein Unternehmen, die größten Kostenverursacher zu kennen.

Im Folgenden wird detaillierter beschrieben, woraus ein Geschäftsmodell besteht. Die Beschreibung orientiert sich an den folgenden neun Geschäftsmodell-Bausteinen:

<table>
<tr><td rowspan="2" colspan="2">Schlüssel-partnerschaften</td><td colspan="2">Schlüssel-aktivitäten</td><td rowspan="2" colspan="2">Wertangebote</td><td colspan="2">Kunden-beziehungen</td><td rowspan="2" colspan="2">Kundensegmente</td></tr>
<tr><td colspan="2">Schlüssel-ressourcen</td><td colspan="2">Kanäle</td></tr>
<tr><td colspan="5">Kostenstruktur</td><td colspan="5">Einnahmequellen</td></tr>
</table>

Abbildung 1: Vorlage zur Beschreibung eines Geschäftsmodells

1.1 Beschreibung der Bausteine eines Geschäftsmodells

(1) <u>Kundensegmente:</u>

Der Baustein Kundensegmente definiert die verschiedenen Gruppen von Personen oder Organisationen, die ein Unternehmen erreichen und bedienen will.

<table>
<tr><td rowspan="2" colspan="2">Schlüssel-partnerschaften</td><td colspan="2">Schlüssel-aktivitäten</td><td rowspan="2" colspan="2">Wertangebote</td><td colspan="2">Kunden-beziehungen</td><td rowspan="2" colspan="2">Kundensegmente</td></tr>
<tr><td colspan="2">Schlüssel-ressourcen</td><td colspan="2">Kanäle</td></tr>
<tr><td colspan="5">Kostenstruktur</td><td colspan="5">Einnahmequellen</td></tr>
</table>

Abbildung 2: Vorlage zur Beschreibung eines Geschäftsmodells

Kunden bilden das Herz jedes Geschäftsmodells. Ohne (profitable) Kunden kann kein Unternehmen lange überleben. Um Kunden besser zufriedenstellen zu können, kann eine Firma sie in verschiedene Segmente mit gemeinsamen Bedürfnissen, gemeinsamen Verhaltensweisen oder anderen Merkmalen unterteilen. Ein Geschäftsmodell kann ein oder mehrere große oder kleine Kundensegmente beschreiben. Eine Organisation muss eine bewusste Entscheidung darüber fällen, welche Segmente sie bedienen und welche sie ignorieren will. Wenn diese Entscheidung einmal getroffen ist, kann ein Geschäftsmodell auf der Grundlage eines tiefen Verständnisses spezieller Kundenwünsche sorgfältig gestaltet werden.

Kundengruppen repräsentieren verschiedene Segmente, wenn

- Ihre Bedürfnisse ein individuelles Angebot erfordern und rechtfertigen;
- Sie über unterschiedliche Distributionskanäle erreicht werden können;
- Sie unterschiedliche Arten von Beziehungen erfordern;
- Sie stark unterschiedliche Rentabilität aufweisen;
- Sie bereit sind, für unterschiedliche Aspekte des Angebots zu bezahlen.

Schlüsselfragen:

- Für wen schöpfen wir Wert?
- Wer sind unsere wichtigsten Kunden?

(2) Wertangebote:

Der Baustein Wertangebote beschreibt das Paket von Produkten und Dienstleistungen, das für ein bestimmtes Kundensegment Wert schöpft.

Schlüssel-partnerschaften	**Schlüssel-aktivitäten**	**Wertangebote**	**Kunden-beziehungen**	**Kundensegmente**
	Schlüssel-ressourcen		**Kanäle**	
Kostenstruktur		**Einnahmequellen**		

Abbildung 3: Vorlage zur Beschreibung eines Geschäftsmodells

Das Wertangebot ist der Grund, weshalb Kunden sich eher dem einen Unternehmen zuwenden als dem anderen. Es löst ein Kundenproblem oder erfüllt ein Kundenbedürfnis. Jedes Wertangebot besteht aus einem Paket von Produkten und/oder Dienstleistungen, die sich um die Anforderungen eines bestimmten Kundensegments kümmern. In diesem Sinne ist das Wertangebot ein Zusammenschluss oder Paket von Nutzen, die ein Unternehmen seinen Kunden anbietet.

Manche Wertangebote sind innovativ und stellen ein neues oder durchschlagendes Angebot dar. Andere ähneln vielleicht bestehenden Marktangeboten, verfügen jedoch über zusätzliche Merkmale und Eigenschaften.

Schlüsselfragen:

- Welchen Wert vermitteln wir dem Kunden?
- Welche der Probleme unseres Kunden helfen wir zu lösen?
- Welche Kundenbedürfnisse erfüllen wir?
- Welche Produkt- und Dienstleistungspakete bieten wir jedem Kundensegment an?

(3) Kanäle:

Der Kanäle-Baustein beschreibt, wie ein Unternehmen seine Kundensegmente erreicht und anspricht, um ein Wertangebot zu vermitteln.

Schlüssel-partnerschaften	Schlüssel-aktivitäten	Wertangebote	Kunden-beziehungen	Kundensegmente
	Schlüssel-ressourcen		**Kanäle**	
Kostenstruktur		Einnahmequellen		

Abbildung 4: Vorlage zur Beschreibung eines Geschäftsmodells

Kommunikations-, Distributions- und Verkaufskanäle bilden die Schnittstellen zwischen einem Unternehmen und seinen Kunden. Kanäle sind Kundenberührungspunkte, die eine wichtige Rolle in der Kundenerfahrung spielen. Sie erfüllen verschiedene Funktionen, darunter:

- die Aufmerksamkeit der Kunden auf die Produkte und Dienstleistungen des Unternehmens zu lenken;
- den Kunden bei der Bewertung des Wertangebots einer Firma zu helfen;
- den Kunden den Kauf spezifischer Produkte und Dienstleistungen zu ermöglichen;
- den Kunden ein Wertangebot zu unterbreiten;
- die Kunden auch nach dem Kauf zu betreuen.

Schlüsselfragen:

- Über welche Kanäle wollen unsere Kundensegmente erreicht werden?
- Wie erreichen wir sie jetzt?
- Wie sind unsere Kanäle integriert?
- Welche funktionieren am besten?
- Welche sind am kosteneffizientesten?
- Wie integrieren wir sie in die Kundenabläufe?

(4) Kundenbeziehungen:

Der Baustein Kundenbeziehungen beschreibt die Arten von Beziehungen, die ein Unternehmen mit bestimmten Kundensegmenten eingeht.

Schlüssel-partnerschaften	Schlüssel-aktivitäten	Wertangebote	**Kunden-beziehungen**	Kundensegmente
	Schlüssel-ressourcen		Kanäle	
Kostenstruktur		Einnahmequellen		

Abbildung 5: Vorlage zur Beschreibung eines Geschäftsmodells

Ein Unternehmen sollte sich Klarheit verschaffen über die Art von Beziehungen, die es mit jedem Kundensegment aufnehmen will. Beziehungen können von persönlich bis zu automatisiert reichen. Kundenbeziehungen werden von den folgenden Motivationen angetrieben:

- Kundenakquise,
- Kundenpflege,

- Verkaufssteigerung.

In den Anfangszeiten waren beispielsweise die Kundenbeziehungen der Mobilnetzbetreiber geprägt von aggressiven Akquisitionsstrategien, wozu auch kostenlose Handys gehörten. Als der Markt allmählich gesättigt war, verlegten sich die Mobilfunkanbieter auf Kundenpflege und eine Steigerung des Umsatzes pro Kunde.

Die im Geschäftsmodell eines Unternehmens vorgesehenen Kundenbeziehungen haben großen Einfluss auf die gesamte Kundenerfahrung.

Schlüsselfragen:

- Welche Art von Beziehung erwartet jedes unserer Kundensegmente von uns?
- Welche haben wir eingerichtet?
- Wie kostenintensiv sind sie?
- Wie sind sie in unser übriges Geschäftsmodell integriert?

(5) <u>Einnahmequellen:</u>

Der Baustein Einnahmequellen steht für die Einkünfte, die ein Unternehmen aus jedem Kundensegment bezieht (Umsatz minus Kosten gleich Gewinn).

Schlüssel-partnerschaften	Schlüssel-aktivitäten	Wertangebote	Kunden-beziehungen	Kundensegmente
	Schlüssel-ressourcen		Kanäle	
Kostenstruktur		Einnahmequellen		

Abbildung 6: Vorlage zur Beschreibung eines Geschäftsmodells

Wenn die Kunden das Herz eines Geschäftsmodells bilden, dann sind die Einnahmequellen die Arterien. Jedes Unternehmen muss sich die Frage stellen: Für welche Werte ist jedes einzelne Kundensegment wirklich zu zahlen bereit? Die erfolgreiche Beantwortung dieser Frage ermöglicht der Firma, aus jedem Kundensegment eine oder mehrere Einnahmequellen zu erzeugen. Jede Einnahmequelle kann verschiedene Preisfestlegungsmechanismen aufweisen, zum Beispiel feste Listenpreise, Verhandlung, Auktionen, marktabhängig, mengenabhängig oder Ertragsmanagement.

Ein Geschäftsmodell kann zwei verschiedene Arten von Einnahmequellen umfassen:

1. Transaktionseinnahmen aus einmaligen Kundenzahlungen.
2. Wiederkehrende Einnahmen aus fortlaufenden Zahlungen, entweder um den Kunden ein Wertangebot zu vermitteln oder um einen Kundendienst nach dem Kauf zu gewährleisten.

Schlüsselfragen:

- Für welche Werte sind unsere Kunden wirklich zu bezahlen bereit?
- Wofür bezahlen sie jetzt?
- Wie bezahlen sie jetzt?
- Wie würden sie gerne bezahlen?
- Wie viel trägt jede Einnahmequelle zum Gesamtumsatz bei?

(6) Schlüsselressourcen:

Der Baustein Schlüsselressourcen beschreibt die wichtigsten Wirtschaftsgüter, die für das Funktionieren eines Geschäftsmodells notwendig sind.

<table>
<tr><td rowspan="2">Schlüssel-partnerschaften</td><td>Schlüssel-aktivitäten</td><td rowspan="2">Wertangebote</td><td>Kunden-beziehungen</td><td rowspan="2">Kundensegmente</td></tr>
<tr><td>Schlüssel-ressourcen</td><td>Kanäle</td></tr>
<tr><td colspan="3">Kostenstruktur</td><td colspan="2">Einnahmequellen</td></tr>
</table>

Abbildung 7: Vorlage zur Beschreibung eines Geschäftsmodells

Jedes Geschäftsmodell erfordert Schlüsselressourcen. Diese Ressourcen ermöglichen es einem Unternehmen, ein Wertangebot zu schaffen und zu unterbreiten, Märkte zu bedienen, Beziehungen zu Kundensegmenten aufrechtzuerhalten und Einkünfte zu erzielen. Je nach Art des Geschäftsmodells werden verschiedene Schlüsselressourcen benötigt. Ein Hersteller von Mikrochips braucht kapitalintensive Produktionsstandorte, während für einen Entwickler von Mikrochips eher die Personalausstattung von Bedeutung ist.

Schlüsselressourcen können physischer, finanzieller, intellektueller oder menschlicher Natur sein. Schlüsselressourcen können im Besitz der Firma sein, geleast oder von Schlüsselpartnern erworben werden.

Schlüsselfragen:

- Welche Schlüsselressourcen erfordern unsere Wertangebote?
- Unsere Distributionskanäle?
- Unsere Kundenbeziehungen?
- Einnahmequellen?

(7) Schlüsselaktivitäten:

Der Baustein Schlüsselaktivitäten beschreibt die wichtigsten Dinge, die ein Unternehmen tun muss, damit sein Geschäftsmodell funktioniert.

<table>
<tr><td rowspan="2">Schlüssel-partnerschaften</td><td>Schlüssel-aktivitäten</td><td rowspan="2">Wertangebote</td><td>Kunden-beziehungen</td><td rowspan="2">Kundensegmente</td></tr>
<tr><td>Schlüssel-ressourcen</td><td>Kanäle</td></tr>
<tr><td colspan="3">Kostenstruktur</td><td colspan="2">Einnahmequellen</td></tr>
</table>

Abbildung 8: Vorlage zur Beschreibung eines Geschäftsmodells

Jedes Geschäftsmodell erfordert eine Reihe von Schlüsselaktivitäten. Das sind die wichtigsten Handlungen, die ein Unternehmen vornehmen muss, um erfolgreich zu agieren. Genau wie die Schlüsselressourcen müssen sie ein Wertangebot schaffen und unterbreiten, Märkte erreichen, Kundenbeziehungen aufrechterhalten und Gewinne erzielen. Und genau wie Schlüsselressourcen unterscheiden sich die Schlüsselaktivitäten je nach Art des Geschäftsmodells.

Für den Softwarehersteller Microsoft umfassen die Schlüsselaktivitäten die Softwareentwicklung. Für den PC-Hersteller Dell gehört das Supply-Chain-Management zu den Schlüsselaktivitäten. Und für die Beratungsfirma McKinsey zählt zu den Schlüsselaktivitäten das Problemlösen.

Schlüsselfragen:

- Welche Schlüsselaktivitäten erfordern unsere Wertangebote?
- …unsere Distributionskanäle
- …Kundenbeziehungen?
- …Einnahmequellen?

(8) <u>Schlüsselpartnerschaften:</u>

Der Baustein Schlüsselpartnerschaften beschreibt das Netzwerk von Lieferanten und Partnern, die zum Gelingen des Geschäftsmodells beitragen.

Schlüssel-partnerschaften	**Schlüssel-aktivitäten**	**Wertangebote**	**Kunden-beziehungen**	**Kundensegmente**
	Schlüssel-ressourcen		**Kanäle**	
Kostenstruktur		**Einnahmequellen**		

Abbildung 9: Vorlage zur Beschreibung eines Geschäftsmodells

Unternehmen gehen aus den verschiedensten Gründen Partnerschaften ein, und Partnerschaften werden für manch ein Geschäftsmodell zum Grundstein. Unternehmen bilden Allianzen, um ihre Geschäftsmodelle zu optimieren, Risiken zu mindern oder Ressourcen zu akquirieren.

Wir können zwischen vier verschiedenen Arten von Partnerschaften unterscheiden:

1. Strategische Allianzen zwischen Nicht-Wettbewerbern
2. Coopetition: strategische Partnerschaften zwischen Wettbewerbern
3. Joint Ventures zur Entwicklung neuer Geschäfte
4. Käufer-Anbieter-Beziehungen zur Sicherung zuverlässiger Versorgung

Schlüsselfragen:

- Wer sind unsere Schlüsselpartner?
- Wer sind unsere Schlüssellieferanten?
- Welche Schlüsselresourcen beziehen wir von Partnern?
- Welche Schlüsselaktivitäten üben Partner aus?

(9) <u>Kostenstruktur:</u>

Die Kostenstruktur beschreibt alle Kosten, die bei der Ausführung eines Geschäftsmodells anfallen.

Schlüssel-partnerschaften	**Schlüssel-aktivitäten**	**Wertangebote**	**Kunden-beziehungen**	**Kundensegmente**
	Schlüssel-ressourcen		**Kanäle**	
Kostenstruktur		**Einnahmequellen**		

Abbildung 10: Vorlage zur Beschreibung eines Geschäftsmodells

Dieser Baustein beschreibt die wichtigsten Kosten, die bei der Arbeit nach einem bestimmten Geschäftsmodell anfallen. Das Schaffen und Vermitteln von Wert, das Pflegen von Kundenbeziehungen und das Generieren von Umsatz sind alle mit Kosten verbunden. Solche Kosten können relativ einfach kalkuliert werden, nachdem die Schlüsselressourcen, die Schlüsselaktivitäten und die Schlüsselpartnerschaften festgelegt wurden. Manche Geschäftsmodelle sind allerdings kostspieliger als andere. Sogenannte Billigfluglinien zum Beispiel haben ihr Geschäftsmodell vollständig auf einer niedrigen Kostenstruktur aufgebaut.

Schlüsselfragen:

- Welches sind die wichtigsten mit unserem Geschäftsmodell verbundenen Kosten?
- Welche Schlüsselressourcen sind am teuersten?
- Welche Schlüsselaktivitäten sind am teuersten?

1.2 Beispiel-Geschäftsmodell

Um die Anwendung der Geschäftsmodell-Bausteine zu veranschaulichen, ist im Folgenden beispielhaft dargestellt, wie ein Geschäftsmodell zur Vermarktung von Autos gestaltet sein kann:

Titel: Autohändler

Beschreibung anhand der neun Geschäftsmodell-Bausteine:

<table>
<tr>
<td rowspan="2">Schlüssel-partnerschaften
Autohersteller, von denen Autos zu guten Konditionen und mit kurzer Lieferfrist beschafft werden können</td>
<td>Schlüssel-aktivitäten
Beschaffung der Autos, Betrieb des Autohauses</td>
<td rowspan="2">Wertangebote
Autos verschiedener Größen und Ausstattungsvarianten</td>
<td>Kunden-beziehungen
Intensive persönliche Beratung zur Autoauswahl und -ausstattung</td>
<td rowspan="2">Kundensegmente
Privatkunden, die ein eigenes Auto benötigen und sich ein solches Auto auch leisten können</td>
</tr>
<tr>
<td>Schlüssel-ressourcen
Attraktiver Standort mit großer Zahl potenzieller Kunden im Einzugsbereich des Autohauses, motiviertes und kompetentes Beratungspersonal</td>
<td>Kanäle
Autohaus, in dem Fahrzeuge angeschaut/ ausprobiert werden können</td>
</tr>
<tr>
<td colspan="2">Kostenstruktur
Beschaffungskosten für Fahrzeuge, Kosten für den Betrieb des Autohauses (für Personal, Gebäude etc.)</td>
<td colspan="3">Einnahmequellen
Kunden kaufen die Autos zu einem festgelegten Verkaufspreis</td>
</tr>
</table>

Abbildung 11: Geschäftsmodell „Autohändler“

1.3 Feedback: (erst am Ende der Einarbeitungsphase zu bearbeiten) Wie gut hat Ihnen das vorliegende Material beim Verstehen der Geschäftsmodell-Bausteine geholfen?

Die Beantwortung der Fragen erfolgt vollkommen anonym! Daher möchten wir Sie bitten, die Fragen vollständig und ehrlich zu beantworten.

Inwiefern treffen folgende Aussagen zu Ihrem jetzigen Verständnis der Geschäftsmodell-Bausteine zu?	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Ich habe die Geschäftsmodell-Bausteine vollständig verstanden.	☐	☐	☐	☐	☐	☐	☐
Ich kann die Geschäftsmodell-Bausteine jetzt sicher anwenden.	☐	☐	☐	☐	☐	☐	☐

Geschäftsmodell-Entwicklung

Materialien für die Aufgabenbearbeitung

2. Geschäftsmodell-Entwicklung

2.1. Aufgabenstellung

Auf der nächsten Seite werden Ihnen ein Produkt sowie ein zugehöriges Geschäftsmodell vorgestellt. Ihre Aufgabe ist es, für dieses Produkt ein neues, innovatives Geschäftsmodell zu entwickeln. **Hierbei ist Ihre Kreativität gefragt! Lösen Sie sich bewusst vom vorgestellten Geschäftsmodell und anderen Ihnen bereits bekannten Geschäftsmodellen**. Wichtig ist weiterhin, dass Sie bei der Entwicklung Ihres Geschäftsmodells

- **alle neun Geschäftsmodell-Bausteine berücksichtigen** und überlegen, welche Gestaltungsmöglichkeiten sich in jedem dieser Bausteine bieten
- **mögliche Abhängigkeiten zwischen den Geschäftsmodell-Bausteinen berücksichtigen** und überlegen, welche Gestaltungsmöglichkeiten sich möglicherweise durch diese Abhängigkeiten bieten

Um den Ideenfindungsprozess zu unterstützen, haben Sie separat einen Stapel mit Vorlagen zur Entwicklung von Geschäftsmodell-Ideen. **Nutzen Sie die Vorlagen möglichst intensiv für Notizen, um Ihnen die Ideengenerierung zu erleichtern.** Weitere Hilfsmittel sind nicht erlaubt (also bitte keine Kommunikation mit Kommilitonen, keine Nutzung von Smartphones etc.).

Wir geben Ihnen fünf Minuten vor Ende der Bearbeitungszeit ein Signal. Dann wählen Sie die Ihrer Meinung nach beste Geschäftsmodell-Idee aus und dokumentieren diese Idee auf der übernächsten Seite unter „Ihre beste Geschäftsmodell-Idee“. Bitte nutzen Sie dabei die Struktur, die Sie bereits kennen:

- Titel
- Beschreibung anhand der neun Geschäftsmodell-Bausteine

Das Vorgehen zur Geschäftsmodell-Entwicklung ist noch einmal in der folgenden Grafik zusammengefasst:

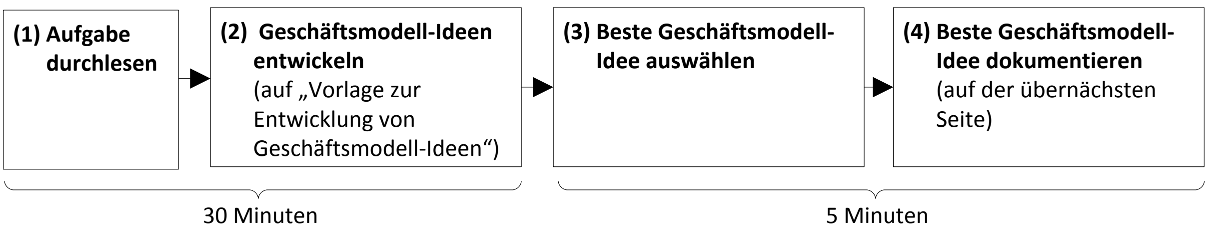

Abbildung 12: Ihr Vorgehen zur Geschäftsmodell-Entwicklung

2.2. Beispiel-Fall

Stellen Sie sich vor, Sie sind Mitarbeiter/in im strategischen Marketing eines Parfümhandelsunternehmens. Ihre Geschäftsführung ist unzufrieden mit dem Erfolg des aktuellen Geschäftsmodells. Daher hat sie Ihnen die Aufgabe gegeben, für das Hauptprodukt des Unternehmens (also Parfüm) ein neues, innovatives Geschäftsmodell zu entwickeln. Dabei sollen Sie möglichst kreativ sein!

Als Ausgangspunkt für Ihre Überlegungen ist im Folgenden das aktuelle Geschäftsmodell Ihres Unternehmens beschrieben:

Titel: Parfümerie

Beschreibung anhand der neun Geschäftsmodell-Bausteine:

<table>
<tr>
<td rowspan="2">Schlüssel-partnerschaften
Parfümhersteller, von denen Parfüms zu guten Konditionen und mit kurzer Lieferfrist beschafft werden können</td>
<td>Schlüssel-aktivitäten
Beschaffung der Parfüms, Betrieb der Parfümerie</td>
<td rowspan="2">Wertangebote

<u>Parfüms verschiedener Hersteller</u></td>
<td>Kunden-beziehungen
Intensive persönliche Beratung zur Auswahl eines passenden Parfüms</td>
<td rowspan="2">Kundensegmente

Privatkunden, die gerne Parfüm nutzen</td>
</tr>
<tr>
<td>Schlüssel-ressourcen
Attraktiver Standort mit großer Zahl potenzieller Kunden im Einzugsbereich der Parfümerie, motiviertes und kompetentes Beratungspersonal</td>
<td>Kanäle

Parfümerie, in der Parfüms angeschaut/ ausprobiert werden können</td>
</tr>
<tr>
<td colspan="3">Kostenstruktur
Beschaffungskosten für Parfüms, Kosten für den Betrieb der Filiale</td>
<td colspan="2">Einnahmequellen
Kunden kaufen Parfüm zu einem festgelegten Verkaufspreis</td>
</tr>
</table>

Abbildung 13: Geschäftsmodell „Parfümerie“

Ihre beste Geschäftsmodell-Idee

1. **Titel Ihrer Geschäftsmodell-Idee: ____**

2. **Beschreibung Ihrer Geschäftsmodell-Idee anhand der neun Geschäftsmodell-Bausteine:**

Kunden-segmente		**Einnahmequellen**
Kunden-beziehungen	**Kanäle**	
Wertangebote		**Kostenstruktur**
Schlüssel-aktivitäten	**Schlüssel-ressourcen**	
Schlüssel-partnerschaften		

3. Feedback

Die Beantwortung der Fragen erfolgt vollkommen anonym! Daher möchten wir Sie bitten, die Fragen vollständig und ehrlich zu beantworten.

Allgemeine Angaben zu Ihrer Person

Demographische Daten				
Alter:	______	**Geschlecht:**	☐ weiblich	☐ männlich
Studiengang:	____________________	**Semester:**	______	

Bitte bewerten Sie die folgenden Aussagen auf einer **Skala von 1 (stimme gar nicht zu) bis 7 (stimme voll zu**).

