# Exploring Design Principles for Business Model Transformation Tools

*Short Paper*

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## Abstract

*Todays' companies have to respond to fast-changing markets and new customer demands to maintain their competitive standing. Therefore, business models must be able to reply flexibly to new requirements and simultaneously their execution must be ensured. However, existing business model concepts and tools are too rigid and often remain on a rather abstract level. We present a research-in-progress design science project with the aim of designing a business model configuration tool enabling higher executability. Based on a comprehensive problem analysis and literature study, we derive a first set of meta-requirements and design principles. Additionally, we demonstrate a first prototypical instantiation and demonstrate its feasibility in a case study. The presented tool enables practitioners and theorists to observe and analyze changes in business models rapidly. Furthermore, impacts of changes can be seen directly through the tools' configuration character. Finally, this research fosters cooperation between different company levels as an imperative capability.*

**Keywords:** Business Model, Business Model Canvas, Design Science, Development Tools.

## Introduction

Increasing global competition and new opportunities driven by a growing number of services and digitalization force companies to adapt their business models (BM) to the new environment (Teece 2010). Next to traditional products, services become more and more important in companies' strategies. This is because consumers are more than ever able to compare products and services on the markets. Therefore companies have to rethink their traditional way of doing business (Piccinini et al. 2015). Companies increasingly concentrate on redesigning BMs focusing on digital services (Ostrom et al. 2015). To support business modelling, several methods, techniques and tools exist (Ebel et al. 2016). The most well-known is the BM canvas of Alexander Osterwalder (2004).

While BMs become more and more important in different research disciplines like strategic management, entrepreneurship or marketing, there is still a huge potential for research inter alia in the field of information systems and the context of the digital transformation in particular (Pagani 2013; Veit et al. 2014). Having a closer look at the often cited BM canvas of Osterwalder, it becomes obvious that the focus of the concept is rather strategic and less focused on the operationalization of the defined BMs (Osterwalder 2004). However, this is important for a successful transformation of a company, as for example several work in BM innovation states (e.g. Chesbrough 2006). However, a high degree of openness of a BM in a way, that it is considering operational levels is important. This is because a BM transformation can be seen as an unstructured and unplanned management approach as it is caused by an external shock (Chesbrough 2006; Demil, Lecocq 2010; Wirtz 2011). As a result, BM approaches like the BM Canvas have to consider operational elements to be able to find an adequate representation in a short period of time. Therefore, an

adequate tool should provide as many information as possible for such a transformation but also only as much information as needed. Thus, different advancements and frameworks of this canvas have been suggested to make the concept more operational (Lindgren, Rasmussen 2013; Ebel et al. 2016). Zott et al. (2011) mention that BM innovation is a key to firm performance and with that, the need of flexibility in BMs rises to support the innovation process. As a result, the knowledge of BM innovation can be used by practitioners, facing for example the challenge of digital transformation. For theorists, this knowledge can be used to extinct the current BM concepts from the strategic level to the operational level. This is because in current BM concepts like the BM canvas (Osterwalder, Pigneur 2010) or the BM cube (Lindgren, Rasmussen 2013) rigidity is quite high. These concepts focus mainly on the strategic view of a company (Osterwalder, Pigneur 2013). In sum most of these models provide guidance rather on a higher abstraction level. Besides, information systems research started to link the operational level to the rather strategic BM level and emphasizes the importance of making BMs more operational (Di Valentin et al. 2012; Bonakdar et al. 2013). This implies the chance for practitioners as well as in theory to support a transformation with the existing BM concepts, if a tool is suitable enough to support this transformation (Veit et al. 2014).

Having a look at strategy execution research, Richardson (2008) stresses the need of supporting the execution of strategic frameworks. Richardson (2008) further claims, that a BM is neither a strategy nor a table of actions to execute the strategy (see also Morris et al. 2005; Di Valentin et al. 2012). The key question is, how to improve the executability of BMs impacting operational levels in organizations to fulfil the path of strategy to execution (Alt, Zimmermann 2001; Zott et al. 2011). In special, there is a need to develop meta-capabilities to overcome rigidity and explicitly enable innovation via BMs (Doz, Kosonen 2010). To summarize, current BM tools have limitations with regards to operationalization (Alt, Zimmermann 2001; Doz, Kosonen 2010; Zott et al. 2011; Veit et al. 2014). Thus, we focus on the following key research question:

*Which design principles of business model transformation tools enable better transformation results of the defined business models as they proposed results closer to the company's characteristics?*

To answer this question, we propose a design science research (DSR) project (Vaishnavi, Kuechler 2004). While existing research mainly focuses on strategic and conceptual aspects in BMs, we want to derive new design principles which contribute to the demanded requirements of executability. From a scientific point of view, we contribute to the design knowledge base for building BM tools. When building BM tools according to our identified principles, practitioners should be able to represent more comprehensive aspects of their daily business, respond faster on internal and external changes and ensure a consequent execution of the defined BM at the same time. The tool itself thereby builds a service for companies, as it helps them to find an adequate BM, which considers individual characteristics and key concepts of a company.

The remainder of this paper is as follows: First, we provide an overview of the related work in chapter 2. Second, we describe our research methodology and the planned cycles in the design science research project in chapter 3. Based on the literature, we derive requirements and design principles in chapter 4. In chapter 5, we describe a first version of the proposed artefact instantiation. Finally, we present preliminary results of the qualitative evaluation and provide a short summary and an outlook on future work in chapter 6.

## Foundations and Related Work

This section introduces foundational concepts of our work. We present the current tools and the related literature to find adequate principles for our research.

### *Business Model Representations*

Several authors like Gordijn et al. (2000), Petrovic et al. (2001) or Veit et al. (2014) focus on definition of business models. One possible definition of Timmers (1998) defines business models as:

"an architecture for the product, service and information flows, including a description of the various business actors and their roles; and a description of the potential benefits for the various actors; and description of the sources of revenue".

In order to increase business models, several scientists found more than twenty BM frameworks with different purposes of use and field of study (Lambert 2010; Wirtz 2011). As common feature, all of these frameworks have six key decision areas (Morris et al. 2005) and 17 evaluation criteria for classification of the BMs (Burkhart et al. 2011). However, the introduction of Osterwalder's ontology for BMs (Osterwalder

2004) and the related book (Osterwalder, Pigneur 2010) changed the situation. As in the past, the concept of the balanced scorecard was used for such long-term strategy implementations (Bourne et al. 2003; Speckbacher et al. 2003; Norreklit 2000), Osterwalder extends the four dimensions to nine dimensions in his BM canvas (Osterwalder 2004). He and other researchers also focus on ontologies to order relations between the BM elements (Osterwalder 2004; Osterwalder, Pigneur 2004; Osterwalder et al. 2005; Ilayperuma 2007). With his ontology, he prepares the way for a new way of business modelling, as his work is cited many hundreds of times (Lucassen et al. 2012). As a result, researchers add further dimensions to transform the flat canvas to a multidimensional cube. Thus, the categories of the BM canvas are rearranged in a way, that they reflect the interlinks and should inter alia support the management in implementing a strategy (Lindgren and Rasmussen, 2013). Practical tools using this BM cube are for example the "NEFFICS platform" (NEFFICS Platform | NEFFICS) or the tool of "VDMBee" (Value Management Platform - VDMbee). These tools use different views on the way of creating value, as there are for example role collaborations, activity networks or value proposition exchanges (NEFFICS Platform | NEFFICS). This reflects the logic, how the value is created, more detailed but also with more modelling effort (Lindgren, Rasmussen 2013). The developers of the tools see herein a chance to make the models more operational and connect different elements of the model (Value Management Platform - VDMbee). Next to these representations, specific representations focus on concrete branches or tasks and provide therefore a suitable representation (Peters et al. 2015). These representations are mostly suitable only for one specific task and therefore hard to generalize. However, these extensions and improvements come at the expense of easy and transparency, which is provided through a BM canvas (Osterwalder, Pigneur 2010).

The BM canvas is often used in practice and therefore a suitable starting point for an improvement of BM in a way to make BMs more operationalize. The BM canvas itself is very adequate to visualize a BM of a company and to show the way, how a company is generating value. The canvas contains nine categories as they are "Key Partners, Key Resources, Key Activities, Value Propositions, Channels, Customer Relationship, Customer Segments, Cost Structure and Revenue Streams". In the book "Business Model Generation" (2010) Alexander Osterwalder and Yves Pigneur claim, that the BM canvas can replace a business plan. Because of the high usability, many companies use this method.