Bearbeitung der Aufgabenstellung

Inwiefern treffen folgende Aussagen zu den <u>Geschäftsmodell-Bausteinen</u> zu?	**stimme gar nicht zu** **1**	**2**	**3**	**4**	**5**	**6**	**stimme voll zu** **7**
Ich habe allen neun Geschäftsmodell-Bausteinen die gleiche Aufmerksamkeit gewidmet.	☐	☐	☐	☐	☐	☐	☐
Die Abhängigkeiten zwischen den Geschäftsmodell-Bausteinen haben eine große Rolle bei meinen Überlegungen gespielt.	☐	☐	☐	☐	☐	☐	☐
Ich hatte eine integrierte, ganzheitliche Sicht auf alle neun Geschäftsmodell-Bausteine.	☐	☐	☐	☐	☐	☐	☐
Der Umgang mit den Geschäftsmodell-Bausteinen ist einfach und verständlich.	☐	☐	☐	☐	☐	☐	☐
Der Umgang mit den Geschäftsmodell-Bausteinen erfordert <u>nicht</u> viel Denkleistung.	☐	☐	☐	☐	☐	☐	☐
Der Umgang mit den Geschäftsmodell-Bausteinen ist leicht zu bewerkstelligen.	☐	☐	☐	☐	☐	☐	☐

Inwiefern treffen folgende Aussagen zu den <u>Vorlagen zur Entwicklung von Geschäftsmodell-Ideen</u> zu?	**stimme gar nicht zu** **1**	**2**	**3**	**4**	**5**	**6**	**stimme voll zu** **7**
Die Vorlagen habe ich sehr intensiv zur Ideenfindung genutzt.	☐	☐	☐	☐	☐	☐	☐
Ich habe viele verschiedene Geschäftsmodell-Ideen auf den Vorlagen dokumentiert.	☐	☐	☐	☐	☐	☐	☐
Die Vorlagen haben mir bei der Ideenfindung sehr geholfen.	☐	☐	☐	☐	☐	☐	☐
Meine Geschäftsmodell-Idee ist kreativ.	☐	☐	☐	☐	☐	☐	☐

Vorlieben

Inwiefern treffen folgende Aussagen auf Sie zu?	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Ich verbringe gerne Zeit damit, Problemen auf den Grund zu gehen.	☐	☐	☐	☐	☐	☐	☐
Ich arbeite gerne an komplexen, neuartigen Fragestellungen.	☐	☐	☐	☐	☐	☐	☐
Ich nutze gerne meine Fantasie, um Ideen zu produzieren.	☐	☐	☐	☐	☐	☐	☐
Ich beschäftige mich gerne mit einzigartigen Ideen.	☐	☐	☐	☐	☐	☐	☐

Vorwissen

Bezogen auf Ihr Vorwissen vor der Übung: **Inwiefern treffen folgende Aussagen zu Ihrem Vorwissen zu Geschäftsmodellen zu?**	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Geschäftsmodelle waren mir bereits sehr vertraut.	☐	☐	☐	☐	☐	☐	☐
Ich war bereits sehr erfahren in der Anwendung von Geschäftsmodellen.	☐	☐	☐	☐	☐	☐	☐
Die vorgestellten Geschäftsmodell-Bausteine waren mir bereits sehr vertraut.	☐	☐	☐	☐	☐	☐	☐
Ich war bereits sehr erfahren in der Anwendung der vorgestellten Geschäftsmodell-Bausteine.	☐	☐	☐	☐	☐	☐	☐

Wie viele Geschäftsmodelle haben Sie in den letzten beiden Jahren insgesamt (mit-)entwickelt?	____________
Wie viele Geschäftsmodelle haben Sie in den letzten beiden Jahren unter Nutzung der Geschäftsmodell-Bausteine (mit-)entwickelt?	____________

Bezogen auf ihr jetziges Verständnis: **Inwiefern treffen folgende Aussagen zu Ihrem jetzigen Verständnis der Geschäftsmodell-Bausteine zu?**	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Ich habe die Geschäftsmodell-Bausteine jetzt vollständig verstanden.	☐	☐	☐	☐	☐	☐	☐
Ich kann die Geschäftsmodell-Bausteine jetzt sicher anwenden.	☐	☐	☐	☐	☐	☐	☐

Inwiefern treffen folgende Aussagen zu Ihrem Vorwissen zum Beispielprodukt zu?	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Ich weiß sehr viel über Parfüm.	☐	☐	☐	☐	☐	☐	☐
Ich würde mich als Experten für Parfüm bezeichnen.	☐	☐	☐	☐	☐	☐	☐
Ich weiß mehr über Parfüm als meine Freunde.	☐	☐	☐	☐	☐	☐	☐
Ich interessiere mich sehr für Informationen über Parfüm-Produkte.	☐	☐	☐	☐	☐	☐	☐

Wie viele Monate haben Sie bisher ca. im Einzelhandel gearbeitet (in Voll- oder Teilzeit)?	____________

Gesamteindruck

Inwiefern treffen folgende Aussagen zu Ihrem <u>Gesamteindruck</u> zu?	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Die Ideenfindung hat mir viel Spaß gemacht.	☐	☐	☐	☐	☐	☐	☐
Ich habe sehr gerne an der Übung teilgenommen.	☐	☐	☐	☐	☐	☐	☐

Weitere Kommentare

Ihr Feedback zum Übungsablauf sowie den Übungsinhalten ist herzlich willkommen! (Was war positiv? Was negativ? Inwiefern waren die Vorlagen zur Ideengenerierung hilfreich/nicht hilfreich?...)

Vorlage zur Entwicklung von Geschäftsmodell-Ideen

<table>
<tr><td rowspan="2">Schlüssel-
partnerschaften</td><td>Schlüssel-
aktivitäten</td><td rowspan="2">Wertangebote</td><td>Kunden-
beziehungen</td><td rowspan="2">Kundensegmente</td></tr>
<tr><td>Schlüssel-
ressourcen</td><td>Kanäle</td></tr>
<tr><td colspan="3">Kostenstruktur</td><td colspan="2">Einnahmequellen</td></tr>
</table>

Appendix C2: Good List Condition

Geschäftsmodell-Entwicklung

Materialien für die Einarbeitung

1. Einführung: Geschäftsmodelle

Ein Geschäftsmodell beschreibt das Grundprinzip, nach dem ein Unternehmen Umsatz generiert und dadurch Gewinn erzielt. Der Erfolg eines Unternehmens hängt entscheidend von der Wahl eines geeigneten Geschäftsmodells ab. Um ein geeignetes Geschäftsmodell identifizieren zu können, ist es zunächst notwendig, eine Vielzahl von Geschäftsmodell-Ideen (= denkbare Geschäftsmodelle) zu entwickeln. Im Anschluss ist aus den entwickelten Ideen die erfolgversprechendste Geschäftsmodell-Idee auszuwählen.

Das Geschäftsmodell eines Unternehmens definiert, welche Kunden das Unternehmen adressiert. Ziel ist es, mit Produkten und/oder Dienstleistungen die Probleme dieser Kunden zu lösen bzw. deren Bedürfnisse zu befriedigen. Dafür ist zu entscheiden, wie das Unternehmen die (potenziellen) Kunden am besten über seine Produkte informiert und wie diese Produkte am besten vom Unternehmen zu den Kunden kommen. Außerdem ist festzulegen, wie intensiv ein Unternehmen den Kontakt zu seinen Kunden gestalten möchte und für welche Eigenschaften der Produkte/Dienstleistungen eines Unternehmens der Kunde bezahlen soll.

Um ein Geschäftsmodell anzubieten, muss ein Unternehmen permanent eine Reihe von Tätigkeiten durchführen und die Voraussetzungen schaffen, dass diese Tätigkeiten möglichst reibungslos durchgeführt werden können. Da ein Unternehmen alleine in der Regel nicht alles bereitstellen kann, das benötigt wird, um die Kundenwünsche zu bedienen, wird es gegebenenfalls mit anderen Unternehmen zusammenarbeiten. Weiterhin verursacht die gesamte Unternehmenstätigkeit Kosten und es ist wichtig für ein Unternehmen, die größten Kostenverursacher zu kennen.

Im Folgenden wird detaillierter beschrieben, woraus ein Geschäftsmodell besteht. Die Beschreibung orientiert sich an den folgenden neun Geschäftsmodell-Bausteinen:

Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen
Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur

Abbildung 1: Vorlage zur Beschreibung eines Geschäftsmodells

1.1 Beschreibung der Bausteine eines Geschäftsmodells

(1) Kundensegmente:

Der Baustein Kundensegmente definiert die verschiedenen Gruppen von Personen oder Organisationen, die ein Unternehmen erreichen und bedienen will.

Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen
Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur

Abbildung 2: Vorlage zur Beschreibung eines Geschäftsmodells

Kunden bilden das Herz jedes Geschäftsmodells. Ohne (profitable) Kunden kann kein Unternehmen lange überleben. Um Kunden besser zufriedenstellen zu können, kann eine Firma sie in verschiedene Segmente mit gemeinsamen Bedürfnissen, gemeinsamen Verhaltensweisen oder anderen Merkmalen unterteilen. Ein Geschäftsmodell kann ein oder mehrere große oder kleine Kundensegmente beschreiben. Eine Organisation muss eine bewusste Entscheidung darüber fällen, welche Segmente sie bedienen und welche sie ignorieren will. Wenn diese Entscheidung einmal getroffen ist, kann ein Geschäftsmodell auf der Grundlage eines tiefen Verständnisses spezieller Kundenwünsche sorgfältig gestaltet werden.

Kundengruppen repräsentieren verschiedene Segmente, wenn

- Ihre Bedürfnisse ein individuelles Angebot erfordern und rechtfertigen;
- Sie über unterschiedliche Distributionskanäle erreicht werden können;
- Sie unterschiedliche Arten von Beziehungen erfordern;
- Sie stark unterschiedliche Rentabilität aufweisen;
- Sie bereit sind, für unterschiedliche Aspekte des Angebots zu bezahlen.

Schlüsselfragen:

- Für wen schöpfen wir Wert?
- Wer sind unsere wichtigsten Kunden?

(2) <u>Wertangebote:</u>

Der Baustein Wertangebote beschreibt das Paket von Produkten und Dienstleistungen, das für ein bestimmtes Kundensegment Wert schöpft.

Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen
Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur

Abbildung 3: Vorlage zur Beschreibung eines Geschäftsmodells

Das Wertangebot ist der Grund, weshalb Kunden sich eher dem einen Unternehmen zuwenden als dem anderen. Es löst ein Kundenproblem oder erfüllt ein Kundenbedürfnis. Jedes Wertangebot besteht aus einem Paket von Produkten und/oder Dienstleistungen, die sich um die Anforderungen eines bestimmten Kundensegments kümmern. In diesem Sinne ist das Wertangebot ein Zusammenschluss oder Paket von Nutzen, die ein Unternehmen seinen Kunden anbietet.

Manche Wertangebote sind innovativ und stellen ein neues oder durchschlagendes Angebot dar. Andere ähneln vielleicht bestehenden Marktangeboten, verfügen jedoch über zusätzliche Merkmale und Eigenschaften.

Schlüsselfragen:

- Welchen Wert vermitteln wir dem Kunden?
- Welche der Probleme unseres Kunden helfen wir zu lösen?
- Welche Kundenbedürfnisse erfüllen wir?
- Welche Produkt- und Dienstleistungspakete bieten wir jedem Kundensegment an?

(3) <u>Kanäle:</u>

Der Kanäle-Baustein beschreibt, wie ein Unternehmen seine Kundensegmente erreicht und anspricht, um ein Wertangebot zu vermitteln.

Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen
Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur

Abbildung 4: Vorlage zur Beschreibung eines Geschäftsmodells

Kommunikations-, Distributions- und Verkaufskanäle bilden die Schnittstellen zwischen einem Unternehmen und seinen Kunden. Kanäle sind Kundenberührungspunkte, die eine wichtige Rolle in der Kundenerfahrung spielen. Sie erfüllen verschiedene Funktionen, darunter:

- die Aufmerksamkeit der Kunden auf die Produkte und Dienstleistungen des Unternehmens zu lenken;
- den Kunden bei der Bewertung des Wertangebots einer Firma zu helfen;
- den Kunden den Kauf spezifischer Produkte und Dienstleistungen zu ermöglichen;
- den Kunden ein Wertangebot zu unterbreiten;
- die Kunden auch nach dem Kauf zu betreuen.

Schlüsselfragen:

- Über welche Kanäle wollen unsere Kundensegmente erreicht werden?
- Wie erreichen wir sie jetzt?
- Wie sind unsere Kanäle integriert?
- Welche funktionieren am besten?
- Welche sind am kosteneffizientesten?
- Wie integrieren wir sie in die Kundenabläufe?

(4) <u>Kundenbeziehungen:</u>

Der Baustein Kundenbeziehungen beschreibt die Arten von Beziehungen, die ein Unternehmen mit bestimmten Kundensegmenten eingeht.

Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen
Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur

Abbildung 5: Vorlage zur Beschreibung eines Geschäftsmodells

Ein Unternehmen sollte sich Klarheit verschaffen über die Art von Beziehungen, die es mit jedem Kundensegment aufnehmen will. Beziehungen können von persönlich bis zu automatisiert reichen. Kundenbeziehungen werden von den folgenden Motivationen angetrieben:

- Kundenakquise,

- Kundenpflege,
- Verkaufssteigerung.

In den Anfangszeiten waren beispielsweise die Kundenbeziehungen der Mobilnetzbetreiber geprägt von aggressiven Akquisitionsstrategien, wozu auch kostenlose Handys gehörten. Als der Markt allmählich gesättigt war, verlegten sich die Mobilfunkanbieter auf Kundenpflege und eine Steigerung des Umsatzes pro Kunde.

Die im Geschäftsmodell eines Unternehmens vorgesehenen Kundenbeziehungen haben großen Einfluss auf die gesamte Kundenerfahrung.

Schlüsselfragen:

- Welche Art von Beziehung erwartet jedes unserer Kundensegmente von uns?
- Welche haben wir eingerichtet?
- Wie kostenintensiv sind sie?
- Wie sind sie in unser übriges Geschäftsmodell integriert?

(5) <u>Einnahmequellen:</u>

Der Baustein Einnahmequellen steht für die Einkünfte, die ein Unternehmen aus jedem Kundensegment bezieht (Umsatz minus Kosten gleich Gewinn).

Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen
Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur

Abbildung 6: Vorlage zur Beschreibung eines Geschäftsmodells

Wenn die Kunden das Herz eines Geschäftsmodells bilden, dann sind die Einnahmequellen die Arterien. Jedes Unternehmen muss sich die Frage stellen: Für welche Werte ist jedes einzelne Kundensegment wirklich zu zahlen bereit? Die erfolgreiche Beantwortung dieser Frage ermöglicht der Firma, aus jedem Kundensegment eine oder mehrere Einnahmequellen zu erzeugen. Jede Einnahmequelle kann verschiedene Preisfestlegungsmechanismen aufweisen, zum Beispiel feste Listenpreise, Verhandlung, Auktionen, marktabhängig, mengenabhängig oder Ertragsmanagement.

Ein Geschäftsmodell kann zwei verschiedene Arten von Einnahmequellen umfassen:

1. Transaktionseinnahmen aus einmaligen Kundenzahlungen.
2. Wiederkehrende Einnahmen aus fortlaufenden Zahlungen, entweder um den Kunden ein Wertangebot zu vermitteln oder um einen Kundendienst nach dem Kauf zu gewährleisten.

Schlüsselfragen:

- Für welche Werte sind unsere Kunden wirklich zu bezahlen bereit?
- Wofür bezahlen sie jetzt?
- Wie bezahlen sie jetzt?
- Wie würden sie gerne bezahlen?
- Wie viel trägt jede Einnahmequelle zum Gesamtumsatz bei?

(6) <u>Schlüsselressourcen:</u>

Der Baustein Schlüsselressourcen beschreibt die wichtigsten Wirtschaftsgüter, die für das Funktionieren eines Geschäftsmodells notwendig sind.

Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen
Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur

Abbildung 7: Vorlage zur Beschreibung eines Geschäftsmodells

Jedes Geschäftsmodell erfordert Schlüsselressourcen. Diese Ressourcen ermöglichen es einem Unternehmen, ein Wertangebot zu schaffen und zu unterbreiten, Märkte zu bedienen, Beziehungen zu Kundensegmenten aufrechtzuerhalten und Einkünfte zu erzielen. Je nach Art des Geschäftsmodells werden verschiedene Schlüsselressourcen benötigt. Ein Hersteller von Mikrochips braucht kapitalintensive Produktionsstandorte, während für einen Entwickler von Mikrochips eher die Personalausstattung von Bedeutung ist.

Schlüsselressourcen können physischer, finanzieller, intellektueller oder menschlicher Natur sein. Schlüsselressourcen können im Besitz der Firma sein, geleast oder von Schlüsselpartnern erworben werden.

Schlüsselfragen:

- Welche Schlüsselressourcen erfordern unsere Wertangebote?
- Unsere Distributionskanäle?
- Unsere Kundenbeziehungen?
- Einnahmequellen?

(7) <u>Schlüsselaktivitäten:</u>

Der Baustein Schlüsselaktivitäten beschreibt die wichtigsten Dinge, die ein Unternehmen tun muss, damit sein Geschäftsmodell funktioniert.

Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen
Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur

Abbildung 8: Vorlage zur Beschreibung eines Geschäftsmodells

Jedes Geschäftsmodell erfordert eine Reihe von Schlüsselaktivitäten. Das sind die wichtigsten Handlungen, die ein Unternehmen vornehmen muss, um erfolgreich zu agieren. Genau wie die Schlüsselressourcen müssen sie ein Wertangebot schaffen und unterbreiten, Märkte erreichen, Kundenbeziehungen aufrechterhalten und Gewinne erzielen. Und genau wie Schlüsselressourcen unterscheiden sich die Schlüsselaktivitäten je nach Art des Geschäftsmodells.

Für den Softwarehersteller Microsoft umfassen die Schlüsselaktivitäten die Softwareentwicklung. Für den PC-Hersteller Dell gehört das Supply-Chain-Management zu den Schlüsselaktivitäten. Und für die Beratungsfirma McKinsey zählt zu den Schlüsselaktivitäten das Problemlösen.

Schlüsselfragen:

- Welche Schlüsselaktivitäten erfordern unsere Wertangebote?
- …unsere Distributionskanäle
- …Kundenbeziehungen?
- …Einnahmequellen?

(8) <u>Schlüsselpartnerschaften:</u>

Der Baustein Schlüsselpartnerschaften beschreibt das Netzwerk von Lieferanten und Partnern, die zum Gelingen des Geschäftsmodells beitragen.

Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen
Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur

Abbildung 9: Vorlage zur Beschreibung eines Geschäftsmodells

Unternehmen gehen aus den verschiedensten Gründen Partnerschaften ein, und Partnerschaften werden für manch ein Geschäftsmodell zum Grundstein. Unternehmen bilden Allianzen, um ihre Geschäftsmodelle zu optimieren, Risiken zu mindern oder Ressourcen zu akquirieren.

Wir können zwischen vier verschiedenen Arten von Partnerschaften unterscheiden:

1. Strategische Allianzen zwischen Nicht-Wettbewerbern
2. Coopetition: strategische Partnerschaften zwischen Wettbewerbern
3. Joint Ventures zur Entwicklung neuer Geschäfte
4. Käufer-Anbieter-Beziehungen zur Sicherung zuverlässiger Versorgung

Schlüsselfragen:

- Wer sind unsere Schlüsselpartner?
- Wer sind unsere Schlüssellieferanten?
- Welche Schlüsselresourcen beziehen wir von Partnern?
- Welche Schlüsselaktivitäten üben Partner aus?

(9) <u>Kostenstruktur:</u>

Die Kostenstruktur beschreibt alle Kosten, die bei der Ausführung eines Geschäftsmodells anfallen.

Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen
Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur

Abbildung 10: Vorlage zur Beschreibung eines Geschäftsmodells

Dieser Baustein beschreibt die wichtigsten Kosten, die bei der Arbeit nach einem bestimmten Geschäftsmodell anfallen. Das Schaffen und Vermitteln von Wert, das Pflegen von Kundenbeziehungen und das Generieren von Umsatz sind alle mit Kosten verbunden. Solche Kosten können relativ einfach kalkuliert werden, nachdem die Schlüsselressourcen, die Schlüsselaktivitäten und die Schlüsselpartnerschaften festgelegt wurden. Manche Geschäftsmodelle sind allerdings kostspieliger als andere. Sogenannte Billigfluglinien zum Beispiel haben ihr Geschäftsmodell vollständig auf einer niedrigen Kostenstruktur aufgebaut.

Schlüsselfragen:

- Welches sind die wichtigsten mit unserem Geschäftsmodell verbundenen Kosten?
- Welche Schlüsselressourcen sind am teuersten?
- Welche Schlüsselaktivitäten sind am teuersten?

1.2 Beispiel-Geschäftsmodell

Um die Anwendung der Geschäftsmodell-Bausteine zu veranschaulichen, ist im Folgenden beispielhaft dargestellt, wie ein Geschäftsmodell zur Vermarktung von Autos gestaltet sein kann:

Titel: Autohändler

Beschreibung anhand der neun Geschäftsmodell-Bausteine:

Kundensegmente	*Privatkunden, die ein eigenes Auto benötigen und sich ein solches Auto auch leisten können*
Wertangebote	*Autos verschiedener Größen und Ausstattungsvarianten*
Kanäle	*Autohaus, in dem Fahrzeuge angeschaut/ausprobiert werden können*
Kundenbeziehungen	*Intensive persönliche Beratung zur Autoauswahl und -ausstattung*
Einnahmequellen	*Kunden kaufen die Autos zu einem festgelegten Verkaufspreis*
Schlüsselressourcen	*Attraktiver Standort mit großer Zahl potenzieller Kunden im Einzugsbereich des Autohauses, motiviertes und kompetentes Beratungspersonal*
Schlüsselaktivitäten	*Beschaffung der Autos, Betrieb des Autohauses*
Schlüsselpartnerschaften	*Autohersteller, von denen Autos zu guten Konditionen und mit kurzer Lieferfrist beschafft werden können*
Kostenstruktur	*Beschaffungskosten für Fahrzeuge, Kosten für den Betrieb des Autohauses (für Personal, Gebäude etc.)*

Abbildung 11: Geschäftsmodell „Autohändler“

1.3 Feedback 1: (erst am Ende der Einarbeitungsphase zu bearbeiten) Wie gut hat Ihnen das vorliegende Material beim Verstehen der Geschäftsmodell-Bausteine geholfen?

Die Beantwortung der Fragen erfolgt vollkommen anonym! Daher möchten wir Sie bitten, die Fragen vollständig und ehrlich zu beantworten.

Inwiefern treffen folgende Aussagen zu Ihrem jetzigen Verständnis der Geschäftsmodell-Bausteine zu?	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Ich habe die Geschäftsmodell-Bausteine vollständig verstanden.	☐	☐	☐	☐	☐	☐	☐
Ich kann die Geschäftsmodell-Bausteine jetzt sicher anwenden.	☐	☐	☐	☐	☐	☐	☐

Geschäftsmodell-Entwicklung

Materialien für die Aufgabenbearbeitung

2. Geschäftsmodell-Entwicklung

2.1. Aufgabenstellung

Auf der nächsten Seite werden Ihnen ein Produkt sowie ein zugehöriges Geschäftsmodell vorgestellt. Ihre Aufgabe ist es, für dieses Produkt ein neues, innovatives Geschäftsmodell zu entwickeln. **Hierbei ist Ihre Kreativität gefragt! Lösen Sie sich bewusst vom vorgestellten Geschäftsmodell und anderen Ihnen bereits bekannten Geschäftsmodellen**. Wichtig ist weiterhin, dass Sie bei der Entwicklung Ihres Geschäftsmodells

- **alle neun Geschäftsmodell-Bausteine berücksichtigen** und überlegen, welche Gestaltungsmöglichkeiten sich in jedem dieser Bausteine bieten
- **mögliche Abhängigkeiten zwischen den Geschäftsmodell-Bausteinen berücksichtigen** und überlegen, welche Gestaltungsmöglichkeiten sich möglicherweise durch diese Abhängigkeiten bieten

Um den Ideenfindungsprozess zu unterstützen, haben Sie separat einen Stapel mit Vorlagen zur Entwicklung von Geschäftsmodell-Ideen. **Nutzen Sie die Vorlagen möglichst intensiv für Notizen, um Ihnen die Ideengenerierung zu erleichtern.** Weitere Hilfsmittel sind nicht erlaubt (also bitte keine Kommunikation mit Kommilitonen, keine Nutzung von Smartphones etc.).

Wir geben Ihnen fünf Minuten vor Ende der Bearbeitungszeit ein Signal. Dann wählen Sie die Ihrer Meinung nach beste Geschäftsmodell-Idee aus und dokumentieren diese Idee auf der übernächsten Seite unter „Ihre beste Geschäftsmodell-Idee“. Bitte nutzen Sie dabei die Struktur, die Sie bereits kennen:

- Titel
- Beschreibung anhand der neun Geschäftsmodell-Bausteine

Das Vorgehen zur Geschäftsmodell-Entwicklung ist noch einmal in der folgenden Grafik zusammengefasst:

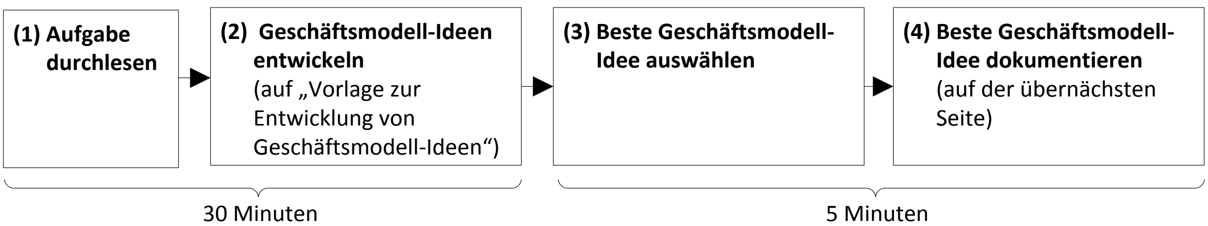

Abbildung 12: Ihr Vorgehen zur Geschäftsmodell-Entwicklung

2.2. Beispiel-Fall

Stellen Sie sich vor, Sie sind Mitarbeiter/in im strategischen Marketing eines Parfümhandelsunternehmens. Ihre Geschäftsführung ist unzufrieden mit dem Erfolg des aktuellen Geschäftsmodells. Daher hat sie Ihnen die Aufgabe gegeben, für das Hauptprodukt des Unternehmens (also Parfüm) ein neues, innovatives Geschäftsmodell zu entwickeln. Dabei sollen Sie möglichst kreativ sein!

Als Ausgangspunkt für Ihre Überlegungen ist im Folgenden das aktuelle Geschäftsmodell Ihres Unternehmens beschrieben:

Titel: Parfümerie

Beschreibung anhand der neun Geschäftsmodell-Bausteine:

Kundensegmente	*Privatkunden, die gerne Parfüm nutzen*
Wertangebote	*Parfüms verschiedener Hersteller*
Kanäle	*Parfümerie, in der Parfüms angeschaut/ausprobiert werden können*
Kundenbeziehungen	*Intensive persönliche Beratung zur Auswahl eines passenden Parfüms*
Einnahmequellen	*Kunden kaufen Parfüm zu einem festgelegten Verkaufspreis*
Schlüsselressourcen	*Attraktiver Standort mit großer Zahl potenzieller Kunden im Einzugsbereich der Parfümerie, motiviertes und kompetentes Beratungspersonal*
Schlüsselaktivitäten	*Beschaffung der Parfüms, Betrieb der Parfümerie*
Schlüsselpartnerschaften	*Parfümhersteller, von denen Parfüms zu guten Konditionen und mit kurzer Lieferfrist beschafft werden können*
Kostenstruktur	*Beschaffungskosten für Parfüms, Kosten für den Betrieb der Parfümerie (für Personal, Gebäude etc.)*

Abbildung 13: Geschäftsmodell „Parfümerie“

Ihre beste Geschäftsmodell-Idee

1. **Titel Ihrer Geschäftsmodell-Idee: ____**
2. **Beschreibung Ihrer Geschäftsmodell-Idee anhand der neun Geschäftsmodell-Bausteine:**

Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen
Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur

3. Feedback

Die Beantwortung der Fragen erfolgt vollkommen anonym! Daher möchten wir Sie bitten, die Fragen vollständig und ehrlich zu beantworten.

Allgemeine Angaben zu Ihrer Person

Demographische Daten				
Alter:	_____	**Geschlecht:**	☐ weiblich	☐ männlich
Studiengang:	____________________	**Semester:**	_____	

Bitte bewerten Sie die folgenden Aussagen auf einer **Skala von 1 (stimme gar nicht zu) bis 7 (stimme voll zu)**.