As mentioned above, an adequate tool should consider the design principles of operationalization as well as simplicity and transparency. As part of operationalization, the tool should also be able to allow changes in the underlying model, as their need is shown in the following section (Zott, Amit 2010).

### *Business Model Transformation*

Disruptive changes can affect companies in a way that they have to adapt and change their BMs significantly (Wirtz 2011). Existing approaches try to represent a clear and transparent representation of how a company creates value (Kinder 2002; Akkermans, Gordijn 2003; Kley et al. 2011) and should enable a mediation between strategic and operational levels (Osterwalder et al. 2005; Di Valentin et al. 2012). Beside this , it is shown, that they do not provide the whole potential of support (Ebel et al. 2016).

The BM research stream focuses on this challenge by adapting BMs after disruptive situations (Zott, Amit 2007, 2010; Johnson et al. 2008). Analogical to marketing channels, three kinds of flow in BMs are identified: Flow of goods, representing the way of products, ownership and risk; flow of information as well as flow of funds (Berman 1996; Rosenbloom 2012). Regarding partial BMs as part of a superior BM, these three kinds of flow between different partial models cause response relationships of the model and represent their development (Magretta 2002; Wirtz 2011). Regarding the BM canvas, the categories "Key Activities" and "Key Resources" would build partial models, which have interlinks between each other, because the resources are used in the activities or at least addresses the same questions of customer relationship and revenue streams (Osterwalder, Pigneur 2010). The intention in practice as well as in theory is to show the interaction of BM parts and the development of the whole BM, so changes in environment and the related development could be regarded better (Wirtz 2011). In general, after disruptive changes in a company's environment (e.g. collapse of the "new economy" bubble), a BM innovation is necessary, as Chesbrough (2006), Zott, Amit (2007), Zott, Amit (2010), Johnson et al. (2008) and Gambardella, McGahan (2010) explored in their research. Their work provides approaches for BM innovation and adaption to new situations of companies. The implementation of BM innovation using a transformation tool should be done in a structured management process (Johnson et al. 2008; Zott, Amit 2010). As design elements, they propose information about the flow of goods, information and funds and consider effects of activities in the innovation process (Zott, Amit 2007, 2010). In general, a BM tool should consider the

current and target state of a company and should be aligned to the processes of the operational level (Chatterjee 2013; Ebel et al. 2016). We want to tie up here and improve the BM canvas in a way, that it considers more the activities of lower levels and is therefore more adequate in replying on changes. The method we want to use is shown in the following section.

## Methodology

Aiming to design BM tools with a higher operationalization, we follow the suggestion of Veit et al. (2014) and apply the Design Science Research approach of Vaishnavi, Kuechler (2004). We consider this approach as a promising possibility to not only understand the factors of increasing operationalization, but also to find an adequate software tool. This software tool should build a service for companies to find their individual target state during a transformation project.

Concerning the practical motivation, a more operational model would help companies to break down their strategies more easily and tailor BMs more suitable as mediator between strategy and operational level. For this, we decide to involve companies in our research, which are experts in the field of business modelling. Therefore, we collaborate with consulting company which is interested in using the results of the project. This company has 174.000 employees in more than 155 countries in 2016 and has inter alia great experience in strategy implementation. As such strategy implementation and the related BMs is one of their core competences, the information of the partner is of high quality and with a lot of practical experience. We see this as a key success factor for building a BM tool, which satisfies the demand for operationalization from a theoretical and a practical side. The access to individual usage of the tool in companies enables us to collect data in document analyses and interviews (Benbasat et al. 1987).

According to Vaishnavi, Kuechler (2004) we plan our DSR project in three cycles as shown in the following picture. In cycle one we select our business partner because of its' knowledge of strategy implementation in different companies and the related BMs. At the beginning, we want to analyse the different requirements of a BM concerning flexibility and operationalization through a literature review. Therefore, we did more than ten exploratory interviews with a consulting company, Siemens AG and HSAG about their use of BMs in the digital transformation and their needs. In the interviews, experts with deep knowledge about BM were asked about the limits of the current BM frameworks and general limits of using them in practice. The questions we derive from the limitations of related work (e.g. Sosna et al. 2010; Veit et al. 2014). For example Sosna et al. (2010) mention of resistance of managers is derived in the question: Which features should a BM tool have, that manager will use the software? Besides this, we follow the requirements of a literature review to build a first prototype. Thereby we first have a look at the different existing approaches and how they relate to each other. Additionally, we evaluated the limitations of the approaches. As a result of the interviews and the literature review, we formulated requirements, which will be shown in the following section.