Bearbeitung der Aufgabenstellung

Inwiefern treffen folgende Aussagen zu den Geschäftsmodell-Bausteinen zu?	**stimme gar nicht zu** **1**	**2**	**3**	**4**	**5**	**6**	**stimme voll zu** **7**
Ich habe allen neun Geschäftsmodell-Bausteinen die gleiche Aufmerksamkeit gewidmet.	☐	☐	☐	☐	☐	☐	☐
Die Abhängigkeiten zwischen den Geschäftsmodell-Bausteinen haben eine große Rolle bei meinen Überlegungen gespielt.	☐	☐	☐	☐	☐	☐	☐
Ich hatte eine integrierte, ganzheitliche Sicht auf alle neun Geschäftsmodell-Bausteine.	☐	☐	☐	☐	☐	☐	☐
Der Umgang mit den Geschäftsmodell-Bausteinen ist einfach und verständlich.	☐	☐	☐	☐	☐	☐	☐
Der Umgang mit den Geschäftsmodell-Bausteinen erfordert nicht viel Denkleistung.	☐	☐	☐	☐	☐	☐	☐
Der Umgang mit den Geschäftsmodell-Bausteinen ist leicht zu bewerkstelligen.	☐	☐	☐	☐	☐	☐	☐

Inwiefern treffen folgende Aussagen zu den Vorlagen zur Entwicklung von Geschäftsmodell-Ideen zu?	**stimme gar nicht zu** **1**	**2**	**3**	**4**	**5**	**6**	**stimme voll zu** **7**
Die Vorlagen habe ich sehr intensiv zur Ideenfindung genutzt.	☐	☐	☐	☐	☐	☐	☐
Ich habe viele verschiedene Geschäftsmodell-Ideen auf den Vorlagen dokumentiert.	☐	☐	☐	☐	☐	☐	☐
Die Vorlagen haben mir bei der Ideenfindung sehr geholfen.	☐	☐	☐	☐	☐	☐	☐
Meine Geschäftsmodell-Idee ist kreativ.	☐	☐	☐	☐	☐	☐	☐

Vorlieben

Inwiefern treffen folgende Aussagen auf Sie zu?	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Ich verbringe gerne Zeit damit, Problemen auf den Grund zu gehen.	☐	☐	☐	☐	☐	☐	☐
Ich arbeite gerne an komplexen, neuartigen Fragestellungen.	☐	☐	☐	☐	☐	☐	☐
Ich nutze gerne meine Fantasie, um Ideen zu produzieren.	☐	☐	☐	☐	☐	☐	☐
Ich beschäftige mich gerne mit einzigartigen Ideen.	☐	☐	☐	☐	☐	☐	☐

Vorwissen

Bezogen auf Ihr Vorwissen vor der Übung: **Inwiefern treffen folgende Aussagen zu Ihrem Vorwissen zu Geschäftsmodellen zu?**	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Geschäftsmodelle waren mir bereits sehr vertraut.	☐	☐	☐	☐	☐	☐	☐
Ich war bereits sehr erfahren in der Anwendung von Geschäftsmodellen.	☐	☐	☐	☐	☐	☐	☐
Die vorgestellten Geschäftsmodell-Bausteine waren mir bereits sehr vertraut.	☐	☐	☐	☐	☐	☐	☐
Ich war bereits sehr erfahren in der Anwendung der vorgestellten Geschäftsmodell-Bausteine.	☐	☐	☐	☐	☐	☐	☐

Wie viele Geschäftsmodelle haben Sie in den letzten beiden Jahren insgesamt (mit-)entwickelt?	____________
Wie viele Geschäftsmodelle haben Sie in den letzten beiden Jahren unter Nutzung der Geschäftsmodell-Bausteine (mit-)entwickelt?	____________

Bezogen auf ihr jetziges Verständnis: **Inwiefern treffen folgende Aussagen zu Ihrem jetzigen Verständnis der Geschäftsmodell-Bausteine zu?**	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Ich habe die Geschäftsmodell-Bausteine jetzt vollständig verstanden.	☐	☐	☐	☐	☐	☐	☐
Ich kann die Geschäftsmodell-Bausteine jetzt sicher anwenden.	☐	☐	☐	☐	☐	☐	☐

Inwiefern treffen folgende Aussagen zu Ihrem Vorwissen zum Beispielprodukt zu?	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Ich weiß sehr viel über Parfüm.	☐	☐	☐	☐	☐	☐	☐
Ich würde mich als Experten für Parfüm bezeichnen.	☐	☐	☐	☐	☐	☐	☐
Ich weiß mehr über Parfüm als meine Freunde.	☐	☐	☐	☐	☐	☐	☐
Ich interessiere mich sehr für Informationen über Parfüm-Produkte.	☐	☐	☐	☐	☐	☐	☐

Wie viele Monate haben Sie bisher ca. im Einzelhandel gearbeitet (in Voll- oder Teilzeit)?	____________

Gesamteindruck

Inwiefern treffen folgende Aussagen zu Ihrem <u>Gesamteindruck</u> zu?	stimme gar nicht zu 1	2	3	4	5	6	stimme voll zu 7
Die Ideenfindung hat mir viel Spaß gemacht.	☐	☐	☐	☐	☐	☐	☐
Ich habe sehr gerne an der Übung teilgenommen.	☐	☐	☐	☐	☐	☐	☐

Weitere Kommentare

Ihr Feedback zum Übungsablauf sowie den Übungsinhalten ist herzlich willkommen! (Was war positiv? Was negativ? Inwiefern waren die Vorlagen zur Ideengenerierung hilfreich/nicht hilfreich?...)

Vorlage zur Entwicklung von Geschäftsmodell-Ideen

Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen
Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur

Appendix C3: Bad List Condition

Geschäftsmodell-Entwicklung

Materialien für die Einarbeitung

1. Einführung: Geschäftsmodelle

Ein Geschäftsmodell beschreibt das Grundprinzip, nach dem ein Unternehmen Umsatz generiert und dadurch Gewinn erzielt. Der Erfolg eines Unternehmens hängt entscheidend von der Wahl eines geeigneten Geschäftsmodells ab. Um ein geeignetes Geschäftsmodell identifizieren zu können, ist es zunächst notwendig, eine Vielzahl von Geschäftsmodell-Ideen (= denkbare Geschäftsmodelle) zu entwickeln. Im Anschluss ist aus den entwickelten Ideen die erfolgversprechendste Geschäftsmodell-Idee auszuwählen.

Das Geschäftsmodell eines Unternehmens definiert, welche Kunden das Unternehmen adressiert. Ziel ist es, mit Produkten und/oder Dienstleistungen die Probleme dieser Kunden zu lösen bzw. deren Bedürfnisse zu befriedigen. Dafür ist zu entscheiden, wie das Unternehmen die (potenziellen) Kunden am besten über seine Produkte informiert und wie diese Produkte am besten vom Unternehmen zu den Kunden kommen. Außerdem ist festzulegen, wie intensiv ein Unternehmen den Kontakt zu seinen Kunden gestalten möchte und für welche Eigenschaften der Produkte/Dienstleistungen eines Unternehmens der Kunde bezahlen soll.

Um ein Geschäftsmodell anzubieten, muss ein Unternehmen permanent eine Reihe von Tätigkeiten durchführen und die Voraussetzungen schaffen, dass diese Tätigkeiten möglichst reibungslos durchgeführt werden können. Da ein Unternehmen alleine in der Regel nicht alles bereitstellen kann, das benötigt wird, um die Kundenwünsche zu bedienen, wird es gegebenenfalls mit anderen Unternehmen zusammenarbeiten. Weiterhin verursacht die gesamte Unternehmenstätigkeit Kosten und es ist wichtig für ein Unternehmen, die größten Kostenverursacher zu kennen.

Im Folgenden wird detaillierter beschrieben, woraus ein Geschäftsmodell besteht. Die Beschreibung orientiert sich an den folgenden neun Geschäftsmodell-Bausteinen:

Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur
Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen

Abbildung 1: Vorlage zur Beschreibung eines Geschäftsmodells

1.1 Beschreibung der Bausteine eines Geschäftsmodells

(1) <u>Kundensegmente:</u>

Der Baustein Kundensegmente definiert die verschiedenen Gruppen von Personen oder Organisationen, die ein Unternehmen erreichen und bedienen will.

Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur
Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen

Abbildung 2: Vorlage zur Beschreibung eines Geschäftsmodells

Kunden bilden das Herz jedes Geschäftsmodells. Ohne (profitable) Kunden kann kein Unternehmen lange überleben. Um Kunden besser zufriedenstellen zu können, kann eine Firma sie in verschiedene Segmente mit gemeinsamen Bedürfnissen, gemeinsamen Verhaltensweisen oder anderen Merkmalen unterteilen. Ein Geschäftsmodell kann ein oder mehrere große oder kleine Kundensegmente beschreiben. Eine Organisation muss eine bewusste Entscheidung darüber fällen, welche Segmente sie bedienen und welche sie ignorieren will. Wenn diese Entscheidung einmal getroffen ist, kann ein Geschäftsmodell auf der Grundlage eines tiefen Verständnisses spezieller Kundenwünsche sorgfältig gestaltet werden.

Kundengruppen repräsentieren verschiedene Segmente, wenn

- Ihre Bedürfnisse ein individuelles Angebot erfordern und rechtfertigen;
- Sie über unterschiedliche Distributionskanäle erreicht werden können;
- Sie unterschiedliche Arten von Beziehungen erfordern;
- Sie stark unterschiedliche Rentabilität aufweisen;
- Sie bereit sind, für unterschiedliche Aspekte des Angebots zu bezahlen.

Schlüsselfragen:

- Für wen schöpfen wir Wert?
- Wer sind unsere wichtigsten Kunden?

(2) Wertangebote:

Der Baustein Wertangebote beschreibt das Paket von Produkten und Dienstleistungen, das für ein bestimmtes Kundensegment Wert schöpft.

Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur
Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen

Abbildung 3: Vorlage zur Beschreibung eines Geschäftsmodells

Das Wertangebot ist der Grund, weshalb Kunden sich eher dem einen Unternehmen zuwenden als dem anderen. Es löst ein Kundenproblem oder erfüllt ein Kundenbedürfnis. Jedes Wertangebot besteht aus einem Paket von Produkten und/oder Dienstleistungen, die sich um die Anforderungen eines bestimmten Kundensegments kümmern. In diesem Sinne ist das Wertangebot ein Zusammenschluss oder Paket von Nutzen, die ein Unternehmen seinen Kunden anbietet.

Manche Wertangebote sind innovativ und stellen ein neues oder durchschlagendes Angebot dar. Andere ähneln vielleicht bestehenden Marktangeboten, verfügen jedoch über zusätzliche Merkmale und Eigenschaften.

Schlüsselfragen:

- Welchen Wert vermitteln wir dem Kunden?
- Welche der Probleme unseres Kunden helfen wir zu lösen?
- Welche Kundenbedürfnisse erfüllen wir?
- Welche Produkt- und Dienstleistungspakete bieten wir jedem Kundensegment an?

(3) Kanäle:

Der Kanäle-Baustein beschreibt, wie ein Unternehmen seine Kundensegmente erreicht und anspricht, um ein Wertangebot zu vermitteln.

Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur
Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen

Abbildung 4: Vorlage zur Beschreibung eines Geschäftsmodells

Kommunikations-, Distributions- und Verkaufskanäle bilden die Schnittstellen zwischen einem Unternehmen und seinen Kunden. Kanäle sind Kundenberührungspunkte, die eine wichtige Rolle in der Kundenerfahrung spielen. Sie erfüllen verschiedene Funktionen, darunter:

- die Aufmerksamkeit der Kunden auf die Produkte und Dienstleistungen des Unternehmens zu lenken;
- den Kunden bei der Bewertung des Wertangebots einer Firma zu helfen;
- den Kunden den Kauf spezifischer Produkte und Dienstleistungen zu ermöglichen;
- den Kunden ein Wertangebot zu unterbreiten;
- die Kunden auch nach dem Kauf zu betreuen.

Schlüsselfragen:

- Über welche Kanäle wollen unsere Kundensegmente erreicht werden?
- Wie erreichen wir sie jetzt?
- Wie sind unsere Kanäle integriert?
- Welche funktionieren am besten?
- Welche sind am kosteneffizientesten?
- Wie integrieren wir sie in die Kundenabläufe?

(4) Kundenbeziehungen:

Der Baustein Kundenbeziehungen beschreibt die Arten von Beziehungen, die ein Unternehmen mit bestimmten Kundensegmenten eingeht.

Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur
Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen

Abbildung 5: Vorlage zur Beschreibung eines Geschäftsmodells

Ein Unternehmen sollte sich Klarheit verschaffen über die Art von Beziehungen, die es mit jedem Kundensegment aufnehmen will. Beziehungen können von persönlich bis zu automatisiert reichen. Kundenbeziehungen werden von den folgenden Motivationen angetrieben:

- Kundenakquise,

- Kundenpflege,
- Verkaufssteigerung.

In den Anfangszeiten waren beispielsweise die Kundenbeziehungen der Mobilnetzbetreiber geprägt von aggressiven Akquisitionsstrategien, wozu auch kostenlose Handys gehörten. Als der Markt allmählich gesättigt war, verlegten sich die Mobilfunkanbieter auf Kundenpflege und eine Steigerung des Umsatzes pro Kunde.

Die im Geschäftsmodell eines Unternehmens vorgesehenen Kundenbeziehungen haben großen Einfluss auf die gesamte Kundenerfahrung.

Schlüsselfragen:

- Welche Art von Beziehung erwartet jedes unserer Kundensegmente von uns?
- Welche haben wir eingerichtet?
- Wie kostenintensiv sind sie?
- Wie sind sie in unser übriges Geschäftsmodell integriert?

(5) <u>Einnahmequellen:</u>

Der Baustein Einnahmequellen steht für die Einkünfte, die ein Unternehmen aus jedem Kundensegment bezieht (Umsatz minus Kosten gleich Gewinn).

Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur
Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen

Abbildung 6: Vorlage zur Beschreibung eines Geschäftsmodells

Wenn die Kunden das Herz eines Geschäftsmodells bilden, dann sind die Einnahmequellen die Arterien. Jedes Unternehmen muss sich die Frage stellen: Für welche Werte ist jedes einzelne Kundensegment wirklich zu zahlen bereit? Die erfolgreiche Beantwortung dieser Frage ermöglicht der Firma, aus jedem Kundensegment eine oder mehrere Einnahmequellen zu erzeugen. Jede Einnahmequelle kann verschiedene Preisfestlegungsmechanismen aufweisen, zum Beispiel feste Listenpreise, Verhandlung, Auktionen, marktabhängig, mengenabhängig oder Ertragsmanagement.

Ein Geschäftsmodell kann zwei verschiedene Arten von Einnahmequellen umfassen:

1. Transaktionseinnahmen aus einmaligen Kundenzahlungen.
2. Wiederkehrende Einnahmen aus fortlaufenden Zahlungen, entweder um den Kunden ein Wertangebot zu vermitteln oder um einen Kundendienst nach dem Kauf zu gewährleisten.

Schlüsselfragen:

- Für welche Werte sind unsere Kunden wirklich zu bezahlen bereit?
- Wofür bezahlen sie jetzt?
- Wie bezahlen sie jetzt?
- Wie würden sie gerne bezahlen?
- Wie viel trägt jede Einnahmequelle zum Gesamtumsatz bei?

(6) <u>Schlüsselressourcen:</u>

Der Baustein Schlüsselressourcen beschreibt die wichtigsten Wirtschaftsgüter, die für das Funktionieren eines Geschäftsmodells notwendig sind.

Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur
Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen

Abbildung 7: Vorlage zur Beschreibung eines Geschäftsmodells

Jedes Geschäftsmodell erfordert Schlüsselressourcen. Diese Ressourcen ermöglichen es einem Unternehmen, ein Wertangebot zu schaffen und zu unterbreiten, Märkte zu bedienen, Beziehungen zu Kundensegmenten aufrechtzuerhalten und Einkünfte zu erzielen. Je nach Art des Geschäftsmodells werden verschiedene Schlüsselressourcen benötigt. Ein Hersteller von Mikrochips braucht kapitalintensive Produktionsstandorte, während für einen Entwickler von Mikrochips eher die Personalausstattung von Bedeutung ist.

Schlüsselressourcen können physischer, finanzieller, intellektueller oder menschlicher Natur sein. Schlüsselressourcen können im Besitz der Firma sein, geleast oder von Schlüsselpartnern erworben werden.

Schlüsselfragen:

- Welche Schlüsselressourcen erfordern unsere Wertangebote?
- Unsere Distributionskanäle?
- Unsere Kundenbeziehungen?
- Einnahmequellen?

(7) <u>Schlüsselaktivitäten:</u>

Der Baustein Schlüsselaktivitäten beschreibt die wichtigsten Dinge, die ein Unternehmen tun muss, damit sein Geschäftsmodell funktioniert.

Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur
Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen

Abbildung 8: Vorlage zur Beschreibung eines Geschäftsmodells

Jedes Geschäftsmodell erfordert eine Reihe von Schlüsselaktivitäten. Das sind die wichtigsten Handlungen, die ein Unternehmen vornehmen muss, um erfolgreich zu agieren. Genau wie die Schlüsselressourcen müssen sie ein Wertangebot schaffen und unterbreiten, Märkte erreichen, Kundenbeziehungen aufrechterhalten und Gewinne erzielen. Und genau wie Schlüsselressourcen unterscheiden sich die Schlüsselaktivitäten je nach Art des Geschäftsmodells.

Für den Softwarehersteller Microsoft umfassen die Schlüsselaktivitäten die Softwareentwicklung. Für den PC-Hersteller Dell gehört das Supply-Chain-Management zu den Schlüsselaktivitäten. Und für die Beratungsfirma McKinsey zählt zu den Schlüsselaktivitäten das Problemlösen.

Schlüsselfragen:

- Welche Schlüsselaktivitäten erfordern unsere Wertangebote?
- …unsere Distributionskanäle
- …Kundenbeziehungen?
- …Einnahmequellen?

(8) <u>Schlüsselpartnerschaften:</u>

Der Baustein Schlüsselpartnerschaften beschreibt das Netzwerk von Lieferanten und Partnern, die zum Gelingen des Geschäftsmodells beitragen.

Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur
Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen

Abbildung 9: Vorlage zur Beschreibung eines Geschäftsmodells

Unternehmen gehen aus den verschiedensten Gründen Partnerschaften ein, und Partnerschaften werden für manch ein Geschäftsmodell zum Grundstein. Unternehmen bilden Allianzen, um ihre Geschäftsmodelle zu optimieren, Risiken zu mindern oder Ressourcen zu akquirieren.

Wir können zwischen vier verschiedenen Arten von Partnerschaften unterscheiden:

1. Strategische Allianzen zwischen Nicht-Wettbewerbern
2. Coopetition: strategische Partnerschaften zwischen Wettbewerbern
3. Joint Ventures zur Entwicklung neuer Geschäfte
4. Käufer-Anbieter-Beziehungen zur Sicherung zuverlässiger Versorgung

Schlüsselfragen:

- Wer sind unsere Schlüsselpartner?
- Wer sind unsere Schlüssellieferanten?
- Welche Schlüsselresourcen beziehen wir von Partnern?
- Welche Schlüsselaktivitäten üben Partner aus?

(9) <u>Kostenstruktur:</u>

Die Kostenstruktur beschreibt alle Kosten, die bei der Ausführung eines Geschäftsmodells anfallen.

Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur
Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen

Abbildung 10: Vorlage zur Beschreibung eines Geschäftsmodells

Dieser Baustein beschreibt die wichtigsten Kosten, die bei der Arbeit nach einem bestimmten Geschäftsmodell anfallen. Das Schaffen und Vermitteln von Wert, das Pflegen von Kundenbeziehungen und das Generieren von Umsatz sind alle mit Kosten verbunden. Solche Kosten können relativ einfach kalkuliert werden, nachdem die Schlüsselressourcen, die Schlüsselaktivitäten und die Schlüsselpartnerschaften festgelegt wurden. Manche Geschäftsmodelle sind allerdings kostspieliger als andere. Sogenannte Billigfluglinien zum Beispiel haben ihr Geschäftsmodell vollständig auf einer niedrigen Kostenstruktur aufgebaut.

Schlüsselfragen:

- Welches sind die wichtigsten mit unserem Geschäftsmodell verbundenen Kosten?
- Welche Schlüsselressourcen sind am teuersten?
- Welche Schlüsselaktivitäten sind am teuersten?

1.2 Beispiel-Geschäftsmodell

Um die Anwendung der Geschäftsmodell-Bausteine zu veranschaulichen, ist im Folgenden beispielhaft dargestellt, wie ein Geschäftsmodell zur Vermarktung von Autos gestaltet sein kann:

Titel: Autohändler

Beschreibung anhand der neun Geschäftsmodell-Bausteine:

Schlüsselressourcen	*Attraktiver Standort mit großer Zahl potenzieller Kunden im Einzugsbereich des Autohauses, motiviertes und kompetentes Beratungspersonal*
Schlüsselaktivitäten	*Beschaffung der Autos, Betrieb des Autohauses*
Schlüsselpartnerschaften	*Autohersteller, von denen Autos zu guten Konditionen und mit kurzer Lieferfrist beschafft werden können*
Kostenstruktur	*Beschaffungskosten für Fahrzeuge, Kosten für den Betrieb des Autohauses (für Personal, Gebäude etc.)*
Kundensegmente	*Privatkunden, die ein eigenes Auto benötigen und sich ein solches Auto auch leisten können*
Wertangebote	*Autos verschiedener Größen und Ausstattungsvarianten*
Kanäle	*Autohaus, in dem Fahrzeuge angeschaut/ausprobiert werden können*
Kundenbeziehungen	*Intensive persönliche Beratung zur Autoauswahl und -ausstattung*
Einnahmequellen	*Kunden kaufen die Autos zu einem festgelegten Verkaufspreis*

Abbildung 11: Geschäftsmodell „Autohändler“

1.3 Feedback 1: (erst am Ende der Einarbeitungsphase zu bearbeiten) Wie gut hat Ihnen das vorliegende Material beim Verstehen der Geschäftsmodell-Bausteine geholfen?

Die Beantwortung der Fragen erfolgt vollkommen anonym! Daher möchten wir Sie bitten, die Fragen vollständig und ehrlich zu beantworten.

Inwiefern treffen folgende Aussagen zu Ihrem jetzigen Verständnis der Geschäftsmodell-Bausteine zu?	**stimme gar nicht zu**						**stimme voll zu**
	1	**2**	**3**	**4**	**5**	**6**	**7**
Ich habe die Geschäftsmodell-Bausteine vollständig verstanden.	☐	☐	☐	☐	☐	☐	☐
Ich kann die Geschäftsmodell-Bausteine sicher anwenden.	☐	☐	☐	☐	☐	☐	☐

Geschäftsmodell-Entwicklung

Materialien für die Aufgabenbearbeitung

2. Geschäftsmodell-Entwicklung

2.1. Aufgabenstellung

Auf der nächsten Seite werden Ihnen ein Produkt sowie ein zugehöriges Geschäftsmodell vorgestellt. Ihre Aufgabe ist es, für dieses Produkt ein neues, innovatives Geschäftsmodell zu entwickeln. **Hierbei ist Ihre Kreativität gefragt! Lösen Sie sich bewusst vom vorgestellten Geschäftsmodell und anderen Ihnen bereits bekannten Geschäftsmodellen**. Wichtig ist weiterhin, dass Sie bei der Entwicklung Ihres Geschäftsmodells

- **alle neun Geschäftsmodell-Bausteine berücksichtigen** und überlegen, welche Gestaltungsmöglichkeiten sich in jedem dieser Bausteine bieten
- **mögliche Abhängigkeiten zwischen den Geschäftsmodell-Bausteinen berücksichtigen** und überlegen, welche Gestaltungsmöglichkeiten sich möglicherweise durch diese Abhängigkeiten bieten

Um den Ideenfindungsprozess zu unterstützen, haben Sie separat einen Stapel mit Vorlagen zur Entwicklung von Geschäftsmodell-Ideen. **Nutzen Sie die Vorlagen möglichst intensiv für Notizen, um Ihnen die Ideengenerierung zu erleichtern.** Weitere Hilfsmittel sind nicht erlaubt (also bitte keine Kommunikation mit Kommilitonen, keine Nutzung von Smartphones etc.).

Wir geben Ihnen fünf Minuten vor Ende der Bearbeitungszeit ein Signal. Dann wählen Sie die Ihrer Meinung nach beste Geschäftsmodell-Idee aus und dokumentieren diese Idee auf der übernächsten Seite unter „Ihre beste Geschäftsmodell-Idee“. Bitte nutzen Sie dabei die Struktur, die Sie bereits kennen:

- Titel
- Beschreibung anhand der neun Geschäftsmodell-Bausteine

Das Vorgehen zur Geschäftsmodell-Entwicklung ist noch einmal in der folgenden Grafik zusammengefasst:

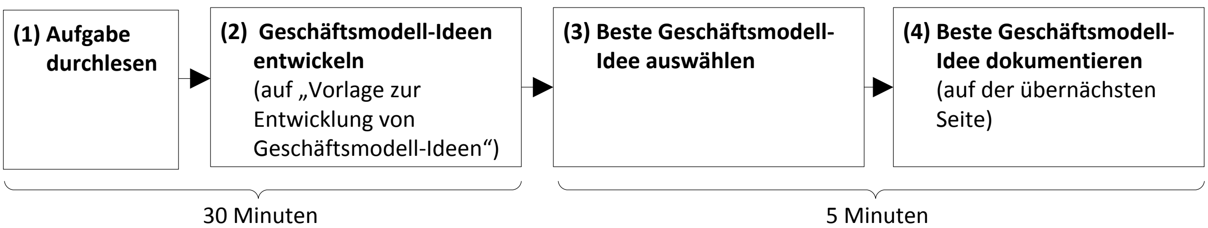

Abbildung 12: Ihr Vorgehen zur Geschäftsmodell-Entwicklung

2.2. Beispiel-Fall

Stellen Sie sich vor, Sie sind Mitarbeiter/in im strategischen Marketing eines Parfümhandelsunternehmens. Ihre Geschäftsführung ist unzufrieden mit dem Erfolg des aktuellen Geschäftsmodells. Daher hat sie Ihnen die Aufgabe gegeben, für das Hauptprodukt des Unternehmens (also Parfüm) ein neues, innovatives Geschäftsmodell zu entwickeln. Dabei sollen Sie möglichst kreativ sein!