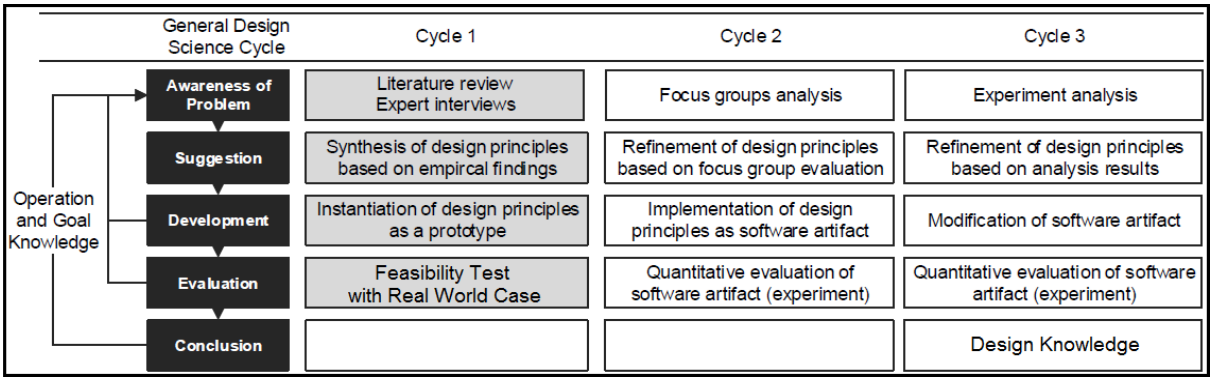


***Figure 1. Design Science Research Cycles (according to Vaishnavi, Kuechler (2004))***

To evaluate it, we will do a feasibility test and show, that our mock-up rebuilds a BM of a real business case. As a pre-evaluation, we let 20 students in groups of four people model a BM transformation with BM canvas templates. Afterwards we compare the outcomes with the outcomes of using the tool for this transformation. Using the tool results in at least as good results and measurements than the BM canvas

groups. For a seamless feasibility test, we use the insights from experience reports (e.g. Augenstein et al. 2016).

Based on the results of the evaluation of the first cycle, we will realize a first running version of the BM configuration tool and perform a lab based evaluation of the software artefact in the second cycle. Finally, in cycle 3 we will deploy the software in the field in cooperation with our industry partner. The purpose of the field experiment is to evaluate how our tool actually contributes an increase of flexibility and operationalization in real-life. The outcome will be design knowledge about the functions of the tool and their effects. For this, we want to introduce the concepts in the following chapter.

## Conceptualization

Practitioners face several challenges through changing environments. In our interviews, we found out that the use of the BM Canvas is quite common in today's business. However, it is restricted to some limitations in executability, as we find out through the interview with the consulting company. Existing research addresses such challenges as the formation and adaptation of BMs in different business areas (Veit et al. 2014). In general, it is relatively easy to model the current state and a target state, representing the future situation of the company with the BM canvas (Osterwalder, Pigneur 2010). However, various challenges in the transformation process exist. For example, when mapping the current and target situation, some elements cannot be reused in their context or might be obsolete. As a result, some gaps exist, which force a decision for example to fill the gap e.g. through internal or external capacities (Lindgardt et al. 2009). Focusing on the BM canvas, a mapping seems to be difficult, as the priority lays mainly on the value creation logic (Timmers 1998; Osterwalder 2004). We found out in our interviews, that the view thereby should rather be on increasing the operability of the BM canvas. So business transformations or long-term observations of a company's BM are possible. Therefore, we target the first requirement:

> *RQ1. In order to increase the executability, the status quo of a companies' business model(s) should be combinable with the target business model(s).*

Mapping the current BM with the target BM is important, because one can see fast, which elements are not mapped and are therefore obsolete (in the "current state") or need to be added (in the "target state"). Hereby, we understand the "current state" BM as representative of the current operational level of a company as it represents the value creation logic. For us, the "target state" model is representing the goals of a company. As a consequence, mapping the elements means to link the different levels of a company as it is the demand of a BM. Thus it is possible to mediate between these levels and show, how the levels work together (Timmers 1998; Osterwalder 2004; Al-Debei, Avison 2010). After mapping the elements, it should be possible to perform a gap analysis, which shows the need for action to realize the target state. For example, a company can decide between an internal or external resource with different effects on revenue and costs. To find an optimum, we demand the second requirement:

> *RQ2. In order to increase mediation of different business levels, business model configuration should explicitly show the consequences of different alternatives.*

These mentioned requirements should be addressed in our design science project. All in all, the operability should be reflected in the design principles (DP). Related to the operability the first DP is:

> *DP1. Status quo and target business models should be captured using semantic models to allow different configurations.*

As Mylopoulos et al. (1999) stress the importance of semantic data modelling in programming practice, we build on the BM canvas ontology proposed by Osterwalder (Osterwalder 2004; Osterwalder, Pigneur 2004; Osterwalder et al. 2005; Ilayperuma 2007). To enrich the canvas models with additional semantics, we extend the core ontology with further relations between the concepts and enable their instantiation. Entities of our tool are the nine dimensions of the canvas, which are represented as black nodes. Further entities are concrete instances of these concepts, which are visualized as hatched nodes. By doing so we create a conceptual model similar to UML-class diagrams or entity relationship models (Pan 2009) or ontology-based languages such as the Resource Description Framework Schema (RDF-S) (Miller 1998). We also enable instantiation of the conceptual models using the Resource Description Framework (RDF). Instances refer to a concept, connections between instances are shown through arrows between them. Furthermore, we allow for the explicit modelling of key performance indicators (KPIs), and assign them to the concepts of the BM canvas. The semantic models enable a more precise reflection of how a company is doing its business today and in the future. Following this, the different elements (for example common elements)

and their categorization as well as other relevant aspects should be reflected (Lindgren, Rasmussen 2013). Additionally, it could be a base for a gap analysis, when mapping the elements of different BMs. Therefore, the current and the target state could be modelled as a semantic graph. The two semantic graphs can then be compared. Thereby, equal notes in both graphs will be detected. One can see fast, where in the target state adaptions have to be done. This leads to the next design principle:

> *DP2. A mapping between status quo and target business models should be enabled to understand transformation dependencies.*

Mapping the different situations enables a better comparison of existing, obsolete and missing elements in different situations. Related to a comparison between a current and a target state, it reveals needs for actions. In particular, a gap analysis could reveal needs for action in arranging the realization of the target state. If different alternatives to realize the model exist, it would be helpful to see the effects of each alternative on the selected KPIs, according to the proposition by Veit et al. (2014). This leads to the design principle:

> *DP3. Business implications of changes performed within the transformation should be reflected in key performance indicators referring to the corresponding elements.*

Through this, changes in the BM can be quickly discovered. For a transformation as well as a long-term observation of BMs it is very helpful but requires that each element is related to at least one KPI, so that the importance of an element can be seen in the model (Wirtz 2011). All in all, these three design principles enable a modelling and an analysis of a business transformation. How it could be done is shown in the following section.

## Instantiation

We have instantiated the design principles in a first conceptual prototype (mock up) based on a real-world transformation case. We use the example of the company "Hilti", which is delivering "high-end" machines for the crafts business. As Hilti wants to change from products to services, they improved their current BM. The company successfully defined the model "fleet management", where customers can rent machines instead of buying them (Hilti USA 2016). They see the need of the customers not in actually owning a machine, but using them. To make the offer more attractive, further services such as repair and optimization of the tool consumption are delivered. As crafts business is divided into online and offline affine segments, they used the existing channels. This can be seen in the current and target state graphs, where these elements are included in each graph. However, for instance the repair service is not part of their current BM. The graph of the target state thereby includes the node "repair service", but the current state graph does not. Therefore, this part of the BM has to be created from scratch. An initial model of the situation of Hilti as classical product seller is shown in figure 2. Following our design principle DP1, we suggest to first create a semantic BM canvas of the present (Pre) and a possible target state. We define the traditional BM of manufacturing and selling machines as "Pre-State" and the service-based-fleet model as "Target-State". Additionally, we model a part of the situation with a semantic model in our current version of the tool. We also connected KPIs with nodes in the graph representing their "values". By clicking on a KPI, one can see which elements are related to it. One can also set new KPIs and connect them with related nodes, depending on the specific BM. This can be seen in the bottom left window (Fig 2.). The KPIs reflect changes in the model like higher costs for a special key resource. Additionally, the influence on different KPIs can be shown through the size of the nodes. In our figure, we renounce on different sizes, to keep the example easy understandable.