Als Ausgangspunkt für Ihre Überlegungen ist im Folgenden das aktuelle Geschäftsmodell Ihres Unternehmens beschrieben:

Titel: Parfümerie

Beschreibung anhand der neun Geschäftsmodell-Bausteine:

Schlüsselressourcen	*Attraktiver Standort mit großer Zahl potenzieller Kunden im Einzugsbereich der Parfümerie, motiviertes und kompetentes Beratungspersonal*
Schlüsselaktivitäten	*Beschaffung der Parfüms, Betrieb der Parfümerie*
Schlüsselpartnerschaften	*Parfümhersteller, von denen Parfüms zu guten Konditionen und mit kurzer Lieferfrist beschafft werden können*
Kostenstruktur	*Beschaffungskosten für Parfüms, Kosten für den Betrieb der Parfümerie (für Personal, Gebäude etc.)*
Kundensegmente	*Privatkunden, die gerne Parfüm nutzen*
Wertangebote	*Parfüms verschiedener Hersteller*
Kanäle	*Parfümerie, in der Parfüms angeschaut/ausprobiert werden können*
Kundenbeziehungen	*Intensive persönliche Beratung zur Auswahl eines passenden Parfüms*
Einnahmequellen	*Kunden kaufen Parfüm zu einem festgelegten Verkaufspreis*

Abbildung 13: Geschäftsmodell „Parfümerie“

Ihre beste Geschäftsmodell-Idee

1. **Titel Ihrer Geschäftsmodell-Idee: ____**
2. **Beschreibung Ihrer Geschäftsmodell-Idee anhand der neun Geschäftsmodell-Bausteine:**

Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur
Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen

3. Feedback

Die Beantwortung der Fragen erfolgt vollkommen anonym! Daher möchten wir Sie bitten, die Fragen vollständig und ehrlich zu beantworten.

Allgemeine Angaben zu Ihrer Person

Demographische Daten				
Alter:	______	**Geschlecht:**	☐ weiblich	☐ männlich
Studiengang:	_____________________	**Semester:**	______	

Bitte bewerten Sie die folgenden Aussagen auf einer **Skala von 1 (stimme gar nicht zu) bis 7 (stimme voll zu**).

Bearbeitung der Aufgabenstellung

Inwiefern treffen folgende Aussagen zu den Geschäftsmodell-Bausteinen zu?	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Ich habe allen neun Geschäftsmodell-Bausteinen die gleiche Aufmerksamkeit gewidmet.	☐	☐	☐	☐	☐	☐	☐
Die Abhängigkeiten zwischen den Geschäftsmodell-Bausteinen haben eine große Rolle bei meinen Überlegungen gespielt.	☐	☐	☐	☐	☐	☐	☐
Ich hatte eine integrierte, ganzheitliche Sicht auf alle neun Geschäftsmodell-Bausteine.	☐	☐	☐	☐	☐	☐	☐
Der Umgang mit den Geschäftsmodell-Bausteinen ist einfach und verständlich.	☐	☐	☐	☐	☐	☐	☐
Der Umgang mit den Geschäftsmodell-Bausteinen erfordert nicht viel Denkleistung.	☐	☐	☐	☐	☐	☐	☐
Der Umgang mit den Geschäftsmodell-Bausteinen ist leicht zu bewerkstelligen.	☐	☐	☐	☐	☐	☐	☐

Inwiefern treffen folgende Aussagen zu den Vorlagen zur Entwicklung von Geschäftsmodell-Ideen zu?	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Die Vorlagen habe ich sehr intensiv zur Ideenfindung genutzt.	☐	☐	☐	☐	☐	☐	☐
Ich habe viele verschiedene Geschäftsmodell-Ideen auf den Vorlagen dokumentiert.	☐	☐	☐	☐	☐	☐	☐
Die Vorlagen haben mir bei der Ideenfindung sehr geholfen.	☐	☐	☐	☐	☐	☐	☐
Meine Geschäftsmodell-Idee ist kreativ.	☐	☐	☐	☐	☐	☐	☐

Vorlieben

Inwiefern treffen folgende Aussagen auf Sie zu?	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Ich verbringe gerne Zeit damit, Problemen auf den Grund zu gehen.	☐	☐	☐	☐	☐	☐	☐
Ich arbeite gerne an komplexen, neuartigen Fragestellungen.	☐	☐	☐	☐	☐	☐	☐
Ich nutze gerne meine Fantasie, um Ideen zu produzieren.	☐	☐	☐	☐	☐	☐	☐
Ich beschäftige mich gerne mit einzigartigen Ideen.	☐	☐	☐	☐	☐	☐	☐

Vorwissen

Bezogen auf Ihr Vorwissen vor der Übung: **Inwiefern treffen folgende Aussagen zu Ihrem Vorwissen zu Geschäftsmodellen zu?**	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Geschäftsmodelle waren mir bereits sehr vertraut.	☐	☐	☐	☐	☐	☐	☐
Ich war bereits sehr erfahren in der Anwendung von Geschäfts-modellen.	☐	☐	☐	☐	☐	☐	☐
Die vorgestellten Geschäftsmodell-Bausteine waren mir bereits sehr vertraut.	☐	☐	☐	☐	☐	☐	☐
Ich war bereits sehr erfahren in der Anwendung der vorgestell-ten Geschäftsmodell-Bausteine.	☐	☐	☐	☐	☐	☐	☐

Wie viele Geschäftsmodelle haben Sie in den letzten beiden Jahren insgesamt (mit-)entwickelt?	____________
Wie viele Geschäftsmodelle haben Sie in den letzten beiden Jahren unter Nutzung der Geschäftsmodell-Bausteine (mit-)entwickelt?	____________

Bezogen auf ihr jetziges Verständnis: **Inwiefern treffen folgende Aussagen zu Ihrem jetzigen Verständnis der Geschäftsmodell-Bausteine zu?**	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Ich habe die Geschäftsmodell-Bausteine vollständig verstanden.	☐	☐	☐	☐	☐	☐	☐
Ich kann die Geschäftsmodell-Bausteine sicher anwenden.	☐	☐	☐	☐	☐	☐	☐

Inwiefern treffen folgende Aussagen zu Ihrem Vorwissen zum Beispielprodukt zu?	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Ich weiß sehr viel über Parfüm.	☐	☐	☐	☐	☐	☐	☐
Ich würde mich als Experten für Parfüm bezeichnen.	☐	☐	☐	☐	☐	☐	☐
Ich weiß mehr über Parfüm als meine Freunde.	☐	☐	☐	☐	☐	☐	☐
Ich interessiere mich sehr für Informationen über Parfüm-Produkte.	☐	☐	☐	☐	☐	☐	☐

Wie viele Monate haben Sie bisher ca. im Einzelhandel gear-beitet (in Voll- oder Teilzeit)?	____________

Gesamteindruck

Inwiefern treffen folgende Aussagen zu Ihrem <u>Gesamteindruck</u> zu?	**stimme gar nicht zu** 1	2	3	4	5	6	**stimme voll zu** 7
Die Ideenfindung hat mir viel Spaß gemacht.	☐	☐	☐	☐	☐	☐	☐
Ich habe sehr gerne an der Übung teilgenommen.	☐	☐	☐	☐	☐	☐	☐

Weitere Kommentare

Ihr Feedback zum Übungsablauf sowie den Übungsinhalten ist herzlich willkommen! (Was war positiv? Was negativ? Inwiefern waren die Vorlagen zur Ideengenerierung hilfreich/nicht hilfreich?...)

Vorlage zur Entwicklung von Geschäftsmodell-Ideen

Schlüsselressourcen
Schlüsselaktivitäten
Schlüsselpartnerschaften
Kostenstruktur
Kundensegmente
Wertangebote
Kanäle
Kundenbeziehungen
Einnahmequellen

Appendix C4: Written Summary of Guidelines for Experts

Checkliste zur Ideenbewertung

- **Ablauf der Bewertung:**
    1. Alle Ideen einmal durchlesen (dabei diejenigen Textteile markieren, die entscheidend für die Bewertung der Idee sind)
    2. Alle Ideen ein zweites Mal durchlesen und dabei hinsichtlich Kreativität bewerten
    3. Die Ideen entsprechend ihrer Bewertung sortieren (also alle 7er in einen Stapel, alle 6er auf einen Stapel etc.) und innerhalb der einzelne Stapel sowie zwischen den Stapeln noch einmal überprüfen, ob die Ideen konsistent bewertet wurden (also gleich kreative Ideen im selben Stapel, verschieden kreative Ideen in verschiedenen Stapeln)

- **Bewertungsmaßstab:**
    - Hintergrundinformation: Den Ideengebern wurde ein Basisfall vorgegeben. Die Aufgabe war es, von diesem Basisfall ausgehend (d. h. abweichend davon) innovative Geschäftsmodell-Ideen zu entwickeln.
    - Die Ideen sind relativ zueinander zu bewerten. Das heißt die beste Idee im Ideen-Pool bekommt die beste Bewertung, die schlechteste Idee bekommt die schlechteste Bewertung. Etwaiges Hintergrundwissen über andere innovative Geschäftsmodelle ist bei der Bewertung auszublenden.
    - Bewertet wird die Kreativität einer Idee: Kreativität ist die Kombination aus Neuheit (novelty) und Nützlichkeit aus Kundensicht (usefulness).
    - Bei der Bewertung ist ausschließlich die inhaltliche Qualität relevant. Formale Aspekte (Umfang der Beschreibung, Rechtschreibfehler etc.) sind nicht relevant.

- **Weiteres**
    - Jede Idee ist über eine Nummer eindeutig identifizierbar. Dass einige Nummern fehlen, ist Absicht (diese Ideen wurden aus der Wertung genommen).
    - Bitte vor erfolgter Bewertung nicht mit anderen über die Ideen sprechen, um das Ergebnis nicht zu verfälschen.
    - Bei der Bewertung kommt es ausschließlich auf die Qualität der Bewertung an, nicht auf die Schnelligkeit.

Appendix D: Materials for the Participatory Observation (Study 5)

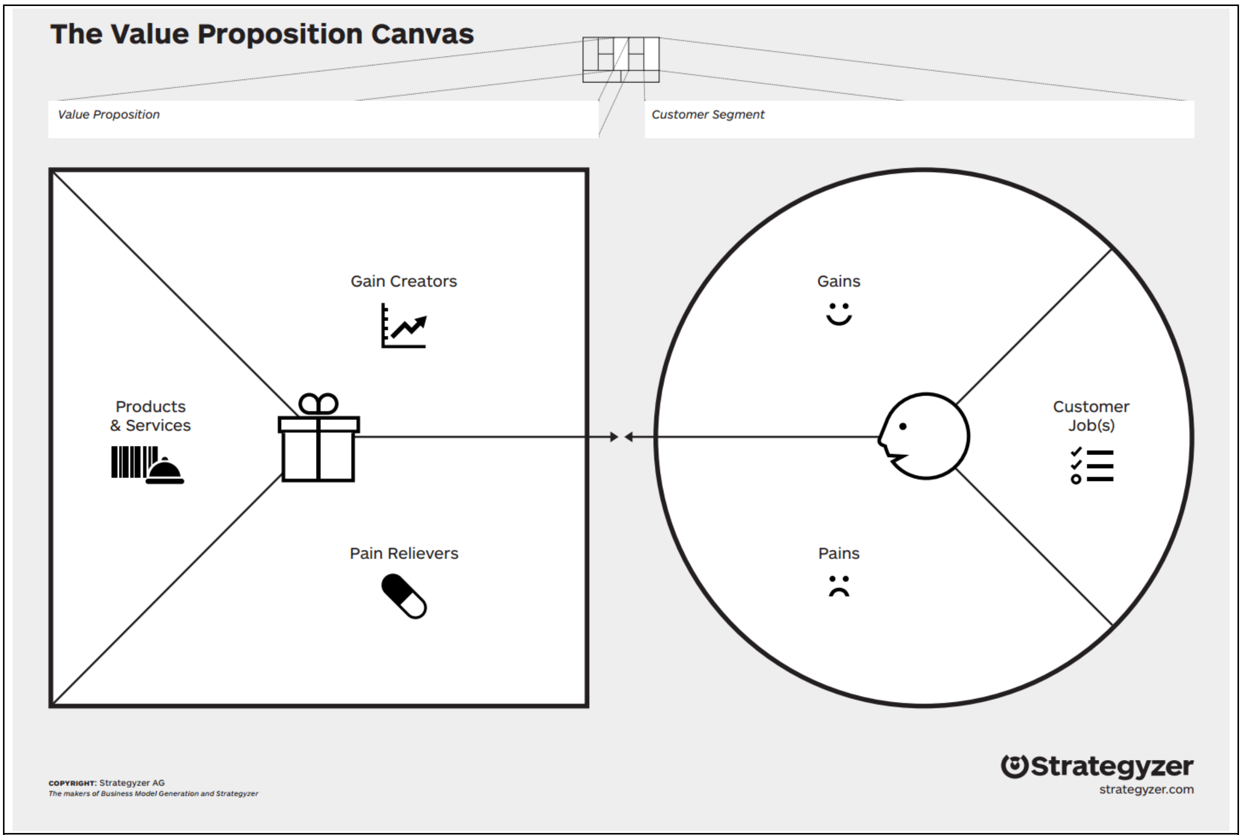

Figure 1. Value Proposition Canvas
(http://www.businessmodelgeneration.com/downloads/value_proposition_canvas.pdf, as of 17th November 2015)

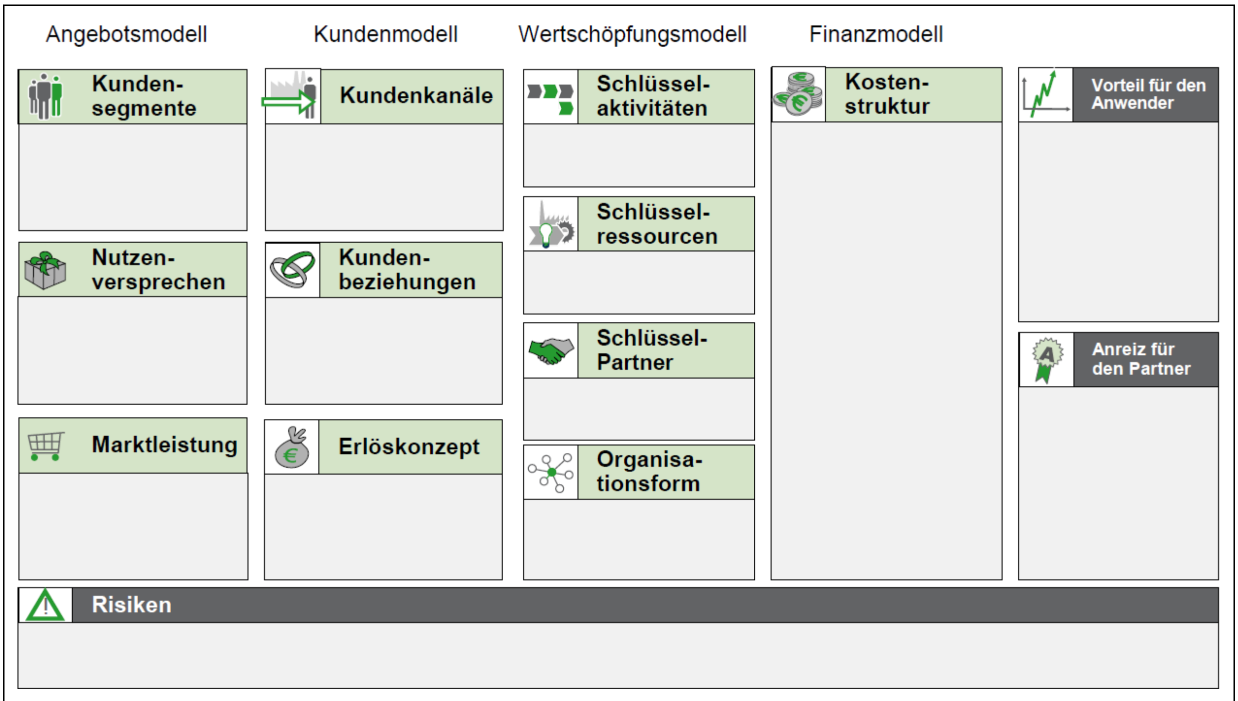

Figure 2. Business model idea generation template used in the GEMINI project (personal communication)

2.4. Supporting Business Model Idea Generation with Machine-generated Ideas: A Design Theory

Supporting Business Model Idea Generation Through Machine-generated Ideas: A Design Theory

Abstract

Successful business model innovation is impossible without innovative business model ideas. When generating such ideas, humans make use of two properties of the human cognitive system: First, they use their ability to build up knowledge, that is, the raw material for new ideas. Second, they use their ability to recombine that knowledge in novel ways to actually arrive at new ideas. While these two properties enable humans to generate innovative ideas, at the same time, the amounts of prior knowledge and cognitive flexibility that humans can possess are limited – which, in turn, limits human idea generation capability. With business model idea generators, a new class of information systems is proposed that can contribute to alleviating the cognitive limits that constrain human idea generation capability. The ideas produced by such idea generators can complement human ideas, thereby increase the probability for high quality business model ideas, and eventually lead to higher rates of successful business model innovation. The contribution is a design theory that describes the high-level architecture of the proposed idea generator systems.

Keywords: Business model innovation, business model idea generation, creativity, collective intelligence, machine learning

1. Introduction

A business model describes a firm's mechanisms for value creation, value delivery, and value capture (Teece 2010), and as such is a detailed description of a firm's strategy (Adner et al. 2014; Casadesus-Masanell and Ricart 2010). The interest in business models and business model innovation is enormous – from researchers and practitioners alike. A recent global survey of some 3,000 executives in 26 countries finds that a majority of 60% consider *"defin[ing] an effective business model"* a major challenge in their firms' innovation activities (GE 2014). Likewise, IBM's global CEO studies (IBM 2006, 2008, 2010, 2012) consistently underline the importance of business model innovation, with each study drawing on interviews with several hundreds to nearly 2,000 CEOs. In line with the interest among practitioners, academic attention to business models has increased rapidly in disciplines as varied as information systems, innovation management, and strategy (Zott et al. 2011). Moreover, research emphasizes the importance of business model innovation not only for established, but also for entrepreneurial firms (George and Bock 2011; Zott and Amit 2007).

High-quality ideas are important for successful innovation (Kornish and Ulrich 2014). Consequently, idea generation is crucial for successful business model innovation (Schneider and Spieth 2013) or, put bluntly, *"ideas constitute the lifeblood for firms in generating [...] new business models"* (Ende et al. 2015). However, at the same time, prior business model research has largely neglected business model idea generation (Schneider and Spieth 2013), and consequently *"idea generation [...] is the step in business model innovation that is least understood"* (Martins et al. 2015, p. 106). A recent review of business model research (Schneider and Spieth 2013) corroborates this view, and identifies the need to better understand how firms can be supported in business model idea generation as an important direction for future research.

This article responds to that call by proposing a new class of information systems termed *business model idea generators* (or, simply, *idea generators*). Idea generators provide business model ideas for a product or service defined by the user, and thereby extend the set of unique ideas that the human user can produce alone. As increasing the number of unique ideas increases the probability for obtaining high-quality ideas (given the expected quality of the additional ideas at least equals the quality of the original ideas, Girotra et al. 2010), the additional ideas produced by the idea generator increase the probability for high-quality business model ideas. As higher idea quality, in turn, increases the probability of market success (Kornish and Ulrich 2014), the proposed idea generators for their users increase the probability of successful business model innovation.

This work represents an important departure from current research on business model idea generation, as current research without exception takes a *human-only* approach (i.e., exclusively relies on human-generated ideas). For example, a number of modeling languages exist that support humans in recording intermediate ideas during idea generation either physically or digitally (e.g., Gordijn and Akkermans 2003; Osterwalder and Pigneur 2010). Moreover, catalogs of business model patterns (e.g., Abdelkafi et al. 2013; Gassmann et al. 2014) or concrete business models (e.g., Stampfl and Sniukas 2013) have been proposed to promote creativity. Finally, morphological approaches support humans in decomposing the idea generation problem (e.g., Im et al. 2013), and in some cases come with extensive catalogs of design options to facilitate idea generation (e.g., Kley et al. 2011). However, in either case, idea generation is solely performed by humans, which subjects the idea generation process to the limitations that constrain human creative capability, that is, the human limitations in cognitive flexibility and prior knowledge (Dane 2010). In contrast, this work seeks to alleviate these limitations and thereby increase human creative capabilities by adopting a *human-with-machine*, rather than a human-only approach.

The proposed approach draws on *blind variation/selective retention theory* (BVSR, Campbell 1960; Simonton 2011), which states that humans produce *creative* ideas (i.e. ideas that are novel and useful, Amabile 1996) through iterations of idea creation and idea evaluation. Through these iterations, humans accumulate knowledge concerning the quality of partial ideas, which allows creating better ideas in every iteration – and eventually leads to high-quality, creative ideas (Simonton 2011). A business model idea generator quasi-automates the process implied by BVSR by iteratively performing the following three steps. Step 1 *idea creation* creates intermediate ideas by forming novel combinations of the knowledge stored in a business model knowledge base. Step 2 *idea evaluation* determines the quality of these ideas through crowd evaluation (Mollick and Nanda 2015). The idea generator performs this step quasi-automatically by connecting to an existing crowdsourcing platform (e.g., Crowdflower, http://www.crowdflower.com) through that platform's API (application programming interface). Step 3 *knowledge accumulation* derives knowledge concerning promising partial ideas through supervised machine learning (Jordan and Mitchell 2015), and employs the business model ideas created in step 1 and evaluated in step 2 as training data. After any given iteration, the knowledge built up in step 3 *knowledge accumulation* guides the choice of which business model ideas to create at the beginning of the subsequent iteration. Repeatedly executing steps 1-3 leads to a gradual buildup of knowledge concerning the features that characterize creative business model ideas in a given context (i.e., for a given product or service), and in the end hopefully leads to high-quality business model ideas.

The contribution of this paper is an information systems design theory that, as a *"systematic specification of design knowledge"* (Gregor and Jones 2007, p. 314), describes the high-level architecture of business model idea generators. The proposed design theory draws on and integrates research in creativity, collective intelligence, and machine learning. It thereby introduces a new perspective into research on business model idea generation, a perspective that is human-with-machine rather than human-only. The resulting idea generators can help to alleviate limitations inherent in human-only idea generation, such as limitations in cognitive flexibility and prior knowledge (Dane 2010), and hence contribute to better business model innovation ideas. From the perspective of business model research, the proposed approach addresses one of the key research priorities identified by Schneider and Spieth's (2013) review of the business model literature. Moreover, from the perspective of information systems (IS) research, the approach contributes to grasping what has been called a *"unique opportunity"* for IS. That is, the opportunity to contribute to management research by leveraging IS competences in modeling and tool development, with the aim of facilitating the exploration of strategic objects such as business models (Osterwalder and Pigneur 2013, p. 239). In the following, I first summarize prior work on creativity to motivate why a human-with-machine approach to idea generation can have benefits compared to a human-only approach. I then go on to describe the proposed design theory, and finally outline plans for its empirical evaluation.

2. Why Human-With-Machine Idea Generation is Worth Exploring

To better understand why machine-generated ideas can be a valuable complement to human-generated ideas, I first sketch the limitations that humans have when trying to be creative[1], and then go on to describe how an idea generator might contribute to alleviating these limitations. The presented reasoning might in several aspects be considered simplistic and artificial. However, the intention is not to provide a full-fledged comparison of the relative advantages that humans and machines may have. Rather, the intention is to provide a thought experiment that, grounded in cognitive creativity research, provides an intuition of the factors that limit human creativity, and thereby suggest that machine-generated ideas can be a valuable complement. Later in the article, in the context of the propositions that are part of the presented design theory, I provide a more elaborate analysis of the idea generators' potential.

Prior research has addressed the question of *'How does human creativity work?'* at a number of different levels. These include the neurological level (e.g., where is creative capability located in human brains?), the cognitive level (e.g., abstracting from specific brain locations, how is creativity created subconsciously?), the individual level (e.g., how can creativity be promoted consciously, for example, through which creativity techniques?), the group level (e.g., what group composition makes a creative group?) and higher levels of analysis such as organizations and societies (Amabile and Hennessey 2010).

[1] Strictly speaking, there is a difference between creative ideas and innovative ideas (and hence creativity and innovation): While an idea can be considered creative *before* and *after* it has proven commercially valuable, an idea can be considered innovative only *after* successful commercialization (Howard et al. 2008). However, in business model innovation research, ideas are referred to as innovative also before actual implementation (e.g., Eppler et al. 2011). To maintain consistency with the original sources (e.g., the prevalent use of *innovative* rather than *creative* in business model innovation research), and for ease of exposition, the terms *creative* (*creativity*) and *innovative* (*innovation*) are used interchangeably with the notion that underlies the above definition of creative (creativity).

Most relevant for comparing human and machine idea generation is the cognitive level. This is because limitations at this level propagate to and affect all higher levels of analysis, and thus are central to human creative capability. In line with this, recent business model research emphasizes the importance of a cognitive perspective for improving our understanding of how to promote business model idea generation (Martins et al. 2015).

At the cognitive level, *domain knowledge* and *cognitive flexibility* are the two central factors that determine creative performance (Dane 2010). This is because humans produce creative ideas by forming novel combinations from their domain knowledge – which requires that they possess domain knowledge and that they can flexibly combine that knowledge. In the following, I describe more specifically how these factors enable human creative capability and how, at the same time, they constrain it.

Humans acquire domain knowledge, for example, through experiential learning (Armstrong and Mahmud 2008) or deliberate practice (Ericsson and Charness 1994). That knowledge is captured in the form of schemas, which are structures that contain *"knowledge about a concept or type of stimulus, including its attributes and the relations among those attributes"* (Fiske and Taylor 1991, p. 98; see Figure 1 for an illustration). These schemas get more detailed and accurate as an individual acquires knowledge. Business model knowledge is likewise captured in the form of schemas (Martins et al. 2015) that get more detailed and accurate as one acquires more knowledge concerning the central choices underlying a given business model. To illustrate how business model knowledge is stored in schemas, consider the business model of the fashion company *Zara*. A novice's schema of Zara's business model may comprise that Zara offers fashion and that it does so with extremely short turnaround times, that is, it takes less than two weeks from the first product idea to that the corresponding product actually is available in stores. A more expert schema might add that Zara procures especially from local, rather than oversees suppliers. In the expert's schema, the additional information on procurement strategy would allow capturing as well that there are interrelations, for example, that buying from local suppliers is a prerequisite for that Zara can offer short turnaround times, because the choice of local rather than oversees suppliers accelerates communication and distribution processes. In sum, the expert schema of Zara's business model would comprise more attributes (Zara offers fashion, it does so with short turnaround times, and procures from local suppliers) and more interrelations between these attributes (local suppliers enable short turnaround times) than the novice's schema (example adapted from Dane 2010; Priem et al. (2013)).

Novice's domain schemas (domain knowledge: low, cognitive flexibility: high)	Expert's domain schemas (domain knowledge: high, cognitive flexibility: low)

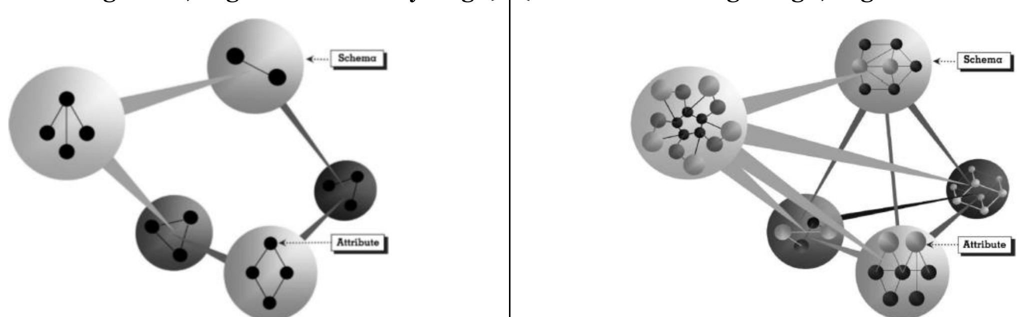

Figure 1. Illustration of domain schemas of novices and experts (Dane 2010).

Creative ideas are produced by forming novel recombinations of the knowledge captured in a person's domain schemas (e.g., the business models known by a person). In other words, the schemas represent the *'raw material'* for new ideas, and the more raw material, or *domain knowledge*, there is available for creating ideas, the higher is the potential for creative ideas to actually be created. As new ideas arise from novel recombinations of existing knowledge, a prerequisite for creativity is that domain schemas are flexible so as to allow changing and combining them with the aim of deriving new ideas. Consequently, creativity does not only increase with the amount of available domain knowledge, but also increases with higher levels of *cognitive flexibility*. However, having invoked schemas numerous times (which typically happens in the course of building up knowledge) makes the schemas inflexible. Especially for radical idea generation, this results in a trade-off between domain knowledge and cognitive flexibility. This is because radical idea generation involves radically departing from existing schemas, and therefore is particularly constrained if the existing schemas are rigid and inflexible (Dane 2010, see Figure 2 (a)). To illustrate the trade-off between domain knowledge and cognitive flexibility, consider how humans go about accelerating and braking while driving a car. Having driven a car for years makes us internalize that the gas pedal is on the right side, and the brake pedal is left of the gas pedal. The advantage of this internalization is that we do not have to think any more about which pedal is where. The corresponding schemas have been invoked numerous times and have become *'hard-wired'* in our brains – finding the correct pedal happens *'automatically'*, that is, with little to no cognitive effort. However, the disadvantage of this hard-wiring is that, were the pedals switched (i.e., the gas pedal left of the brake pedal), it would be rather tedious for us to get used to the new positions. In contrast, consider someone who has just recently learned how to drive. He or she would have substantially less trouble getting used to the new positions because the corresponding schemas would still be rather flexible. Translated to the business model context, this means that someone with lots of domain knowledge from a given industry would, on one hand, be in a favorable position to generate new business model ideas because that person would have a considerable amount of domain knowledge to draw on when creating new ideas. Nonetheless, having been exposed to the business models prevalent in a given industry over years makes it cognitively more difficult to break away from these business models, as the flexibility of the corresponding schemas will be comparably low. This, in turn, limits an expert's ability to generate radically new business model ideas even though the acquired industry knowledge would put that expert into a favorable position for being creative.

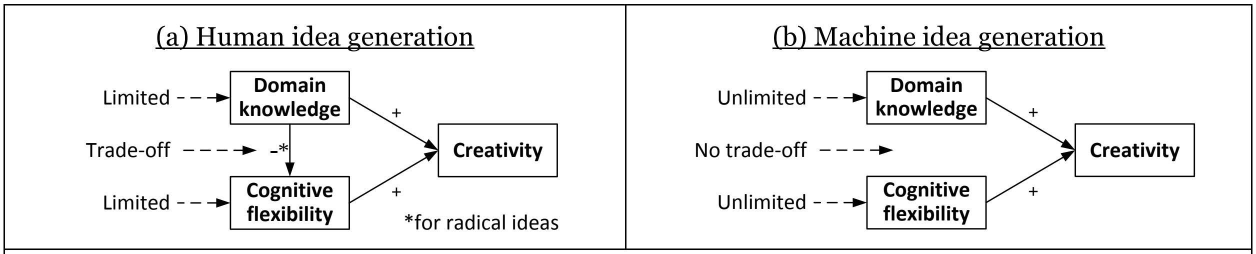

Figure 2. Simplified comparison of the antecedents and limitations of human idea generation (based on Dane 2010) and machine idea generation.

To summarize, when trying to generate creative business model ideas, humans make use of two properties of the human cognitive system that enable their creative capability and, at the same time, constrain it: First, they use the ability to build up knowledge, that is, knowledge of existing business models that forms the raw material for new ideas. Second, they use the ability to recombine that knowledge in novel ways to actually arrive at new business model ideas. However, these properties are designed in ways that constrain human creativity in the following ways. First, the ability to build up knowledge is limited because learning takes time (Simon 1996) – thus no human can possibly know all business models that exist. Second, cognitive flexibility is limited because human memory is associative, which implies that it is easier for us to retrieve schemas that are already in a way associated with one another compared to schemas that are not (Baddeley 1997). Third, as one acquires knowledge (which typically goes along with knowledge reuse), one loses the flexibility to form novel recombinations of that knowledge, consequently there is a trade-off between domain knowledge and cognitive flexibility (Dane 2010). The centrality of these limitations can be seen in the fact that a considerable amount of approaches for promoting creativity become effective by addressing limitations in domain knowledge or cognitive flexibility (or even both). For example, going from individual to group idea generation, or activating even more individuals through crowd sourcing and open innovation, are simply ways of extending the available knowledge base. Employing creativity techniques that facilitate changing perspective or questioning assumptions are simply means to increase cognitive flexibility. Finally, employing the business model patterns and business model catalogs mentioned in the introduction, at the same time, broadens the knowledge base (if the business models are yet unknown to an individual), and increases cognitive flexibility (if deliberate effort is undertaken to apply a certain business model pattern to a given firm)[2].

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[2] While these approaches do not always explicitly build on cognitive level arguments (i.e., schema level arguments), the rationales underlying these approaches can be traced back to the arguments made here.

Having illustrated how human-only idea generation proceeds, I now turn to the benefits that human-with-machine idea generation potentially has. Figure 2 compares the limitations of the human cognitive system (i.e., limited domain knowledge, limited cognitive flexibility, the trade-off between domain knowledge, and cognitive flexibility) with the characteristics that (at least theoretically) a machine could have with regards to creativity. First, a machine could possess virtually unlimited amounts of *'domain knowledge'* because its knowledge base could be built up cooperatively by many individuals, rather than one individual accumulating knowledge only on her own (i.e., a machine could possess more business model knowledge, or raw material for new ideas, than any individual possibly could). Second, a machine is also unlimited with regards to its *'cognitive flexibility'*, as a machine is not by its nature constrained to more easily retrieve pieces of information already associated with each other (i.e., is not biased towards forming familiar combinations of its knowledge). Finally, machines, unlike humans, do not suffer from the trade-off between domain knowledge and cognitive flexibility. Obviously, performance may suffer as database size grows; however, that effect is negligible for the sake of this argument.

Taken together, at least within the simplistic worldview adopted here, these observations seem to suggest that machines can have advantages over humans when it comes to creativity. This does not contravene that outside that worldview humans have advantages. However, as the proposed idea generators are not intended to replace humans but rather are intended to complement them, it should suffice to state that there can be circumstances under which machines have the potential to generate creative ideas that are different from those generated by humans (and thereby have the potential to augment human creativity). In the following, I explore this notion further by describing how the potential of human-with-machine idea generation can be tapped for the purpose of business model idea generation.

3. How to Leverage Human-With-Machine Idea Generation for Business Model Innovation

In the following, I propose a design theory that describes the high-level architecture of the class of systems I earlier termed business model idea generators. The design theory is documented along the lines of the recommendations by Gregor and Jones (2007), who propose that a design theory should comprise the following eight components: (1) *purpose and scope* that specify how and within which boundaries artifacts instantiated from the design theory are to be used, (2) *justificatory knowledge* that describes the theoretical rationale for the design of resulting artifacts, (3) the basic entities, or *constructs*, that follow from the justificatory knowledge, (4) the *principles of form and function* that, based on the justificatory knowledge, describe how the constructs interact and thereby form an abstract blueprint of the intended IT artifact, (5) *principles of implementation* (optional) that define the steps needed to instantiate a concrete artifact from the theory, (6) an *expository instantiation* (optional) that facilitates communicating the content of the theory, (7) *testable propositions* that capture the predictive component of the theory, and finally (8) the *artifact's mutability*, that is, possible changes to the theory that can already be anticipated. To facilitate understanding the design theory, in the following I preview the proposed idea generator architecture, and only thereafter flesh out the details.

Figure 3 shows the proposed architecture and illustrates the structural and behavioral properties of the proposed idea generators. At an abstract level, the workflow for using the corresponding idea generators comprises three steps: First, the user provides the idea generator with a description of the product or service that he or she needs business model ideas for, and starts the idea generator. Second, the idea generator iteratively produces ideas for the product or service that the user has specified. Third, the user receives the best ideas that the idea generator has produced. At a more detailed level, for producing ideas, the idea generator performs multiple iterations of *idea creation* (which yields *unevaluated ideas*), *idea evaluation* (which yields *evaluated ideas*), and *idea quality accumulation* (which accumulates the knowledge from idea evaluations across iterations). In every iteration, the product/service description, together with the created ideas, is given to crowd workers who evaluate the ideas. Once the idea generator

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For example, using teams for creative tasks *"is based on the notion that they bring a wider pool of perspectives and knowledge to the table [compared to individuals]"* (Hoever et al. 2012, p. 983). The purpose of creativity techniques is *"to help individuals break out of a mindset"* (Nagasundaram and Dennis 1993, p. 466).

is finished, the user receives unique business model ideas that are suitable for the product or service that he or she specified when starting the idea generator. The unique ideas that the user receives is the result of continuous improvements across multiple iterations. These ideas extend the user's set of unique ideas, and thereby increase the probability that he or she arrives at high-quality ideas. Having sketched the overall principle of the idea generator, in the following I come to the description along the eight components defined by Gregor and Jones (2007).

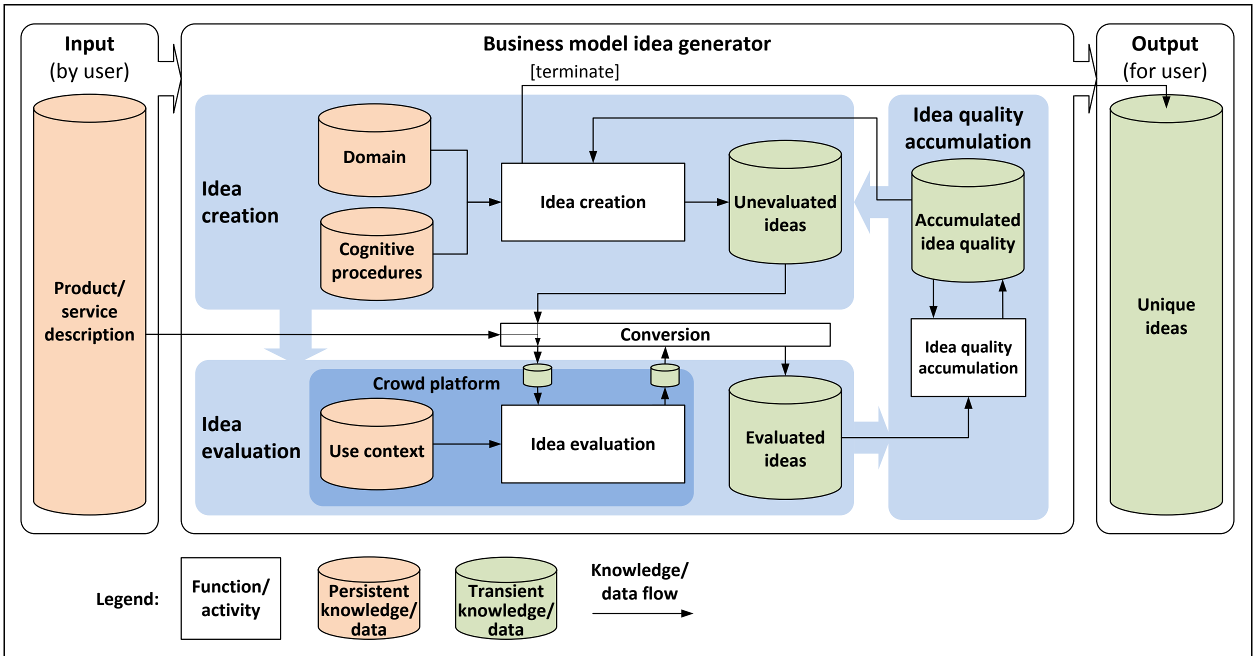

Figure 3. Architecture of a business model idea generator.

3.1. Purpose and Scope

The purpose of the proposed design theory is to provide prescriptive and explanatory knowledge about the high-level architecture of systems referred to as business model idea generators. Such systems are intended to support business model idea generation processes of individuals or groups for a given product or service (the product or service may or may not already be existing). Such individuals or groups include anyone who might be confronted with the task of developing a business model, such as entrepreneurs, innovation managers, product managers, and strategy consultants. The systems that result from the proposed design theory would not replace these individuals (groups) or replace their ideas. Rather, these systems would provide ideas that complement human ideas and thereby increase the number of unique ideas available in a given business model innovation context. The potential for idea generators to produce such ideas arises from them not being constrained by some of the limitations that humans have when trying to be creative (as described in the previous section). Put in the context of the general innovation process (Hansen and Birkinshaw 2007), idea generators contribute to the initial phase of human idea generation. In that phase, idea generators can complement human idea generation either by preceding human idea generation or by (partially) paralleling it (see Figure 4).

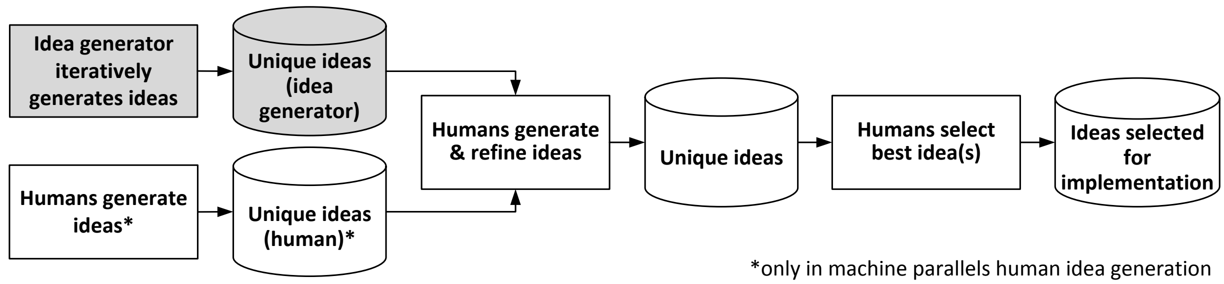

Figure 4. Use contexts for the business model idea generator (shaded in white: simplified process of human-only idea generation).

3.2. Justificatory Knowledge

In the following, I derive six design principles from prior theoretical and empirical work in creativity, collective intelligence and machine learning. These design principles capture the justificatory knowledge for the proposed design theory, and constitute the foundation for the business model idea generator architecture that is proposed thereafter.

Principle 1: Iterate idea creation, idea evaluation, and idea quality accumulation. It is widely accepted by creativity researchers that humans generate creative ideas by going through numerous iterations of *idea creation* and *idea evaluation*. This insight is, for example, captured in blind variation/selective retention theory, whose explanatory accounts have received wide-spread support (Campbell 1960; Simonton 2011). However, the idea of iterative idea creation/idea evaluation has elsewhere been expressed similarly. For example, creative processes have been characterized to involve alternations of divergent thinking (i.e., idea creation) and convergent thinking (i.e., idea evaluation, Mumford et al. 1991). Likewise, creating random stimuli (i.e., idea creation) and subsequently reinterpreting these stimuli (i.e., idea evaluation) has been shown to promote creativity (Finke et al. 1992). The underlying idea is that the step of idea creation creates novelty, while the step of idea evaluation ensures that novelty goes along with usefulness, which together leads to creativity. Obviously, learning needs to take place from one iteration to the next, because otherwise every idea creation step would naïvely create ideas that expectedly are no better than the ideas created in the previous iteration. Therefore, idea creation and idea evaluation need to be complemented by some way of learning, or *idea quality accumulation*.

Principle 2: Implement idea creation by applying cognitive procedures to domain knowledge. As outlined in section 2, idea creation is performed by recombining prior knowledge in novel ways. A variety of different procedures are suitable for this purpose. Within the business model context, for example, *analogical reasoning* and *conceptual combination* have recently been highlighted (Martins et al. 2015). Analogical reasoning involves transferring structural properties from business models in one domain to business models in another. This could, for example, involve applying the freemium business model pattern that is popular with smartphone apps to other industries in which this type of business model is not yet applied. Conceptual combination involves combining two entities, while selectively retaining properties of one or the other to create a new entity that is different from both the original ones. This could, for example, involve combining properties of a search engine business model (e.g., ad-financing) with properties of a car business model (e.g., car purchase), so as to arrive at a car business model that involves subsidizing the purchase price with ads printed onto the cars. As noted, other cognitive procedures exist. For the idea generator, it is merely necessary that it can invoke at least one of these procedures to create new ideas.

Principle 3: Implement idea evaluation quasi-automatically through a crowd (drawing on the crowd's knowledge of the use context). Currently (and for the foreseeable future), machines will not be able to evaluate the creativity of ideas at a level of sophistication that is comparable to that of humans (Colton and Wiggins 2012). Moreover, in human evaluation, expert judges have been termed the *"gold standard"* for assessing creativity (Baer and McKool 2014). However, expert judges are typically not available at will, which makes idea evaluation lengthy and costly. Luckily, empirical evidence has emerged recently for that non-experts (i.e., crowds) can assess creativity at a level comparable to that of experts (Magnusson et al.

2016; Mollick and Nanda 2015), and can do so at substantially lower cost (Kornish and Ulrich 2014). This statement holds at least as long as the crowd workers are able to understand the ideas that they are assessing and as long as they have the necessary knowledge of the use context (which, in a way, makes them experts again). To illustrate this point, while it would be reasonable to let crowd workers evaluate business models for *perfume*, it would most likely be less reasonable to let them evaluate business models for *enterprise resource planning (ERP) systems*. This is because the average crowd worker is unlikely to know what an ERP is, let alone what qualities a well-designed ERP business model should have.

The idea generator needs to perform the idea evaluation step without requiring further actions from its user. Only then can it automatically perform the iterations of idea creation, idea evaluation, and idea quality accumulation prescribed by principle 1. Moreover, the evaluations need to be performed rather quickly (i.e., at most in the order of hours) because the idea generator performs multiple iterations before presenting output to the user – and its utility would be substantially diminished if each of these iterations already took days or weeks. Both requirements can be met by using crowd platforms such as *CrowdFlower* (http://www.crowdflower.com) or *Amazon Mechanical Turk* (http://www.mturk.com), which allow tapping hundreds of thousands of crowd workers and, through their APIs, make it possible to automatically create tasks and retrieve results. To ensure the validity of evaluations, automatic quality checks can determine whether the evaluations retrieved in a certain iteration can be trusted (e.g., a minimum threshold for interrater reliability) – or whether the evaluation should possibly be repeated. In summary, idea evaluation within the context of an idea generator should be implemented by interfacing to a crowd platform because this allows the evaluation task to be performed in a cost-effective, valid, fast, and quasi-automatic way (with quasi-automatic meaning that for the user of an idea generator it is not transparent that ideas are evaluated by a crowd, as the whole evaluation process is performed through APIs that allow automatically creating tasks and retrieving results).

Principle 4: Implement idea quality accumulation through machine learning. In the following, I first summarize the context that idea quality accumulation takes place in, and then more specifically sketch how idea quality accumulation should be implemented. Concerning the context, recall that in every iteration, the idea creation step produces ideas by forming recombinations of the stored domain knowledge. Hence, every created idea consists of different pieces of domain knowledge (e.g., specific sales channels such as an *internet store* or a *physical store*, or different revenue models such as *buy* or *rent*). Idea evaluation then for each of these ideas provides a measure that represents the aggregate quality of an idea, that is, the aggregate quality of a specific combination of pieces of domain knowledge. However, as the aim of the idea generator is to create better ideas in every iteration, knowledge on the aggregate quality of already created ideas is not of much help. Rather, knowledge is needed that captures to what extent specific pieces of domain knowledge (and their combinations) drive idea quality. To illustrate, it is necessary to understand to what extent, for example, a given sales channel or revenue model are conducive to idea quality. Only once this is understood, the idea creation step can produce better ideas in every iteration by purposefully forming recombinations of pieces of domain knowledge (i.e., forming recombinations that promise to result in ideas with high aggregate quality). So to summarize, to allow the idea creation step to produce better ideas in every iteration, the idea generator needs to iteratively build up knowledge that captures what pieces of domain knowledge are conducive to idea quality (and in what combinations). To achieve this learning the idea generator can draw on the ideas it produces in every iteration and the corresponding evaluations.

Machine learning approaches do precisely what is needed in the context of idea quality accumulation. Broadly speaking, they allow *"construct[ing] computer systems that automatically improve through experience"* (Jordan and Mitchell 2015, p. 255). More specifically, a supervised machine learning algorithm can take pairs of objects and corresponding evaluations as training data, and from that data can learn how to evaluate new objects. For example, the training data could consist of e-mails and a corresponding evaluation as *spam* or *no spam*. A supervised machine learning algorithm would *'inspect'* the characteristics of the emails contained in the training data and would inspect how these characteristics translate into spam evaluations. Given sufficient training data, this would enable the algorithm to evaluate also new e-mails (i.e., emails not contained in the training data) as *spam* or *no spam* (Jordan and Mitchell 2015). Similarly, a supervised machine learning algorithm could take pairs of business models and corresponding evaluations as training data. From inspecting the characteristics of the business models (i.e., the pieces of domain knowledge contained therein) and inspecting how these characteristics translate into the aggregate evaluations of idea quality, the algorithm could learn to also evaluate (i.e., predict) the quality of ideas not contained within its training data (i.e., of ideas that have not yet been created and evaluated by the crowd). The capability of the algorithm to predict idea quality of so far unevaluated ideas would improve with the amount of available training data (i.e., with every iteration). This allows improving the expected quality of the created ideas in every iteration, as will be further described in the next design principle.

Principle 5: Partially prioritize idea creation through the accumulated idea quality knowledge. A naïve approach to business model idea generation would simply create all ideas that one can derive from the stored domain knowledge. From a technical perspective, this would indeed be possible (even if the number of ideas to be created goes into the millions) and would minimize the risk of overseeing possibly promising business model ideas. However, evaluating all these ideas would be problematic. Given a large enough crowd, evaluation would potentially still be feasible in acceptable amounts of time. But evaluating such great amounts of ideas would be rather costly and, given that most randomly created ideas will have no or only little value, it would be rather inefficient to create all ideas that can be derived from the stored domain knowledge. Therefore, there is the need to prioritize which ideas to create. This is where the accumulated idea quality knowledge comes in, which allows to determine the subset of all feasible ideas that comprises the most promising business model ideas (e.g., 50 ideas). Obviously, in the first iteration, accumulated idea quality knowledge is still empty because no ideas have yet been evaluated, so in the first iteration all ideas need to be created at random. In subsequent iterations then, a certain share of ideas is created based on a prioritization that results from accumulated idea quality knowledge (e.g., 70% of all ideas). The remaining share is nonetheless created randomly because otherwise the ideas from the first iteration might unduly influence all subsequent iterations. This would possibly result in the identification of only *'locally optimal'* ideas, rather than ideas that best possibly take advantage of the entirety of stored domain knowledge.

Principle 6: Enable idea evaluation by converting ideas into a 'crowd-readable' format and back. The steps of idea creation and idea quality accumulation will require business model ideas to be in a somewhat formal format to allow automatic processing. However, for the idea evaluation step, the crowd needs the created ideas to be in a human-readable format, and would need the ideas to be complemented with instructions that prescribe how to evaluate the ideas (e.g., on a scale from *1 – not at all creative* to *9 – extremely creative*). In addition, the crowd would need a description of the product or service that the business model ideas are intended for (e.g., *perfume*). Therefore, the following two-step conversion is necessary. First, right after idea creation, ideas need to be converted from the somewhat formal format into a human-readable format (e.g., by means of natural language generation). Second, the ideas need to be converted into a format that is compatible with the API of the chosen crowd platform (e.g., meta information needs to be added by the idea generator to determine how ideas are to be presented to the crowd, and on which scale(s) the ideas are to be rated). After idea evaluation, the conversion needs to be performed the other way round.

Taken together, these six design principles constitute the theoretical foundation for the architecture of a business model idea generator. The following sections translate these principles into constructs, and thereafter describe how the constructs are interrelated in the resulting architecture.

3.3. Constructs

The constructs are a theory's building blocks, and as such they are at the most basic level in any theory (Gregor and Jones 2007). Table 1 provides an overview of the constructs that follow from the presented design principles and links each construct to the design principle that the construct follows from. The constructs differ in that they either store information, or transform information from one state into another. The information they store would most likely be referred to as *knowledge* in the context of human idea generation, and as *data* in the context of machine idea generation. To account for this dual role, the corresponding construct type is termed *knowledge/data*. Knowledge/data can, in turn, differ in that the corresponding information either remains unchanged during idea generation (*persistent knowledge/data*, e.g., domain knowledge), or is created and changed during idea generation (*transient knowledge/data*, e.g., unevaluated ideas). The constructs that transform knowledge/data from one state to another are referred to as *function/activity*.

Table 1. Constructs of the proposed design theory (DP = design principle giving rise to the construct)			
#	**Name**	**Description (type)**	**DP**
1	Product/service description	This is a plain text description of the product or service which the idea generator user needs business model ideas for. The user of the idea generator creates this description and gives it as an input to the idea generator when starting the idea generator. The idea generator, in turn, provides this description to the crowd so that crowd workers have the necessary background information for evaluating the created business model ideas. The more complicated the product or service is, the more elaborate this description needs to be. For example, when business model ideas are sought for perfume, the description can be short because perfume is a rather self-explanatory product. This may be different, for example, when the user of the idea generator seeks ideas for, say, an innovative internet platform. This is because the functionality of that platform may not be self-explanatory, and thus probably needs to be described to enable crowd workers to understand the implications that different business models may have for that platform. (persistent knowledge/data)	3, 6
2	Idea creation	Applies cognitive procedures to domain knowledge to create new ideas, prioritizes business model ideas to be created based on aggregated idea quality (function/activity)	1, 2, 5
3	Unevaluated ideas	Ideas created in a given iteration before evaluation (transient knowledge/data)	1
4	Idea evaluation	Employs use context knowledge of the crowd to evaluate ideas (function/activity)	1
5	Evaluated ideas	Ideas created in a given iteration and the corresponding evaluation (transient knowledge/data)	1
6	Idea quality accumulation	Builds up knowledge about the characteristics of creative ideas through machine learning (function/activity)	1, 4
7	Accumulated idea quality	Knowledge accumulated throughout all iterations on what features characterize creative ideas (transient knowledge/data)	1
8	Domain	Knowledge base that captures the business model knowledge that serves as the raw material for new ideas (persistent knowledge/data)	2
9	Cognitive procedures	Knowledge on procedures that create new ideas by being applied to domain knowledge (persistent knowledge/data)	2
10	Use context	The use context comprises the crowd's knowledge on the context that ideas will be used in, that is, the knowledge that crowd workers draw on for determining the value that a given business model idea is likely to have. Unlike the other knowledge/data constructs, this knowledge is not captured in the idea generator (i.e., it is in the *'minds'* of the crowd workers). Nonetheless, the construct is a part of the architecture to make the architecture comprehensive in terms of the knowledge/data sources that idea generators draw on. (persistent knowledge/data)	3
11	Conversion	Converts ideas and user specifications into a *'crowd-readable'* format and back, optionally performs quality checks on the evaluations (function/activity)	3, 6
12	Unique ideas	The best unique ideas that comply with the user's product/service description, these ideas are the output for the user (transient knowledge/data)	1

3.4. Principles of Form and Function

The following section presents the principles of form and function of the proposed design theory, that is, the *"abstract 'blueprint' [...] for the construction of an IS artifact"* (Gregor and Jones 2007, p. 326). This blueprint translates the design principles and the constructs derived thereof into a description of the architecture of business model idea generators (see Figure 3).