The following figure shows the latest status of our tool and a mock-up of planned features. In this figure, an exemplary BM Canvas for the Hilti case is shown on the top-left side. There we show the BM of Hilti as a traditional tool producer. On the bottom left side, we show the comparison of the BM as a tool producer (current state) and the BM of Hilti's fleet management (target state). For a better overview, we only focus on the categories of customer relationship, customer segments and channels. The right side of the figure shows the latest functions of our tool. Modelling the BM Canvas, arranging the nodes and connecting nodes with KPIs are currently possible. Exemplary, a part of the BM Canvas of Hilti is shown.

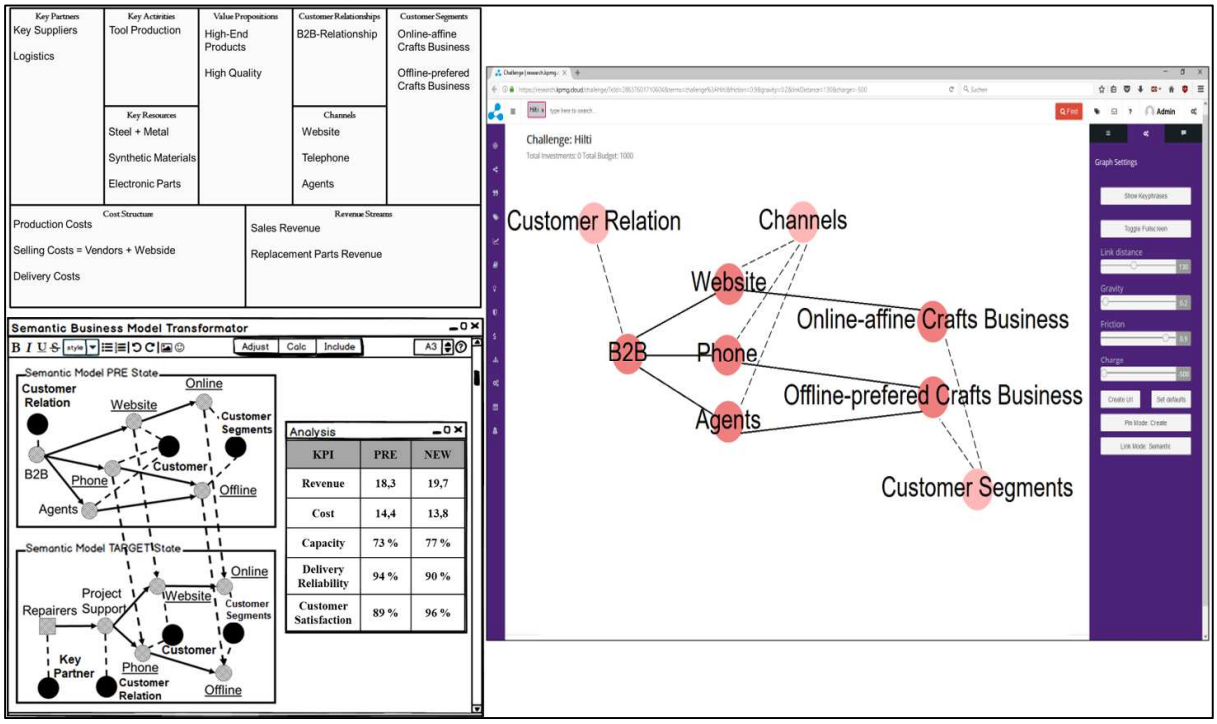


***Figure 1. Overview of the current state of BM Transformation Tool (right side) and planned features (bottom left side), based on the BMC (top left side)***