During idea generation, in the first iteration, *idea creation* randomly creates a number of business model ideas (e.g., 50) by applying one or several *cognitive procedures* to the stored *domain* knowledge. The resulting ideas are stored in *unevaluated ideas*. Thereafter, *conversion* prepares the *unevaluated ideas* and the *product/service description* for the crowd platform, and triggers *idea evaluation*. The crowd then performs *idea evaluation* by drawing on its knowledge of the *use context*. In the perfume example mentioned earlier, this would involve that the crowd evaluates the created business model ideas by drawing on its knowledge of how perfume is used and what preferences customers have concerning the use of perfume. *Conversion* needs to ensure that the crowd receives the *product/service description* provided by the user of the idea generator (e.g., by automatically including it in the task description that crowd workers receive). After *idea evaluation*, *conversion* checks the quality of the evaluations (e.g., by means of assessing interrater reliability). If that quality check fails, *conversion* resubmits the evaluation task to the crowd. If the evaluation check is successful, *conversion* transforms the ideas back into the internal format of the idea generator and stores the ideas together with the corresponding evaluations in *evaluated ideas*. *Idea quality accumulation* then derives knowledge on which characteristics and combinations thereof are likely to lead to a positive/negative evaluation of an idea by the crowd and stores that knowledge in *accumulated idea quality*.

In the second iteration, *idea creation* does not create business model ideas completely at random (as it did in the first iteration). Rather, it prioritizes which ideas to create based on the knowledge stored in *accumulated idea quality*. That is, it tries to create ideas that, based on the knowledge in *accumulated idea quality*, seem most promising. This roughly results in that features of the ideas evaluated rather positively in the first iteration are more likely to appear in ideas created in the second iteration (compared to features of ideas evaluated rather negatively). As the first iteration has only produced a small subset of all possible ideas, *accumulated idea quality* knowledge is still rather incomplete. Consequently, not all ideas are created based on *accumulated idea quality* knowledge. Rather a fraction of the newly created ideas are created at random also in the second and subsequent iterations. With the new set of created ideas (that is stored in *unevaluated ideas*), the second iteration continues with *conversion* and *idea evaluation*. In the second iteration, *idea quality accumulation* has a different role than in the first. Recall that in the first iteration *idea quality accumulation* simply stored knowledge on the evaluated ideas in *accumulated idea quality*. However, from the second iteration onwards, it needs to integrate knowledge on idea quality from previous iterations with the knowledge generated in the current iteration. As such, *idea quality accumulation* updates and revises *accumulated idea quality* in every iteration by drawing on the additional information contained in additional sets of *evaluated ideas*. With *accumulated idea quality* getting better in each iteration, *idea creation* is likely to also create better ideas in every iteration. Once a predefined stop criterion is met (e.g., number of iterations = 4), the iterations stop and for the last time a set of ideas is created – solely prioritized on the basis of *accumulated idea quality* knowledge. That set, which hopefully contains only comparably creative ideas, is handed over to the user as the output of the idea generation process.

3.5. Expository Instantiation

An expository instantiation is an optional component of a design theory and is intended to facilitate communicating a design theory's content (Gregor and Jones 2007). In the following, such an expository instantiation is presented in the form of a prototype (see Figure 5). The prototype consists of three web applications that use HTML for the user interface, JavaScript for the application logic, and JSON (JavaScript Object Notation) for storing data. Each of the three applications addresses one of the steps of idea creation, idea evaluation, and idea quality accumulation; communication between these applications happens through JSON files that contain the domain knowledge, unevaluated ideas, evaluated ideas, and accumulated idea quality knowledge. Idea evaluation was provisionally implemented so as to be performed locally by the idea generator user. Multiple test runs with the prototype by the author and the developer indicated that idea quality indeed tends to increase with every iteration. However, so far the results are highly tentative. To facilitate grasping the functionality of the prototype, an example is provided below (see also Figure 4); a complete description of the prototype and the tentative evaluation results can be found in Berhörster (2016).

To illustrate the functionality of the prototype, imagine that an idea generator user would like to have business model ideas for the product *perfume*. Perfume is likely to be rather self-explanatory to the average crowd worker, hence there is no need for an extensive product/service description. The data structure that captures the business model knowledge within the domain knowledge construct consists of the three components of *revenue model*, *customer relation*, and *sales channel* (see Figure 4). These components are a subset of the components that the *Business Model Canvas* (Osterwalder and Pigneur 2010) uses to define a business model. They are chosen from the Business Model Canvas because that modeling language, at least in practice, has developed into the quasi-standard for representing business models (e.g., Spieth et al. 2014; Strategyzer 2015). The defined data structure is populated with values such as *fixed price, usage-based*, and *subscription* (for the revenue model), *personal assistance*, *recommender system*, and *self-service* (for the customer relation), and *physical store, house party* (e.g., as used by Tupperware), and *vending machine* (for the sales channel, see Figure 4). The cognitive procedure that creates business model ideas from the stored business model knowledge is termed *'select one of each'* and creates new business model ideas by selecting exactly one value from every component in the domain construct. The idea creation step thus could create the two sample business model ideas shown in Figure 4 by applying the chosen cognitive procedure to the domain knowledge.

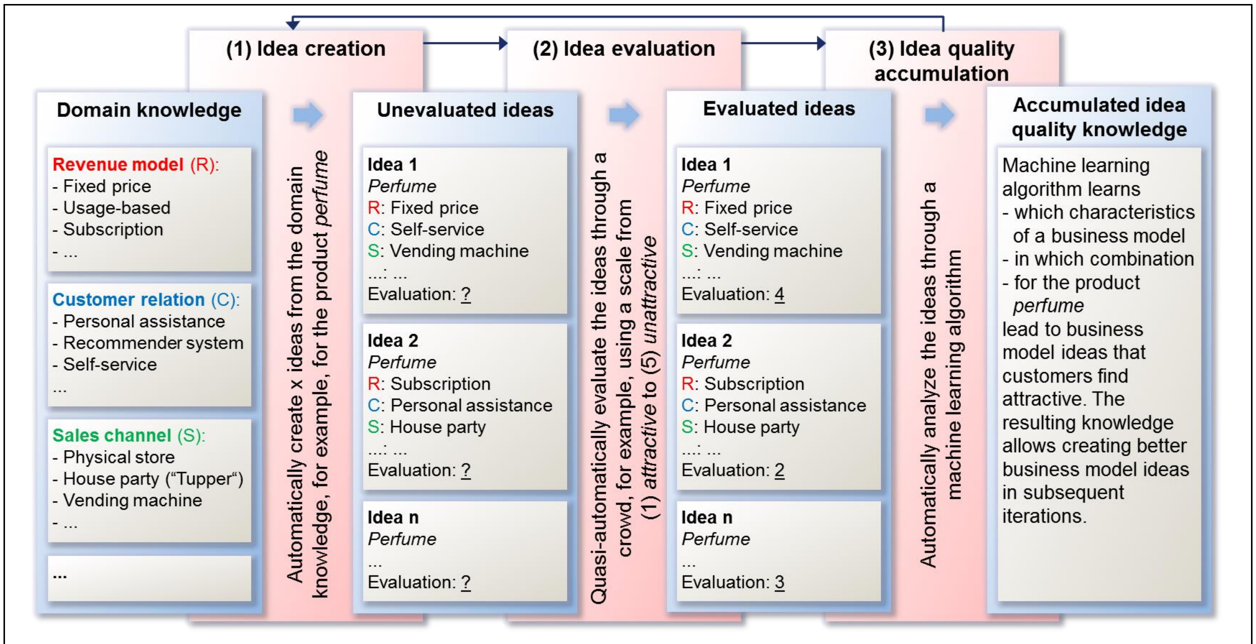

Figure 4. Conceptual overview of the prototype including illustratory domain knowledge and sample ideas

Once started, the idea generator needs to determine which of the ideas that the domain knowledge allows to create are the most valuable for the idea generator user. Hence, in the first iteration, the idea creation step randomly creates ideas that, for example, can include the two ideas shown in Figure 4. Let us assume that of the ideas created in the first iteration, the crowd evaluates most of the ideas that contain the sales channel *house party* rather favorably. This would give some indication that this channel type is promising from the perspective of the user. In the second iteration, idea creation would then prioritize creating ideas with the sales channel *house party*, which means that more ideas with that channel are created than in the first iteration. This means that the value *house party* is combined with values of the revenue model and customer relation that *house party* had not been combined with in the first iteration. This allows exploring whether there are interdependencies between this type of sales channel and the other business model components. For example, the second iteration could possibly uncover that ideas containing *house party* are only evaluated favorably when they are combined with a customer relation that is *personal assistance* rather than *recommender system*. This knowledge then could be used in the third iteration to further prioritize which ideas to create. In other words, creating ideas that contain the *house party* sales channel together with a *personal assistance* customer relation could be prioritized over creating ideas that contain a *house party* channel together with other customer relations. Thereby, in the third iteration, the idea generator would produce ideas that are better than the ideas of the second iteration, which in turn are better than those of the first iteration (in terms of expected quality). In other words, idea quality is likely to increase gradually with each iteration.

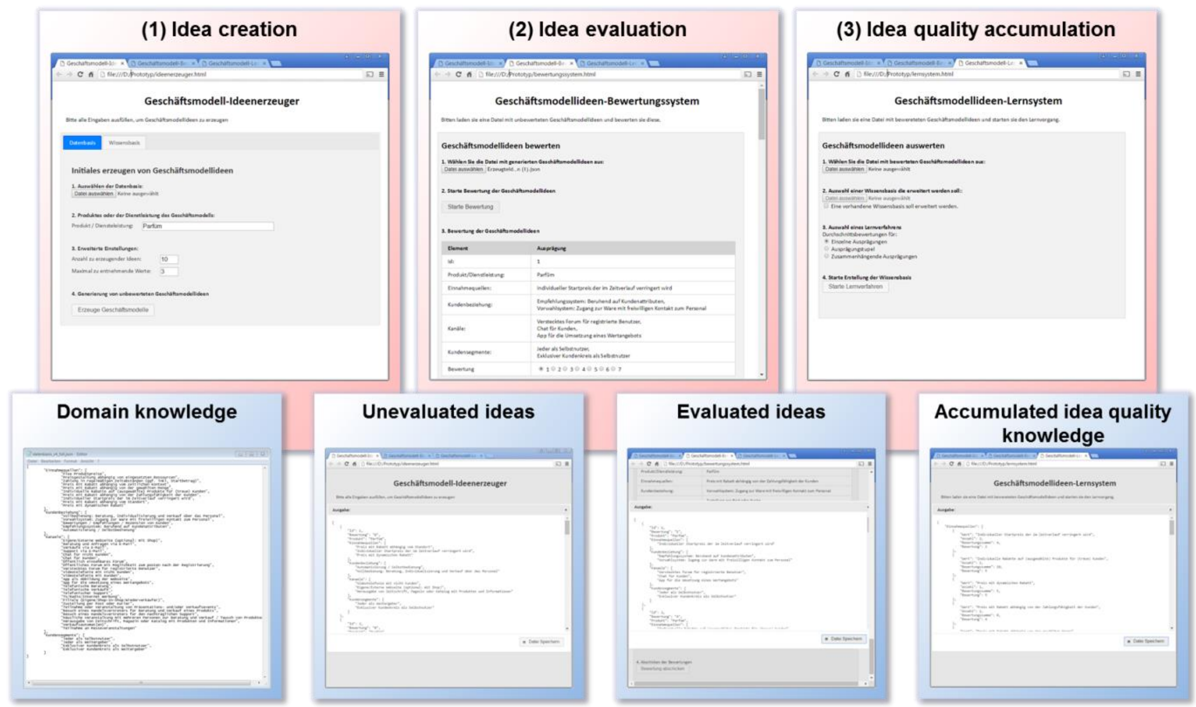

Figure 5. Screenshots of the developed prototype

Admittedly, the presented example is very simple. Nonetheless, note that even with the simple logic contained therein, a reasonable amount of ideas could be created that, depending on the amount and variety of stored domain knowledge, could be quite creative. Moreover, the amount of business model components and the values contained therein can easily be multiplied. That is, totally different data structures are feasible, which would allow a lot more, and more faceted, business model knowledge to be stored in the domain construct. This knowledge could be compiled by a multiplicity of individuals with a variety of backgrounds, allowing the idea generator user to simultaneously tap business model knowledge from virtually any industry that exists. In addition, other data structures would enable other cognitive procedures to operate, and thereby would increase the variety of feasible business model ideas even further. Finally, a distinctive feature of instantiations of the presented design theory is that the resulting business model ideas are not generated naïvely, but rather are tailored to the specific business model innovation context (i.e., to the product or service that the user needs business model ideas for). This is achieved through the evaluation that the crowd gives to the created business model ideas, which depends on the product or service specified by the user of the idea generator. To illustrate, ideas with a sales channel *house party* might be evaluated positively in the context of perfume, but they are likely to be evaluated less positively when the user has defined a product such as a *car battery*. Consequently, the output of the unique ideas varies depending on the product/service description provided by the user.

3.6. Principles of Implementation

The following section describes the principles of implementation, that is, the actions needed to implement an idea generator on the grounds of the proposed design theory. In the context of idea generators, these actions mostly relate to refining constructs that are defined in the idea generator architecture, which is a typical feature of design theories as *"a single construct in a [design] theory can represent a sub-system that has its own separate design theory"* (Gregor and Jones 2007, p. 325). The actions needed for implementation are (only) an optional part of a design theory (Gregor and Jones 2007). Also, as most actions relate to already defined constructs, the added value may be considered limited in the idea generator context. Nonetheless, for reasons of completeness and to facilitate grasping the overall idea of idea generators, the required actions are outlined in the following (they do not necessarily need to be performed in that order):

1. *Domain* construct: Define data structures to capture business model knowledge in the domain construct and populate these data structures with information on existing and/or feasible business models.
2. *Cognitive procedures* construct: Identify suitable cognitive procedures and formalize these procedures in a way consistent with the data structures defined in the domain construct.
3. *Idea creation* construct: Define the logic that describes how ideas are selected for creation based on the aggregated idea quality knowledge.
4. *Idea evaluation and conversion* constructs: Select a crowd platform, define how ideas should be presented to the crowd on that platform (e.g., how many ideas to evaluate at a time, on which scales to evaluate ideas, what context to give to crowd workers in terms of the purpose of their evaluation), and then implement a component that converts ideas from the data structures defined in the domain construct into the format in which the ideas will be shown to the crowd.
5. *Idea quality aggregation* construct: Define what algorithms to use and how to parametrize them.
6. *Overall:* Define how many ideas should be created in each iteration, how many ideas should be contained in the output to the user, and which criteria to use for terminating idea creation (e.g., average quality of ideas in the last iteration, number of total iterations).

3.7. Testable Propositions

In innovation contexts, one typically prefers 99 bad ideas and 1 outstanding idea to 100 merely good ideas (Girotra et al. 2010). Consequently, for determining the value that using an idea generator has, there is the need to determine how using an idea generator can increase the probability of arriving at outstanding business model ideas – and to what extent the expected result depends on the context that an idea generator is used in (i.e., whether machine idea generation precedes or parallels human idea generation, see Figure 4). An effective way for increasing the probability for outstanding ideas is to increase the number of available unique ideas, because an increase in unique ideas also increases the probability that these ideas comprise outstanding ideas – at least as long as the expected quality of additional unique ideas at least equals the quality of the ideas initially available (Girotra et al. 2010; Kornish and Ulrich 2011). This leads to two questions: First, can an idea generator increase the amount of unique ideas? And second, is the expected quality of these ideas high enough to increase the probability of arriving at outstanding ideas?

A necessary condition for that an idea generator can increase the overall amount of unique ideas is that the idea generator is able to produce ideas that differ from its user's ideas. One case in which an idea generator is able to do so is when its domain knowledge at least partially goes beyond the user's knowledge, that is, the idea generator *'knows'* some business models (or characteristics thereof) that the user does not know. This naturally allows the idea generator to produce ideas that its user cannot produce. However, also when an idea generator's domain knowledge does not exceed its user's knowledge, the idea generator has the potential to produce ideas that are unlike its user's ideas. This is because it is highly unlikely that a human explores its domain knowledge in exactly the same ways as the idea generator (i.e., forms exactly the same combinations of knowledge to arrive at ideas). Put differently, a user might have a certain (characteristic of a) business model in his or her domain knowledge, but simply does not happen to think of it during idea generation, while the idea generator potentially does. Moreover, limitations in cognitive flexibility can prevent the user from forming certain combinations at all. Hence, no matter whether the idea generator's domain knowledge exceeds the user's knowledge or not, the idea generator is able to produce ideas that are different from its user's ideas. Whether this ability actually increases the overall amount of unique ideas then depends on whether the amount of human ideas is affected by using the idea generator, as is discussed in the following.

In machine-paralleled idea generation, users generate ideas independently from the idea generator, and therefore the amount of human ideas is not affected by using an idea generator. However, the amount of human ideas is expanded by the ideas that the idea generator produces, at least to the extent that these ideas are different from the ideas produced by the user (see Figure 6). This leads to the following proposition:

Proposition 1: Machine-paralleled idea generation leads to more unique ideas than human-only idea generation.

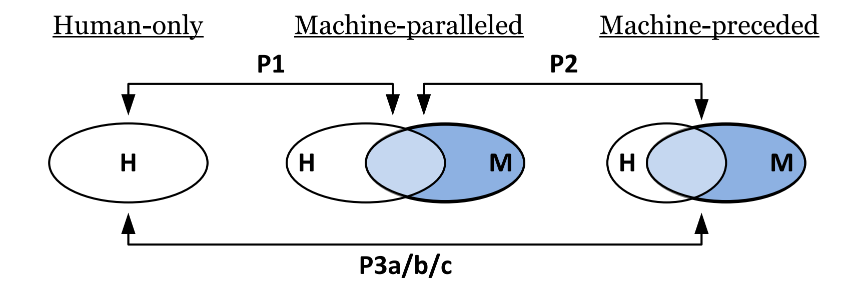

Figure 6. Final sets of unique ideas by use context and corresponding propositions (H = human-generated ideas, M = machine-generated ideas).

In contrast to machine-paralleled idea generation, in machine-preceded idea generation, users do not generate ideas independently from the idea generator. Rather, they generate ideas after the idea generator, which means they use the ideas produced by the idea generator as an input for their own idea generation. In such a setting, humans are likely to suffer from fixation effects (Girotra et al. 2010; Kavadias and Sommer 2009), that is, human idea generators risk getting fixated to the machine-generated ideas, thus losing sight of the potential inherent in the ideas they could derive from their own knowledge. Consequently, while the amount of unique ideas generated by the idea generator is the same in machine-paralleled and machine-preceded idea generation, the amount of human ideas is likely to be smaller in machine-preceded idea generation (see Figure 6). This leads to the following proposition:

Proposition 2: Machine-paralleled idea generation leads to more unique ideas than machine-preceded idea generation.

As noted above, machine-preceded idea generation is likely to reduce the number of human ideas compared to the human-only and machine-paralleled contexts. While this clearly puts machine-preceded idea generation at a disadvantage compared to machine-paralleled idea generation (cf. proposition 2), the implications compared to the human-only context are unclear. This is because it is unclear whether the reduction in human ideas can be offset by the additional machine-generated ideas or not, which in turn depends on other factors such as how susceptible the actual users are to fixation effects (i.e., to which extent the amount of human ideas actually decreases). The following competing propositions reflect this uncertainty:

Proposition 3a: Machine-preceded idea generation leads to more unique ideas than human-only idea generation.

Proposition 3b: Machine-preceded idea generation leads to the same amount of unique ideas as human-only idea generation.

Proposition 3c: Machine-preceded idea generation leads to less unique ideas than human-only idea generation.

Recall that for increasing the probability for arriving at outstanding business model ideas it is not enough to increase the number of unique ideas. Rather, the expected quality of these ideas also needs to be sufficiently high. However, the question of whether the quality of resulting ideas is *'sufficiently high'* is not so easily answered. This is because the benchmark against which to determine *'sufficiently high'* varies with the users that use the idea generator: if the human-generated ideas are low in quality, then it is more likely for the machine-generated ideas to increase the overall idea generation quality than if the human-generated ideas are high in quality. Moreover, it is not only the human benchmark that is uncertain, but also the performance of the idea generator. This is because the proposed design theory is a high-level theory that contains a number of constructs that still need to be refined upon implementation. Consequently, the performance of idea generators instantiated from the proposed theory does not only depend on the design decisions built into the theory, but also largely depends on design decisions made upon implementation. In other words, only if the design decisions necessary during implementation are reasonably made, is it possible to leverage the advantages that human-with-machine idea generation promises to deliver.

That an artifact's performance does not only depend on decisions made at the high-level design is not ideal, but also not uncommon in high-level design theories. For such theories, the greater scope by definition comes at the price of a somewhat less comprehensive specificity, as the greater scope inevitably increases the number of design decisions still to be made upon implementation. This is also acknowledged by Gregor and Jones (2007) in that they state that propositions can range from rather general (e.g., *"If a system or method that follows certain principles is instantiated then it will work."*) to more specific (e.g., it will not only work, but *"…it will be better in some way than other systems or methods.")* (Gregor and Jones 2007, p. 327). The only way then to arrive at specific propositions is to assume that design decisions necessary during implementation are reasonably made. Hence, it is a necessary boundary condition for the following idea quality-related propositions that decisions upon implementation are made in a way that reasonably leverages the theoretical advantages of the human-with-machine approach. Given this boundary condition, the arguments used earlier to motivate the human-with-machine approach, together with the characteristics of the proposed architecture, can provide an indication of how using an idea generator affects idea quality.

Hence, towards arriving at propositions that address idea quality rather than quantity, recall that machines have distinct advantages over humans, such as unlimited amounts of domain knowledge and cognitive flexibility. Hence, given enough effort for building up the business model knowledge, the ideas that the idea creation step of the idea generator can produce are likely to also include a number of high-quality ideas that the user will not be able to generate alone. The challenge for the idea generator then is to identify these ideas so that it can include them in the ideas that the user receives. However, it is likely that the idea generator is able to identify at least some of the high-quality ideas because, as described, the proposed architecture has an inherent quality evaluation step. Again, it needs to be assumed that this evaluation step is reasonably performed (e.g., by means of a sufficient number of iterations during idea generation and by means of an appropriate crowd). Taken together, these observations lead to the following proposition:

> *Proposition 4: The (best) unique ideas generated with machine-paralleled idea generation are better than the (best) unique ideas generated with a human-only approach.*

As the number of available unique ideas determines the probability of arriving at high-quality ideas, the rationales concerning idea quantity that underlie propositions 2 and 3a/b/c equivalently apply to idea quality. This leads to the following propositions:

> *Proposition 5: The (best) unique ideas generated with machine-paralleled idea generation are better than the (best) unique ideas generated with machine-preceded idea generation.*

> *Proposition 6a: The (best) unique ideas generated with machine-preceded idea generation are better than the (best) unique ideas generated with a human-only approach.*

> *Proposition 6b: The (best) unique ideas generated with machine-preceded idea generation are of the same quality as the (best) unique ideas generated with a human-only approach.*

> *Proposition 6c: The (best) unique ideas generated with machine-preceded idea generation are worse than the (best) unique ideas generated with a human-only approach.*

3.8.Artifact Mutability

Artifact mutability describes possible changes that can be anticipated in a design theory (Gregor and Jones 2007). Drawing on the classification of IS artifacts into *constructs*, *models*, *methods*, and *instantiations* by March and Smith (1995)[3], artifact mutability can take the forms of *construct mutability*,

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[3] To illustrate these artifacts: A construct according to March and Smith (1995) matches the understanding of a construct by Gregor and Jones (2007) used earlier; a model refers to the entirety of relationships between constructs (e.g., the proposed architecture); a method is a sequence of steps (e.g.,

model mutability, *method mutability*, and *instantiation mutability* (Pöppelbuß and Goeken). There are three main ways in which such mutability can be anticipated for the proposed design theory:

Extend the domain knowledge (instance mutability): The knowledge base of an idea generator will never be complete. With every run of an idea generator, be it preceding or parallel to human idea generation, humans will generate some ideas that go beyond the ideas which the idea generator could not have created from its knowledge base (because, for example, it simply did not *'know'* a certain sales channel or revenue model). Consequently, every run of an idea generator offers the chance to extend the knowledge base, and thereby to better prepare the idea generator for the next run.

Change the 'all new' approach to idea creation (construct/model mutability): Currently, in every iteration, all ideas from the previous iteration are dismissed, and a new set of ideas is created based on accumulated idea quality. However, it would also be possible not to dismiss all ideas, but to keep the best unique ideas of one iteration and add them to the unevaluated ideas of the subsequent iteration, or to add them to the unique ideas that the user receives right away.

Capture idea evaluation knowledge across idea generator runs (construct/model mutability): Currently, the designed architecture prescribes that accumulated idea quality is transient, that is, it is cleared every time the user starts the idea generator with a new product or service. However, after the idea generator has been used numerous times, idea evaluations probably reveal patterns that are stable across product/service contexts. For example, certain business models are possibly never evaluated as *'good'*, which would question why they should still be created. The reason is that if ideas that foreseeably are low in potential were not created any more, this would allow arriving at better ideas with a given number of iterations. Changing the approach accordingly would involve creating a new construct to store idea quality knowledge across idea generator runs, and allow the idea creation activity to draw on that knowledge. However, rare and highly unlikely combinations may, depending on the context, also be the source of radical innovations. So caution is needed when deciding to exclude certain business models altogether.

4. Proposed Empirical Evaluation

In the following, inspired by Müller-Wienbergen et al. (2011), exemplary research designs are presented to illustrate how the proposed theory can be evaluated. Such evaluation would require instantiating an idea generator from the proposed theory by using the corresponding principles of implementation. Evaluation then would proceed by letting that idea generator generate ideas for a sample product or service, and then let humans generate ideas for the same product/service in the human-only and human-with-machine conditions.

In general, for evaluating interventions that are intended to affect creative performance, quantitative studies with controlled experiments are widely accepted in creativity and innovation research (e.g., Girotra et al. 2010). Nonetheless, critics have pointed out that, especially for complex interventions (which an idea generator undoubtedly belongs to), controlled experiments are too simplistic, and rather qualitative or mixed method designs should be used (e.g., Shneiderman 2007). Consequently, the following presentation includes research designs for quantitative as well as qualitative evaluation (which may be combined in a mixed method design).

4.1. Quantitative Evaluation

For quantitative evaluation through a controlled experiment, a between-subjects design with the following conditions could be employed: (1) *human-only* (control condition), (2) *machine-precedes* (see Figure 4), (3) *machine-parallels* (see Figure 4), and (4) *machine-only*. The last condition of *machine-only* does not exhibit strong external validity because it is unreasonable to assume that there are cases that force humans to use ideas generated by the idea generator as they are, and not being able to refine these ideas.

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the overall workflow that the user has when using an idea generator, that is, specify the product or service that business model ideas are needed for, start the idea generator, and review the ideas generated by the idea generator); an instantiation is the artifact resulting from a proposed design (e.g., an implemented idea generator system).

Still, investigating this condition is worthwhile for determining some *'base level'* performance of the idea generator, and probably for evaluating progress in building up the knowledge base (progress concerning the knowledge base might better be assessed through this than the other conditions to avoid confounding results with performance differences of the human subjects).

Subjects would individually and randomly be assigned to conditions 1-3. Creative performance would be measured by employing either experts or crowds, who would blind-rate the ideas generated in each experimental condition (i.e., the experts/crowd workers are blind to the purpose of the experiment and do not know which experimental condition a given idea has been created in). These ratings would shed light on how much (if any at all) value there is in using an idea generator, and in what use context the idea generator should be used. While conditions 1-3 (human and human-with-machine) would be employed for confirmatory purposes regarding the presented propositions, the investigation of condition 4 (machine-only) would be rather exploratory in nature.

4.2. Qualitative Evaluation

For qualitative evaluation, it would be reasonable to adopt a case study approach to investigate to what extent actual users perceive idea generators to facilitate their work, and what organizational settings possibly lead to higher or lesser benefits of idea generator use. In that sense, an exploratory case study design would suggest itself, which is well-suited when it is not yet clear which phenomena are most important, and open-ended information search is needed rather than information search based on predefined protocols (Yin 2013). Moreover, a multiple case study design would be needed to identify possible context-dependent and context-independent patterns. Data collection should be performed through multiple methods, such as observation (e.g., to explore group dynamics that might play a role when using the idea generator ideas) and interviews (e.g., to understand how users perceive the idea generators).

5. Discussion

Business model innovation has become a key factor for firm success, and as such has received tremendous attention in research (Zott et al. 2011) and practice (GE 2014). Nonetheless, especially the first phase of the business model innovation process, the idea generation phase, is still poorly understood (Martins et al. 2015) – and to further explore this phase has been called a key priority for business model researchers (Schneider and Spieth 2013). As a response to this call, by drawing on and integrating contributions from collective intelligence, creativity, and machine learning, I propose a radically new approach to business model idea generation that involves complementing human ideas with machine-generated ideas. Such machine-generated ideas would be produced by systems I term business model idea generators (or, simply, idea generators) by iteratively performing the three steps of idea creation, idea evaluation, and idea quality accumulation. Idea creation creates new ideas by forming novel recombinations of knowledge from a business model knowledge base, idea evaluation quasi-automatically evaluates the created ideas by interfacing to a crowd platform, and idea quality accumulation builds up knowledge concerning promising ideas through supervised machine learning. The overall approach is inspired by the processes that give rise to human creativity, and hopefully contributes to alleviating two central factors that constrain human creative capability, namely the limitations of prior knowledge and the limitations of cognitive flexibility. This could help to generate better business model ideas and, given the association between idea quality and market success (Kornish and Ulrich 2014), would raise the odds of successful business model innovation.

5.1. Theoretical Contributions

As this research develops a design theory for business model idea generators, two different perspectives are relevant for assessing the theoretical contribution: the design science perspective and the business model perspective.

From a design science perspective, the knowledge contribution framework by Gregor and Hevner (2013) aids in assessing the size of a potential scientific contribution. Within that framework, *problem novelty* and *solution novelty* simultaneously determine contribution size, and along both dimensions, more novelty translates into greater potential for a substantial contribution (Gregor and Hevner 2013). As previous business model innovation research has exclusively relied on human-only idea generation, the question of how to business model idea generation can be supported through machine-generated ideas is a novel problem. In addition, the proposed solution tends to qualify as being novel. While the constituting components such as crowd evaluation or machine learning already exist in their respective fields, their combination for the sake of business model idea generation is a novel solution. Therefore, by addressing a novel problem through a novel solution, an idea generator tends to qualify for an *invention* contribution, which according to Gregor and Hevner (2013, p. 345) is a *"clear departure from the accepted ways of thinking and doing"*, and according to their framework carries the largest potential for a scientific contribution. As such, invention contributions typically come with great potential to improve the status quo, however, due to their novel character, they typically also come with a number of concerns that can include a lack of theoretical grounding, a still incomplete design, or shortcomings concerning rigorous evaluation (Gregor and Hevner 2013). These concerns at least partially also apply to the proposed idea generator architecture, as its design is not fully complete in the sense that a number of design decisions still need to be made upon implementation, and its evaluation (even the first instantiation) is still pending. Nonetheless, Gregor and Hevner state that invention contributions – despite the involved hurdles – should be encouraged, because *"after all, new knowledge must begin somewhere."* (Gregor and Hevner 2013, p. 353). This view is echoed by leading behavioral science authorities who call for more nonempirical theory articles and see it as *"critically important for scholars to develop […] manuscripts that attempt to synthesize advances and ideas into fresh theory"* because a lack of nonempirical theorizing in the long-term *"will only end up stifling […] knowledge creation"* (Devers et al. 2014, p. 249). Notwithstanding these voices, the validity of any design theory contribution naturally hinges on that contribution being developed in a transparent and comprehensible manner. For this purpose, the design theory is presented along the lines of the widely accepted guidelines of Gregor and Jones (2007), with justificatory knowledge that draws on and integrates well-established contributions from a variety of disciplines. Moreover, to facilitate future work, the proposed design theory is complemented by exemplary research designs for qualitative and quantitative evaluation.

From a business model perspective, as noted, the proposed human-with-machine approach introduces a radically new perspective into the idea generation phase. Nonetheless, the proposed approach is compatible with existing tools for business model idea generation such as morphological analysis (e.g., Im et al. 2013), business model patterns (e.g., Gassmann et al. 2014), and modeling languages like the Business Model Canvas (Osterwalder and Pigneur 2010). These existing tools can still be used to support the human-only part of idea generation. In addition, existing modeling languages are a likely foundation for how idea generators present the unique ideas to users. This is because presenting the unique ideas in a format that the user is already familiar with is likely to foster user acceptance. Moreover, presenting the output through an existing modeling language also implies that the internal formalisms that the idea generator employs for representing domain knowledge need to be compatible with that modeling language. Hence, one could argue that idea generators are not only compatible with the existing modeling languages. Rather, they also augment these modeling languages by pointing out a different way to use them for promoting business model idea generation.

While the focus of this article is on business model research, at least two additional disciplines could benefit from the proposed ideas: *(international) opportunity recognition* (e.g., Kontinen and Ojala 2011) and *corporate foresight* (e.g., Rohrbeck et al. 2015). Recall that up to now the crowd has implicitly been assumed to be rather homogenous and as a whole representative, or knowledgeable, of a specific target market (cf. design principle 3). However, existing crowd platforms draw crowd workers on a global scale, and as such include crowd workers who are representative of different regional markets. Hence, it is possible to run a business model idea generator not only for a specified *'home'* market (by drawing on crowd workers from that market), but rather to deliberately run the idea generator for markets worldwide in a rather exploratory manner. This would, for example, allow identifying markets that yield unique ideas that are similar to the unique ideas of the home market, which might imply possible synergies and thus a potentially valuable internationalization opportunities. Used in this manner, the principles underlying the idea generator could prove valuable for the opportunity recognition literature in general, and more specifically for international opportunity recognition (e.g., Kontinen and Ojala 2011). Moreover, while business model innovation and opportunity recognition involve active change efforts at a certain point in time, the principle underlying idea generators could also be applied rather passively, and on a continuing basis. This would involve periodical evaluations of whether the (best) unique ideas that an idea generator produces are still the same, or have possibly changed due to changes in customer preferences or other changes in market conditions. An idea generator would then not be used as a one-time (or multiple-time) innovation tool, but rather as a strategic early warning system that one continuously employs to reap potential information advantages. In that sense, the principles underlying business model idea generators would fall into the realm of corporate foresight research that, among others, is devoted to providing support in *"identifying, observing and interpreting factors that induce change"* at a strategic level (Rohrbeck et al. 2015, p. 6).

5.2. Managerial Implications

Recall that the intended users of an idea generator include anyone that might be confronted with the task of developing a business model for a given product or service. This includes entrepreneurs who need to develop a business model for their own venture, managers who need to develop a business model on behalf of their employer, and consultants who need to develop business models for their customers. However, the user of an idea generator and its developer are not necessarily one and the same. And whether they are, mainly depends on the trade-off between the desire to protect the strategic knowledge that a business model knowledge base captures and the desire to minimize the cost involved in building up such a knowledge base. More specifically, as emphasized throughout the article, the sophistication of the domain knowledge that is captured in an idea generator plays a crucial role for the quality of the produced business model ideas. In that sense, the depth and variety of the business model knowledge base are a potential source of competitive advantage because a sophisticated knowledge base would possibly allow identifying better business model ideas than one that is less sophisticated. This is similar to the notion that organizational language can be a source of competitive advantage – because firms may oversee potentially valuable business opportunities if they cannot frame, and thus recognize, certain opportunities through the language they use (Brandenburger and Vinokurova 2012). As a consequence, on one hand, firms can be expected to build up their dedicated knowledge base and to try protecting that knowledge. On the other hand, building up such a knowledge base entails considerable effort, while using that knowledge for idea creation happens at virtually no cost. Therefore, if the business model idea generator approach gets traction, one can conjecture that different knowledge bases will be developed, with larger firms being inclined to develop and exploit them internally, and smaller firms being inclined to draw on external expertise – maybe from open source knowledge bases or from consultancies that exploit scale economies by selling idea generation services to a number of clients.

5.3. Limitations and Future Research

The proposed design theory is subject to a number of limitations, which opens up a vast array of future research directions. Apart from the necessary overall evaluation of the approach, the open questions mainly revolve around the following three perspectives: (1) a *technical perspective* that concerns how to best implement the corresponding idea generators, that is, how to make specific design decisions upon implementation, (2) an *economic perspective* that concerns the question of when potential users are likely to see an idea generator as an economically viable complement to other idea generation methods, and (3) a *behavioral perspective* that concerns how the crowd and potential users interact with the idea generator, and how the efficiency of these interactions can be enhanced.

5.3.1. Technical Perspective

Technical questions that need to be resolved before implementation (see also principles of implementation) can be distinguished into questions pertaining to the idea creation step, the idea quality accumulation step, and the overall approach. Concerning idea creation, data structures need to be developed to capture business model knowledge. While the mentioned modeling languages can serve as a starting point, the somewhat informal character of the existing approaches needs to be overcome so as to arrive at a formalization that allows automatic processing and recombination of the stored business model knowledge. Regarding the knowledge base, there also is the need to determine what characteristics the content should have that is stored in that knowledge base. On one hand, increases in amount and variety of knowledge lead to more creative business model ideas. On the other hand, such increases in knowledge also increase the cost involved in sufficiently exploring the idea space that a knowledge base contains (i.e., the number of iterations and thus crowd evaluations needed to arrive at a stable set of (best) unique ideas increases). Hence, there is the need to determine how to trade off knowledge variety against the cost of exploiting that variety. In addition, insights are needed that concern the appropriate choice of parameters of the idea creation step, such as the number of ideas to be created and the share of randomly created ideas. Finally, there is the need to determine which cognitive procedures can reasonably be employed for creating new ideas. With conceptual combination and analogies, two such procedures were mentioned earlier. However, a lot more have been proposed, and we need to determine which subset of these procedures can be sufficiently formalized for automatic execution, and which exemplars of that subset then yield the best results.

Concerning the idea quality accumulation step, there is the need to determine which algorithms to use to best possibly exploit the information contained in a given set of evaluated ideas. As a given machine learning algorithm is not capable of processing arbitrary data, the choice of algorithm is likely to also depend on the data structure that is chosen for representing business model knowledge. However, establishing which algorithms best lend themselves is essential as the chosen algorithm is likely to substantially affect the number of iterations that are necessary to arrive at a certain level of idea quality.

Concerning the overall approach, it needs to be kept in mind that the proposed idea generator architecture draws on a range of theoretical and empirical contributions that largely center around cognitive creativity research. However, with *computational creativity* there is a complementary field of research that has a more technical, rather than cognitive, perspective on creativity (Colton and Wiggins 2012; McCormack and d'Inverno 2014). The computational creativity field explores a number of creative domains, including machine-generated music, poetry, or visual arts (Colton and Wiggins 2012), for which it is not immediately clear to what extent it is possible to make inferences for the business model domain. However, in addition, there are also contributions that relate to product development, that draw on interactive genetic algorithms and in so doing share similarities with the approach proposed for business model innovation (e.g., Cho 2002; Lee and Chang 2010). The underlying justificatory knowledge is very different, with cognitive creativity research being the foundation for the approach proposed in this article, and rather technical considerations concerning genetic algorithms being the foundation for much of computational creativity research. Nonetheless, the respective goals of increasing creativity are the same. Therefore, future work should carefully consider how contributions from computational creativity can be integrated into the proposed architecture, and what contributions the proposed architecture can potentially make to the field of computational creativity.

5.3.2. Economic Perspective

While the technical perspective addresses questions on how the output of idea generators can be improved at a given cost, from an economic perspective there is the need to determine how potential users actually assess these costs compared to alternatives There are costs for developing idea generators and for using them (in terms of paying the crowd). While certain users may weigh these costs against the working time potentially saved for brainstorming (which might make a cost/benefit assessment rather tedious), others may see idea generators as an alternative to open innovation contests (in that context an idea generator, at least in terms of time and cost, is likely to be a favorable alternative). Hence, it needs to be determined whether practitioners see a benefit in bearing the costs for an idea generator and under which circumstances they are willing to do so.

5.3.3. Behavioral Perspective

While an implicit assumption has so far been that idea generator users and the crowd weigh their respective costs and benefits in a fully rational way, a number of behavioral aspects are likely to influence the efficiency and effectiveness of the overall approach. For example, the cost for compensating crowd workers is a major determinant of the overall cost of using idea generators. That cost, however, is not a given, but rather is substantially influenced by how the evaluation task is presented to crowd workers. To illustrate, previous research on crowd-based labeling of medical images has shown that framing that task in a meaningful way (i.e., emphasizing the medical benefit that a proper execution of the task has) increases performance substantially compared to a neutral framing – at no change in costs (Chandler and Kapelner 2013). Likewise, it can be expected that different framings of the idea evaluation task are likely to affect the quality of evaluations at a given cost, which implies the need to explore what task framing yields the best trade-off between cost and evaluation quality.

Moreover, there is the need to explore through a behavioral lens how users perceive the benefits that idea generators provide (assuming that idea generators actually provide benefits). Potential problems include the *not-invented-here (NIH) syndrome* of potential users. The NIH syndrome refers to the tendency to downgrade ideas that have not been generated by oneself or one's peers, but rather originate from outside sources (Katz and Allen 1982). That effect has long been known and also today is a major threat, for example, to open innovation initiatives that by definition draw on outside ideas (Gassmann et al. 2010). The ideas that the idea generator produces in a way are also from *'outside'*. Therefore, users may irrationally downgrade the ideas that the idea generator produces, which implies the need to find out how to address this reaction.

6. References

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2.5. Business Model Representation Incorporating Real Options: An Extension of e3-value

Business Model Representation Incorporating Real Options: an Extension of e3-value

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Abstract

Business models are not typically doomed to remain as they are; rather, they may contain a variety of options to be changed or extended. Nevertheless, current approaches for business model representation cannot handle such options, because no appropriate modeling constructs are available. This substantially inhibits the qualitative consideration of options in business model design. Also, it inhibits the integration of options into subsequent quantitative analysis. Our contributions in this context are twofold: at a 'macro-level', we combine business model representations with real options theory from finance. At a 'micro-level', we extend one widely established and applied business model representation, namely e3-value, for handling real options. We develop the graphical notation necessary for option modeling and a corresponding extension of the formal e3-value ontology. Finally, we illustrate in a case study how the proposed extensions can support options reasoning and also serve as a basis for the correct financial analysis of a business model.

1. Introduction

A business model can be defined as "the representation of a firm's underlying core logic and strategic choices for creating and capturing value within a value network" [29]. In recent years, interest in the business model concept has surged [28, 35]. The business model is seen as a key determinant of a firm's ability to create value [6] and there is widespread agreement regarding the business model's importance to a firm's success. At the same time, the business model concept has been criticized for being "fuzzy and vague" [1], and scholars do not have a common understanding of the concept [35]. Nevertheless, the importance of its financial dimension is widely acknowledged [1, 21, 35].

The financial analysis of a business model generally refers to the analysis of revenue streams and cost structures [35], with the ultimate goal being to design a business model which yields a positive net present value [36]. Such a valuation based on expected revenue and cost streams determines the value of an 'as is' business model. It is performed under the implicit assumption that a business model is static during its lifetime and does not possess the flexibility to be altered.

However, business models are not typically doomed to remain as they are; rather, they may contain a variety of options to be changed or extended [20]. Options, for example, may exist to increase sales through additional distribution channels or target markets. Likewise, the option to introduce complementary products or services is often present. For example, the initial implementation of an Internet portal could allow the range of offered e-services to be expanded [4]. Further elements of a business model may be seen as optional in that they may be exchanged in favor of others or abandoned completely. In analogy to financial options, all such options are called *real options.* They are defined as "the right, but not the obligation, to take an action (e.g., deferring, expanding, contracting, or abandoning) at a predetermined cost" [8].

If an investment opportunity includes real options, it is essential to consider their value. Valuing an investment without considering the inherent option value always leads to an undervaluation [5, 8, 31] and thereby potentially to shortsighted decisions and underinvestment [31] – worthwhile business opportunities may be rejected. Consequently, when determining the financial viability of a business model which contains real options, it is necessary to explicitly consider the value of these options.

In reality, business models are too complex to be dealt with without abstractions. Thus, working with a business model actually means working with "a model of the business model": a representation of it [6]. Such a *business model representation* (BMR) can be a mixture of textual and graphical elements, or any rather formalized ontology which aims at representing a business model [35]. A BMR is used, for example, to im-

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prove the understanding, communication, and analysis of a business model's underlying logic [17]. It may also facilitate business model innovation by enabling experimentation [9] and can be utilized as the basis for defining requirements to the underlying information systems [11]. For these purposes, a large number of approaches are available (e.g., [7, 12, 16, 17, 24]).

Of the available BMRs, none does explicitly cover the options which a business model may contain. Options are not considered at a qualitative level, i.e., no appropriate modeling constructs are available to represent optional elements of a business model (research issue 1). Because they cannot be modeled qualitatively, options cannot be seamlessly incorporated into subsequent quantitative analysis either (research issue 2) – even though the instruments needed to value options are readily available in finance theory. Hence, no currently available BMR supports options reasoning and, in the presence of real options, none provides a basis for the correct financial analysis of a business model.

To establish a link between real options and BMRs, our contributions focus on research issue 1 and are at two levels: at a 'macro-level', we combine BMRs with the theory of real options from finance by introducing qualitatively the notion of optionality, or options reasoning, into the domain of BMRs. At a 'micro-level', we extend one specific BMR to enable it for handling real options. Based on a literature review, we identify e3-value [12] as the most suitable among the currently available BMRs to support option valuation. We extend this representation in two ways: First, we develop a graphical notation for modeling options. Second, we provide a formal integration of this notation into the e3-value ontology. The proposed extensions support options reasoning and also serve as a basis for the correct analysis of a business model's financial viability. Using a case study, we illustrate how the extended notation can be applied and how explicitly considering options can affect the financial analysis of a business model.

2. Business model representations

The literature on business models has become extremely comprehensive [35], but no common understanding of the business model concept has emerged so far [1, 35]. This lack of common understanding, naturally, also extends to the approaches to represent business models. Given this ambiguity – in order not to unnecessarily exclude representational approaches – we adopt a wide understanding of a BMR: Every BMR which (I) allows representing the model of a specific business, and (II) provides a graphical representation qualifies as a BMR in terms of this research.

To identify available representations in the literature, in addition to keyword search, we followed a structured approach as recommended by Webster et al. [32]: We used recent reviews of the business model literature ([1, 14, 35]) and as a first step selected the articles on BMRs mentioned there. Taking the corresponding articles as a starting point, we went backward by reviewing the sources they mention and forward by reviewing the articles which cite the representations identified in the previous steps. We restricted ourselves to BMRs which have been treated in a non-marginal way in a book or peer-reviewed journal article. Altogether, this yielded 12 approaches (see table 1).

Table 1. Available business model representations and main characteristics

Business model representation	Domain of origin	Main concepts	Main scope	Design tool / financial tool	Options considered
Activity system map* [23]	Strategy	Strategic theme, activity	General	No / No	No
Business models for e-government (BMeG) [22]	E-business	Partner, object ex-change, (dis)advantage	E-government	Yes / No	No
Business model ontology (BMO) [17]	E-business	Interrelated building blocks	General	Yes / No	No
Causal loop diagram [7]	Causality theory	Choice, consequence	General	No / No	No
e3-value [12]	E-business	Actor, value exchange	General	Yes / Yes	No
E-business model schematics [33]	E-business	Actor, flow, relation	E-business	No / No	No
Eriksson-Penker business extensions of the Unified Modeling Language [11]	Information systems	Actor, interaction, goal, rule	General	Yes / No	No
Resource-event-agent* (REA) [16]	Accounting	Resource, event, agent	General	Yes / No	No
Strategic business model ontology (SBMO) [27]	E-business	Actor, goal	General	Yes / No	No
Value map [2], [30]	Value networks	Actor, value exchange	General	No / No	No
Value net* [19]	Value networks	Actor, activity, flow	General	No / No	No
Value stream map [24]	Value networks	Actor, value stream	ICT	No / No	No

* = the contributing author makes no explicit reference to the term "business model": These approaches had been developed before the business model concept gained prominence. Nonetheless, they are listed because of their conceptual similarity to later approaches which are explicitly intended to represent business models.

The identified BMRs originate from a wide range of domains. They make use of various conceptual approaches, and to some extent convey a different understanding of the business model concept. Also, the employed terminology is rather inconsistent. These representations have (with differences in scope), for example, been referred to as "business model representations" [6, 35], "business model ontology" [17], methods for "business modeling" [11, 22], and "conceptual models" [21]. In some instances, there is also confusion about whether a BMR only refers to the representation of a specific business [6], or whether BMRs also comprise representations of conceptual business model aspects. Following this second notion, for example, Zott et al. [35] categorize their visualization of value driver interactions in [3] as a BMR – even though that visualization is not capable of representing the model of a specific business. Another source of confusion is the fuzziness of the business model concept itself, for example, towards the concepts of strategy and value networks. This conceptual fuzziness inhibits the identification of representations which are rooted in other literature streams, but which may still qualify as a BMR. For example, the "activity system map" [23] is an approach to visualize strategies, which is rooted in the strategy literature and does not make explicit reference to business models. However, it has been noted that activity system maps and business models are very similar and that "it is not clear how Porter's conceptualization of strategy differs from what others call business models" [28].

Of the identified representations, none explicitly considers real options as they are defined above. The term "option" is only used in [22], but with a different meaning. Thus, to be able to represent a business model including the embedded options, each of the representations would need to be extended – which leads to the question of which representation is most suitable for handling options.

As the ultimate goal is to have a representation which combines the design of a business model with a correct financial analysis, a representation which already provides tool support (I) for design, and (II) for financial assessment of a business model *without* options seems best suited. Half of the identified representations come merely as conceptual tools. They define a number of main concepts and provide a corresponding graphical notation. For BMeG, BMO, e3-value, REA, SBMO, and Eriksson-Penker business extensions, there are also software tools available which support the design and change of a business model. e3-value, however, is the only representation that provides a software tool which integrates the design *and* the financial evaluation (using capital budgeting techniques) of a business model. Thus, this representation seems best suited for an option-based extension.

3. Case study

The following case study is based on a case by Copeland et al. [8] which analyzes the business idea of a French Internet portal. While keeping all the figures, the case study was conceptually simplified and slightly adapted.

The business idea of the Internet portal is to sell the recovery software *Recover* to business clients and provide the corresponding support services so that customers have instant expert help if needed. The software is developed by a US-based software manufacturer and in France is to be sold exclusively by the Internet portal. After-sales support for *Recover* is provided by a local software service provider.

The Internet portal expects to sell 200 licenses of *Recover* in the first year and to double sales by year 6. The unit price is expected to initially be $30,000, but to decline to $20,000 due to competition. The continuing value of the business after the first six years is $44.748 million (based on an expected growth rate of the cash flows of 3% and capital costs of 12% after year 6). The initial investment for starting the business amounts to $35 million. Capital costs and risk-free rate for the six-year period are estimated to be 13.88% and 5.13%, respectively. The volatility of the rate of return is 30%. Further details concerning the expected cash flows for *Recover* are summarized in table 2.

There is also a second product, the back-up software *PreventLoss*, whose functionality is complementary with that of *Recover*. Because of this complementarity, it is assumed that many customers of *Recover* will also buy *PreventLoss*. The cash flows of *PreventLoss* are expected to amount to 30% of *Recover's* cash flows; its introduction requires an additional investment of $10.5m. The introduction of *PreventLoss* can take place immediately or at any time after the introduction of *Recover*. Thus, the Internet portal can

Table 2. Summary of financial parameters of *Recover*

Item	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Sales (# licenses)		200	230	264	303	348	400
Price/license ($)		30,000	27,660	25,510	23,520	21,690	20,000
Cost/license ($)		9,000	8,600	8,100	7,700	7,400	7,000
Cost for support services/license ($)		4,000	3,726	3,625	3,502	3,359	3,200
Initial investment ($)	35,000,000						
Continuing value ($)							44,748,000

defer the introduction until some experience with *Recover* has been gained and thereby some uncertainty regarding the market success of *PreventLoss* has been resolved. In the following section, the main concepts of e3-value are introduced using this case study.