Following DP2, we allow mapping of the "Pre State" and the "Target State" as shown in the bottom left window. By doing so one can recognize which elements could be covered through the current state of the company. Having a look for example at the websites and the call centre, they exist in the current situation and are part of the target situation. Therefore, these elements can be reused. In this case it means that the crafts business can order via the existing website or hotline. As it can be seen in the "Pre State", "Agents" are obsolete because in the "Target State" they are no longer part of the model. This is because Hilti focuses in his fleet strategy only on the online and the phone channels. The "Agents" channel will not be kept in the new strategy of Hilti. Furthermore, in the "Target State" the node "Repairers" is shown, because Hilti wants to offer a repair service in its' strategy. In the "Pre State" this node is not included, because repairers are not part of the product-focused BM. As a result, "Repairers" is set as square because there is no equivalent in the "Pre state". In the analysis part (DP3) on the bottom left side, the set of KPIs is shown and their current value. To support a decision, one can try out different alternatives and see the impact of the changes. In our example one can think of internal or external repair teams. Comparable to a configurator, the tool yields direct feedback through the belonging KPIs. One can then decide for the configuration with the highest improvement of the set KPIs. Furthermore, with the KPIs and the connections of the different elements, an "as-is-analysis" is also thinkable, but not part of the tool yet.

## Conclusion

In this paper we present our research in progress exploring design principles to improve existing BMs with a higher degree of operability and flexibility. In our design science project we use the BM canvas of (Osterwalder 2004) and extend it in a way that it is more flexible and operational. We use the BM canvas as a starting point, as it is a widely adopted concept in practice and theory. We extend the BM canvas ontology and allow its instantiation. Furthermore, we semantically model status quo and target states and allow for mappings. This satisfies inter alia the demand of the BM as mediator between the strategic and the operational level (Osterwalder, Pigneur 2010; Wirtz 2011). Existing BM tools are too strategic or contain too many views. This makes a comprehensive understanding of how value is actually created harder because the tools do not use all possibilities provided by the latest techniques (Veit, 2014). The extended BM canvas

offers the possibility to model not only in a more operational way, but also to support innovations or fast changes following a configuration paradigm. Through the semantic model, also a gap analysis becomes possible. Additionally, the tool has a configuration character, where the best alternatives can be found. All in all, for practitioners, observing a current BM and deciding about adequate changes to transformation to target state are supported.

However, our work has some limitations. On the practitioner's side, requirements can differ between different branches. So the tool might not be suitable for each industry or has to be adapted. Furthermore, the semantic model depends on the canvas. The canvas can be filled differently by various persons and still describes the same model. This has the consequence that the semantic model may look differently and a gap analysis is harder to perform. Therefore, a common method, how to fill the canvas should be used or it should be done at least consistently. Further limitations include the loss of abstraction on the strategic side. So the developed canvas cannot give the information on the same abstraction level, which is suitable for a strategic view.

Future work will include to develop the software, to evaluate and to improve it. As a part of design cycle 2, we first plan to evaluate the advantages of executability in a lab experiment. We will compare the performance of two groups, while one group will work with a traditional BM canvas. Another group will use our semantic BM transformation tool. As part of the evaluation, decisions on operational changes have to be taken and will be evaluated.

Additionally, future work from a conceptual point of view with regards to extending design principles may also cope with the fact, that many different focus of BMs exist. Different semantic models could also be interlinked through partial models and additional models. For example, when clicking on the "Key Partner: Logistics", the BM of this partner will be opened and one can directly see the partner's BM. Another idea involves the BM of the partner to be added to the model of the company. Another possibility is, that by clicking on an internal instance, a partial model can be opened, which shows more detailed information and relations. Furthermore, it is possible to expand the approach by including additional KPIs like "customer satisfaction" or "time". Moreover, a consideration of the whole organisation in the comparison of the current and target state is possible. Thereby, not only the organisation is considered, but also its' alignment to the individuals or IT architecture (Zimmermann et al. 2015). Changing (parts of) an organisation can mean a change of conditions for the employees or changes in technology. Future work will consider these impacts.

With our research we want to close the gap between BMs and the operational levels to support exchange between different company levels. The presented tool shows a possibility to link the existing value creation logic of a company with their targets. As mentioned, a transformation or a new strategy in general is caused by different factors as changes in environment and many more. Responding on this changes adequately makes a company competitive and grants its success.

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