4. e3-value methodology

The e3-value methodology was initially developed to help in the design and evaluation of e-commerce businesses, but it has also been applied in a variety of other domains such as telecommunications, banking, energy, or entertainment [13]. Designing an e3-value model starts with identifying the involved actors and the value exchanges which occur among these actors. These value exchanges are subsequently valued financially to understand which economic performance each actor in the network is likely to have. The main concepts of e3-value are the following [12] (see also figure 1):

- *Actors* are the partners who work together within the business model (e.g., the Internet portal and the software service provider). Actors are represented by rectangles. If they have common characteristics regarding their value exchanges and the value they assign to value objects, they are grouped in *market segments* (represented by a stack of actors).
- *Value objects* are the objects which are exchanged by the actors (e.g., *Recover* and support services). They are shown as text next to the value exchanges.
- *Value ports* are the means by which actors show the environment that they offer or request certain value objects. In and outgoing value ports which belong together are grouped in *value interfaces.* The respective value objects (in and outgoing) have to be exchanged simultaneously, because an actor always wants to have something in return for the value objects offered.
- *Value exchanges* connect value ports of different actors, thereby showing that these actors would like to exchange value objects.

These main concepts and their relations are part of an ontology, which has been formalized in the Unified Modeling Language (UML) [12]. This ontology also contains the *activities* which are performed by actors. For simplicity, these activities are left out of the model here (as, e.g., in [13]).

The semantics of an e3-value model are further refined by concepts which are not part of the formal ontology. Whereas value exchanges are dependencies among actors (or inter-actor dependencies), *dependency elements* represent dependencies within actors (or intra-actor dependencies). They can be split (joined) by *OR (AND)* connection elements [13]. They illustrate which ingoing value objects are needed to produce certain outgoing value objects. The specific need of a customer or a market segment is represented by a *start stimulus*. *Scenario paths*, starting from a start stimulus, comprise all value exchanges which are necessary to fulfill a customer need. A *stop stimulus* (or several stop stimuli) marks the end of such a scenario path.

Profitability analysis in e3-value is first of all based on *profitability sheets* which the e3-value software tool can automatically generate. Profitability sheets show the number of incoming and outgoing value objects and their value. The sum of in and outflows for a given actor determines its cash flow in a given period and provides a first impression of the economic attractiveness of a business model (see figure 2). This initial assessment can be complemented by a multi-period view in which a series of cash flows is evaluated to determine their present value [34]. This multi-period view is also supported by the e3-value software tool.

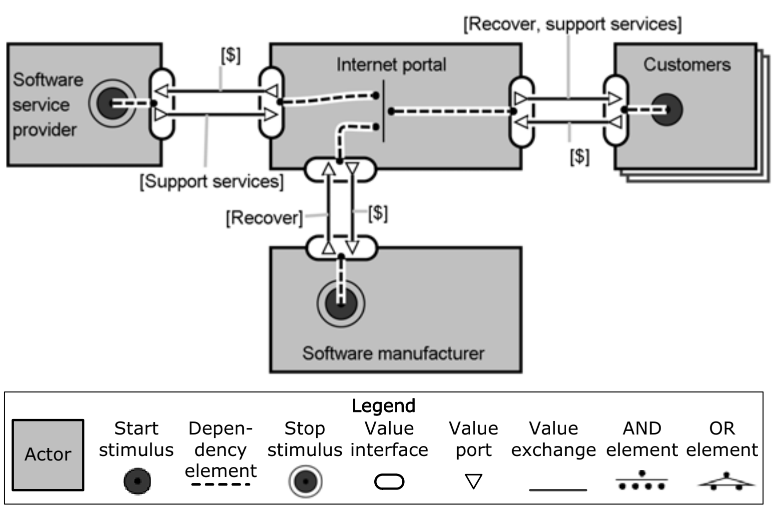
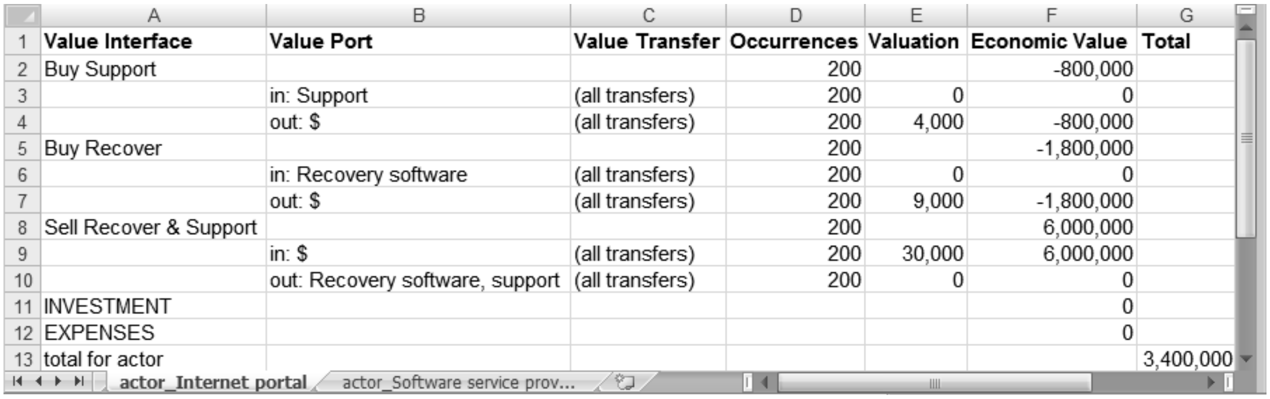


Figure 1. e3-value model of the Internet portal

The calculations of the net present values of *Recover* and *PreventLoss* are summarized in table 3. The net present value of *Recover* is $-312,411. Hence, with *Recover* alone, the business model is not viable from a financial perspective. However, there is also the second product which could be introduced, but considering *PreventLoss*, the situation becomes even worse. The net present value of *PreventLoss* is $-93,723, leading to a net present value of $-406,134 for the two products combined.

Given these calculations, the business model appears not to be financially viable. However, the implicit assumption behind the calculations is that either only *Recover* or both products are introduced immediate-



	A	B	C	D	E	F	G
1	Value Interface	Value Port	Value Transfer	Occurrences	Valuation	Economic Value	Total
2	Buy Support			200		-800,000	
3		in: Support	(all transfers)	200	0	0	
4		out: $	(all transfers)	200	4,000	-800,000	
5	Buy Recover			200		-1,800,000	
6		in: Recovery software	(all transfers)	200	0	0	
7		out: $	(all transfers)	200	9,000	-1,800,000	
8	Sell Recover & Support			200		6,000,000	
9		in: $	(all transfers)	200	30,000	6,000,000	
10		out: Recovery software, support	(all transfers)	200	0	0	
11	INVESTMENT					0	
12	EXPENSES					0	
13	total for actor						3,400,000

actor_Internet portal | actor_Software service prov...

Figure 2. Year 1 profitability sheet of the Internet portal

ly. In contrast, for the introduction of *PreventLoss* there is not only the choice between an immediate introduction and no introduction at all. *PreventLoss*' introduction can also be deferred so that it is only introduced if there are enough customers of *Recover* to make the *PreventLoss* introduction profitable. If demand for *Recover* remains low, there is no need to (unprofitably) introduce *PreventLoss* and incur the initial investment of $10.5m.

The fact, however, that the introduction of *PreventLoss* can be deferred, cannot be accounted for in the profitability analysis currently incorporated into e3-value. This is because that analysis to date is solely based on net present values and does not support the valuation of real options. Also, the optional character of *PreventLoss* to date cannot be modeled graphically. So far some ad hoc notation denoting optionality or separate diagrams (called *evolutionary scenarios* [12]) would have to be used – bringing along potential problems with regards to consistency and clarity of a model. Therefore, in the following, we develop the extensions needed to appropriately model optionality in e3-value models.

Table 3. Cash flows and net present value of *Recover* and *PreventLoss* ($, in millions)

		Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Recover	**Cash flow**	-35.000	3.400	3.527	3.639	3.732	3.804	3.920
	Present value of subsequent cash flows	34.688	36.102	37.586	39.164	40.868	42.736	44.748
	Net present value	-0.312						
Prevent-Loss	**Cash flow**	-10.500	1.020	1.058	1.092	1.120	1.141	1.176
	Present value of subsequent cash flows	10.406	10.831	11.276	11.749	12.260	12.821	13.424
	Net present value	-0.094						

5. Real options

Real option theory, based upon financial option pricing theory, seeks to determine the value of options on real assets. The following types of *simple* options can be distinguished [8]:

- *Abandonment option:* the right to stop a project in exchange for its salvage value
- *Contraction option:* the right to sell out a certain share of a project for a salvage value
- *Deferral option:* the right to postpone an investment to a later point in time
- *Expansion option:* the right to increase the project value for a fixed price
- *Extension option:* the right to extend the lifetime of a project for a fixed price

The abandonment and contraction options are analogous to financial put options, because they confer the right to sell certain goods. The other three types of options are analogous to call options. All these types of options can either belong to the class of European options (which can only be exercised at maturity) or American options (which can be exercised at or before maturity).

For the valuation of real options, the most common approaches are binomial trees and closed-form solutions based on partial differential equations. The binomial valuation is more intuitive than closed-form valuations and does not necessitate their complex mathematics [8]. Therefore, it is employed in the following as originally developed in [10] and refined for handling irregular cash flow patterns in [8]. Rather than to elaborate on the theoretical details of the valuation, our aim in the following is to illustrate how optionality can be integrated into a BMR and how the consideration of options can affect the estimated financial viability of a business model. Comprehensive overviews of real option valuation have, for example, been provided by Copeland et al. [8] (with a rather practical focus) and Trigeorgis [31] (with a rather technical focus).

6. Options in e3-value

6.1. Development of option-based extensions

To introduce options into e3-value, the following questions have to be answered: Which option types can in principle be modeled in e3-value? Which requirements does the graphical notation have to fulfill? Which modeling constructs are affected by the introduction of options? How can options be represented graphically? And finally, how is the formal relationship between the new constructs and existing ones? These questions will each be addressed in turn.

An e3-value model represents structural aspects of a business model. It does not make statements concerning the timing of the underlying processes or of the overall business model. Though timely aspects are incorporated into the financial analysis, the respective information is not represented in the graphical model or the formal ontology. Thus, only those option types can be modeled whose exercise can affect the structure of a business model. These option types are the option to abandon, to defer, to contract, and to expand. Each of them is either capable of adding or removing elements of the e3-value model or of changing the underlying quantities. The option to extend cannot be modeled in the e3-value context because its exercise affects only the time frame of a business model and not its structure.

Requirements for a suitable graphical notation can be derived (I) from the desirable compatibility with the e3-value software tool, and (II) from general best-practices for graphical modeling. One advantage of e3-value is that the design of a business model is facilitated by a corresponding tool. Thus, the extended notation should be representable with that tool. This may be achieved through the functionality to adapt original notation elements (as implemented in the latest version 3.48). Furthermore, the extended notation should comply with "good notation principles" [26]. These, among others, demand a graphical notation to have a clear mapping of concepts to symbols, be consistent with past practice, and without overloading of symbols.

The affected modeling constructs, above all, are value exchanges and actors. Options affect value exchanges, because option exercise can add or remove value exchanges in an e3-value model. Options can also affect actors, because option exercise can include new actors into the e3-value model or exclude current ones.

The exercise of call-like options (deferral and expansion option) can add additional value exchanges to the e3-value model. Because these optional value exchanges may be added at some time in the future – when a given option is exercised – we term them *optional (future) value exchanges* (represented by a dotted line). The exercise of call-like options can also add additional actors to the e3-value model if these have previously had no connection to other actors except for optional (future) value exchanges. In such a case, an actor constitutes an *optional (future) actor* (represented by a dotted line rectangle), because it is only part of the e3-value model if an option is exercised at some time in the future.

Conversely, put-like options (abandonment and contraction option) can remove value exchanges and actors from an e3-value model. Because the value exchanges affected by such an option already exist, they constitute *optional (existing) value exchanges* (represented by a dashed line). They are part of an e3-value model until the corresponding put-like option is exercised. If an existing actor is only connected to the remaining model via optional (existing) value exchanges, the exercise of the corresponding put-like options can remove this actor from the e3-value model – the actor will have no connection to the e3-value model any more. Such an actor is termed an *optional (existing) actor* (represented by a dashed line actor).

Finally, it is important to indicate the owner and reach of an option as well as its maturity. An owner has to be indicated, because otherwise it would be implicitly stated that any actor who has access to a certain optional value exchange

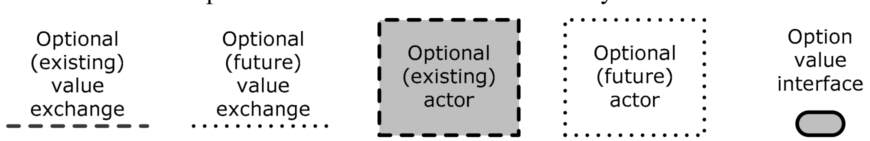


Figure 3. Additional graphical notation elements

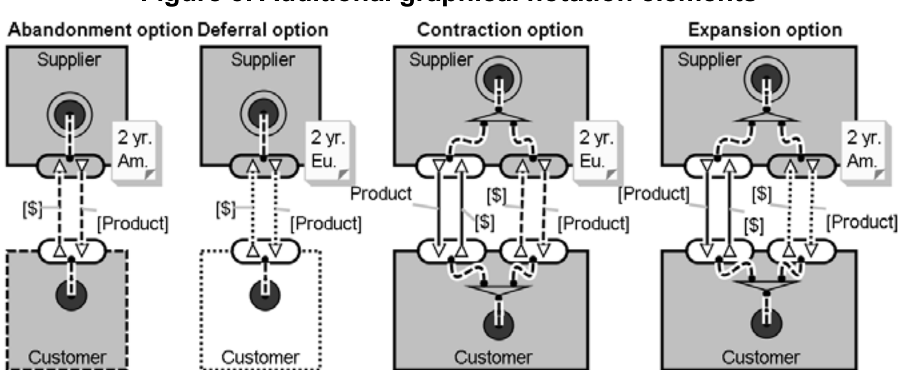


Figure 4. Illustrative application of the additional notation elements

has the right to exercise the corresponding option. However, by definition, an option confers an exercise right just to the owner. Thus, option ownership has to be exclusive. An *option value interface* (represented by a shaded value interface) for each option highlights the actor who can take action and exercise the option.

The reach of an option refers to the question of which value exchanges belong to a specific option/option value interface. The reach is determined by the corresponding scenario path: an option comprises all optional value exchanges which are within the same scenario path as the corresponding option value interface. The argument is as follows. In e3-value, different scenario paths are assumed to be independent in the sense that value exchanges in two separate scenario paths do not affect each other. A value object can only be transferred via value exchanges which belong to the same scenario path. Thus, the exercise of an option cannot affect value exchanges which belong to a different scenario path. In contrast, the exercise of an option can potentially affect all value exchanges on the same scenario path. For example, if an abandonment option for an optional (existing) value exchange is exercised, previous and subsequent value exchanges may become infeasible. Therefore, an option has to comprise all optional value exchanges which are within the same scenario path as the corresponding option value interface.

Concerning option maturity, it is important to recall that e3-value does not incorporate timely aspects into the graphical model. However, option maturity is crucial information which has to be represented in an e3-value model to fully allow an option's significance to be judged. To remain in line with the current approach of e3-value, but at the same time not losing information on maturity, for the time being we suggest annotating the option interface with a comment. There, information on maturity and further information deemed necessary by the modeler can be documented.

The graphical notation of the optionality constructs is summarized in figure 3. It is representable in the e3-value software tool and complies with the good notation principles. Thus, the two requirements outlined above are fulfilled. Examples for modeling the various option types are given in figure 4. There, an American abandonment option with a 2-year maturity is owned by a supplier who can discontinue manufacturing a product. This is modeled by optional (existing) value exchanges. Because the customer has no other value exchanges but these optional ones, upon option exercise the customer would not have any value exchanges at all, and thus is modeled as an optional (existing) actor here (the supplier is assumed to also have other value exchanges which are not shown). The comment note indicates that the option is American (Am.) and has a 2-year maturity (2 yr.). Regarding the deferral option, the supplier could introduce a product at a later point in time. This is modeled by optional (future) value exchanges. Because the customer has no value exchanges except for the optional ones, i.e., currently is not part of the e3-value model, the customer is modeled as an optional (future) actor here (again, the supplier is assumed to have other value exchanges). The comment note indicates that the option is European (Eu.) and has a 2-year maturity. For the contraction and expansion options, an analogous logic applies. One difference is, however, that these option types are always related to a non-optional value exchange because they contract or expand quantities relative to the quantity of another, non-optional value exchange.

The formal integration of the additional constructs into the e3-value ontology is realized through additional subclasses of the original classes *value interface*, *elementary actor*, and *value exchange* (see figure 5). Also, a new class *option* was introduced, which ensures consistency of the additional constructs. For instance, it ensures that each option has either optional (existing) or optional (future) value exchanges, but not both types at the same time. This is necessary, because it would be meaningless to have, for example, a sce-

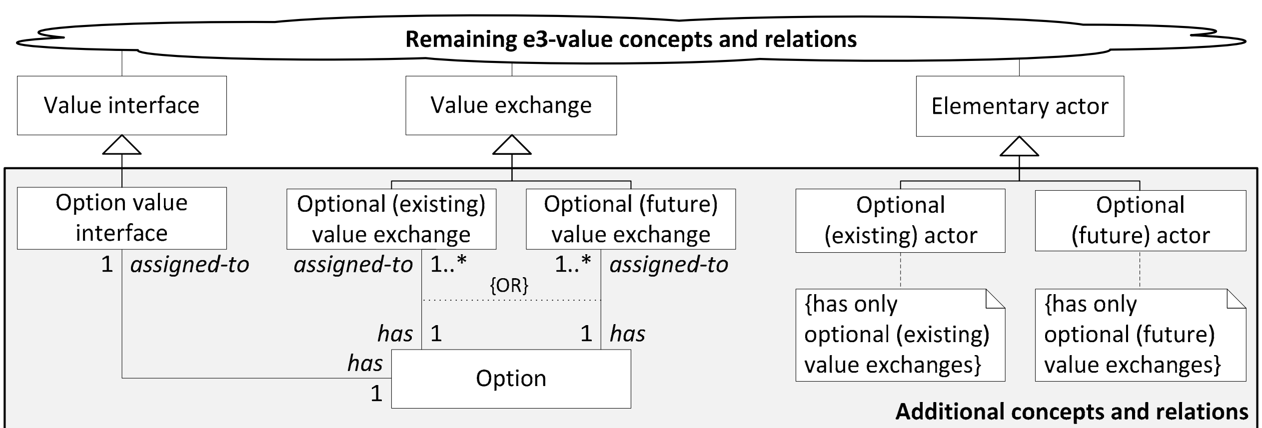


Figure 5. Additional formal concepts and relations

nario path which consists of successive optional (future) and optional (existing) value exchanges.

The class option also ensures that every option has exactly one optional value interface and, thus, is only owned by one actor. It also ensures that every optional value exchange is unambiguously linked to one option value interface and, therefore, can only be invoked by one actor. This last aspect could also have been achieved differently, for instance, through the addition of optional subclasses of the original classes *value offering* and *value port*. The latter design choice, however, would have come at the cost of a substantially more comprehensive UML class diagram.

6.2. Application of option-based extensions

With the extended notation it is now possible to correctly model the deferral option character of *PreventLoss* (see figure 6). Beginning with the start stimulus in the customer market segment, optional (future) value exchanges between the customers and the Internet portal as well as between the Internet portal and the software manufacturer represent the deferral option. They correctly model that the value exchanges related to *PreventLoss* may come into existence at some time in the future – and do not necessarily have to exist already. The option value interface of the Internet portal shows that it is the portal that has the discretion over the introduction of *PreventLoss*.

To analyze the impact of considering the *PreventLoss* deferral option on the financial evaluation, we use the binomial method. The initial value, \$34.688m, is the present value of *Recover*; the time step Δt is one year. The up factor u is $\exp(\sigma\sqrt{\Delta t}) \approx 1.35$; the down factor d is given by $1/u \approx 0.74$. The risk-neutral probability p is calculated from $(1+r\Delta t-d)/(u-d) \approx 0.51$. The relevant parameters are summarized in table 4. The resulting binomial tree is shown in table 5, further computational details are provided in [8].

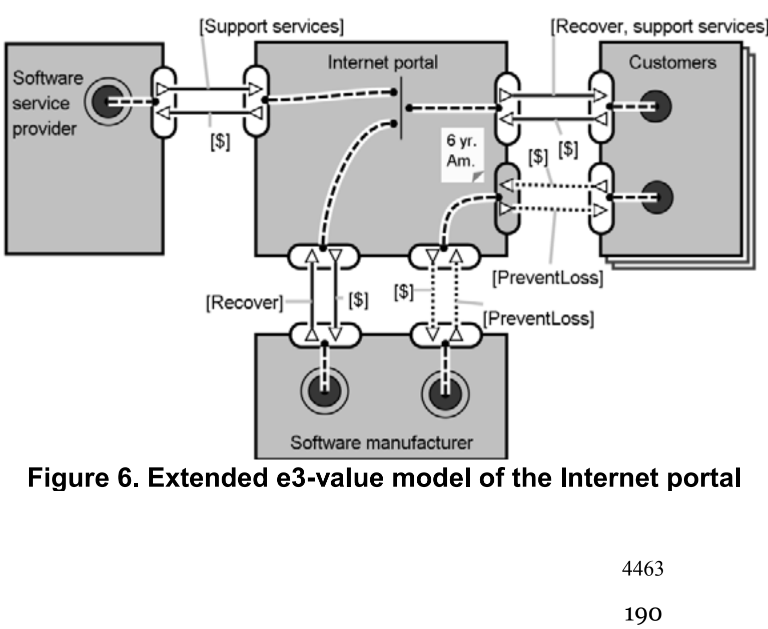


Figure 6. Extended e3-value model of the Internet portal

Table 4. Valuation parameters

Input parameters		Calculated parameters	
Initial value (\$)	34,688,000	Up factor, *u*	1.35
Volatility, σ	30%	Down factor, *d*	0.74
Time step, Δt	1	Risk-neutral probability, *p*	0.51
Risk-free rate, *r*	5.13%		

The payout ratio of the cash flows in each period is calculated as the ratio of the expected cash flow in a given period (see table 3) and the corresponding expected present value before payout. For example, the payout ratio in year 1 is given by \$3.400/\$39.502m ≈ 8.6%. The pre-payout present values in a given node are calculated from the pre-payout present value of the previous period, which is adjusted for payout and then multiplied by the corresponding up/down factor. For example, the upper node of year 2 is calculated from \$39.502m x (1-0.086) x 1.35 ≈ \$48.733m. The other node values are determined accordingly. In the best case, the resulting project value before the last cash flow is paid out in year 6 amounts to \$113.880m. In the worst case, the project value may go down as far as \$5.670m.

The deferral option in each period provides the right to introduce *PreventLoss*, which yields cash flows amounting to 30% of the *Recover* cash flows in exchange for a fixed cost of \$10.5m. Therefore, the exercise of the option is only worthwhile in those nodes where 30% of the present value of *Recover* exceed the fixed cost. Checking this condition in every node, the value of *Recover* including the option on *PreventLoss* is determined backwards, whereby subsequent nodes are weighted using the risk-neutral probability.

When considering the optional character of the *PreventLoss* introduction, the resulting present value is \$36.245m. This present value exceeds the initial investment of \$35m by \$1.245m, thereby making the overall investment worthwhile. Recall that, by contrast, both the business model of *Recover* alone as well as the business model of the simultaneous introduction of *Recover/PreventLoss* had been found not to be financially viable and, thus, would have been rejected.

7. Discussion & conclusion

Current approaches for BMR do not consider the options which a business model may contain. This substantially inhibits the qualitative consideration of options in business model design and also their integration into subsequent financial analysis. In this research, we are the first to establish a link between options and BMRs by extending the e3-value BMR. We discussed why abandonment, contraction, deferral and expan-

Table 5. Binomial valuation of the case study

Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6
Cash flow payout ratios						
0%	8.6%	8.6%	8.5%	8.3%	8.2%	8.1%
Present value tree of *Recover* ($ in millions, before payout)						
34.688	39.502	48.733	60.140	74.278	91.874	113.880
		26.745	33.005	40.765	50.421	62.499
			18.114	22.372	27.672	34.300
				12.278	15.187	18.824
					8.335	10.331
						5.670
Present value tree of *Recover* including the option on *PreventLoss* ($ in millions, before payout, * = option is exercised)						
36.245	41.275	52.018	*66.147	*84.196	*106.683	*134.792
		27.132	33.802	42.408	*53.811	*69.238
			18.114	22.372	27.672	34.300
				12.278	15.187	18.824
					8.335	10.331
						5.670

sion options can particularly be modeled within e3-value. We developed agraphical notation for these types of options and integrated the necessary constructs into the formal e3-value ontology. Using a case study, we illustrated how the proposed extensions can be applied.

The notational extensions of e3-value are of immediate usefulness for practitioners who are occupied with designing and analyzing business models. The extensions allow optional and non-optional business model aspects to be represented within one e3-value model, and thereby improve the practicability of e3-value. With these extensions, it is no longer necessary to rely on separate diagrams or ad-hoc notation for optional business model aspects. Also, having a notation for optionality readily available can spur creativity with regards to contemplating which previously considered aspects of a business model are optional (i.e., their realization does not need to be decided on immediately), and which additional options are opened up by a specific business model. Furthermore, explicating the available options is a prerequisite for evaluating them. Therefore, the extended notation can serve as a basis for the correct financial analysis of a business model.

The formal extension of the ontology ensures the unambiguousness of the notational extensions. Whereas the graphical extensions can already be modeled with the current version of the e3-value software tool, the valuation of options, naturally, is not possible yet. As formalization is a prerequisite for tool support, our formal extension can serve as a first step for an option-based extension of the e3-value software tool. Such an extension would provide a tool that integrates the design of the qualitative logic of a business model with the analysis of its financial logic, while covering static as well as optional aspects of a business model. To develop such an integrated tool denotes a long-term goal in this area of research.

To achieve this goal, a few limitations have to be addressed. The binomial valuation, which was chosen to illustrate the effect of considering options, comes with some limitations. These include, for example, the underlying assumptions and the difficulty of generating the necessary input data [5]. To make the extensions more useful for practitioners, more appropriate valuation methods have to be identified. There are a number of approaches available to simplify real option valuation. These include, for example, heuristics such as that proposed by Luehrman [15]. Also, approaches based on decision trees can be employed in a manner which is easier to apply than options valuation, but still correct in the treatment of discount rates [25]. Having introduced real options into the domain of BMRs for the first time, it remains to be investigated which options are the ones that will typically be modeled within e3-value and which valuation method best lends itself to their valuation. These two aspects will be the focus of our future research efforts in this area.

There are also some limitations concerning the extended notation. These stem from the focus on actors (and the exclusion of their *activities*) and the focus on *simple options* (as defined by Copeland et al. [8], this excludes switching and compound options). Also, timely aspects (e.g., maturities), so far, are only considered informally because the formal e3-value ontology focuses on structural aspects of a business model. A time-based extension of the formal ontology, by explicating assumptions concerning time structures, could improve handling time characteristics of options and also prove worthwhile for exploring the evolution, or dynamics, of a business model. A highly relevant question in this context is how the analysis of options and their exercise can contribute to the understanding of how companies' business models evolve over time. Hence, how option-extended BMRs can be linked to the broader research on business model evolution should be explored.

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