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Jumping, dumping, and pumping: Three mental principles for idea generation to activate software-based tools in business model innovation

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Jumping, dumping, and pumping: Three mental principles for idea generation to activate software-based tools in business model innovation

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Abstract Following the growing interest in business model innovation, software tools have shown great potential in supporting business model development and innovation. The highly creative task of business model innovation is, however, not effectively supported by software, and especially the cognitive processes involved in the generation of business model ideas have received little attention in software design-knowledge. Our study is the first to investigate how cognitive models can inform the development of creativity-enhancing functions to activate software-based tools in business model innovation. Specifically, we utilize three mental principles from cognitive psychology for the purpose of business model innovation. Cognitive stimuli can activate these mental principles and aid individuals by promoting perspectival changes for idea generation. This enables us to propose theoretical foundations for researching business model development tools to help practitioners and researchers in developing and evaluating software-based tools supporting innovating business models.

Keywords: • Business Model Innovation • Idea Generation • Cognitive Stimuli • Business Model Development Tool • Creativity Support System • Theory •

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1 Introduction

A business model describes the mechanisms of how a firm creates, delivers, and captures value to their customers (Teece, 2010), and as such is a cognitive model "that consists of concepts and relations among them that organize managerial understanding about the design of […] value-creation" (Martins et al., 2015, p. 105). It allows managers individually, and collectively, to innovate ways of doing business in their organizations (Baden-Fuller & Morgan, 2010; Massa et al., 2017). As successful innovation in general requires high-quality ideas (Kornish & Ulrich, 2014), so does the innovation of business models. Despite the importance of idea generation for business model innovation, prior research has largely neglected it (Schneider & Spieth, 2013), and in particular the creative aspect of business model idea generation is little understood (Martins et al., 2015). Thus, business model innovation is a cognitive as well as a creative task (Ebel et al., 2016; Eppler et al., 2011) and prior research has found that such tasks can benefit from being supported by software tools (e.g., Hender et al., 2002).

Given the creative nature of business model innovation and the success of paper-based tools like the Business Model Canvas (Osterwalder & Pigneur, 2010), software-based business model development tools (BMDTs) are seen as having great potential to support users in innovating business models (e.g., Ebel et al., 2016; Osterwalder & Pigneur, 2013; Veit et al., 2014). However, BMDTs are still in their infancy and a large part of their potential remains untapped. We found evidence of this in our systematic review of BMDTs in an earlier study where the software had been used merely as an electronic whiteboard (Szopinski et al., 2019). While these BMDTs have functions that, among others, allow to represent, share, annotate, and version business models, they fall short of those suggested by Lubart (2005) as being able to facilitate "the creative act through integrated human-computer cooperation during idea production" (Lubart, 2005, p. 365). Research lacks appropriate designs with which to purposefully evaluate the usefulness of different functions of BMDTs and – in the spirit of the Bled Manifesto 2017 – to enable researchers and practitioners to "implement novel technologies and change from traditional ways of doing business to new business models" (Bled eConference, 2017).

The study pursues three aims: first and foremost, it prepares the ground for a more theory-informed development of BMDTs with a particular focus on creativity-enhancing functions. Second, it contextualizes a cognitive model for business model idea generation. Third, it applies three mental principles derived from previous literature on general IT-based cognitive stimulations tools to BMDTs. In so doing, the study responds to calls and scholarly and practitioners' interests by addressing the following research question: How can cognitive models inform the development of creativity-enhancing functions to activate software-based tools in business model innovation?

2 Theoretical background

2.1 Business Model Development Tools (BMDTs)

Software-based tools for business model development are a new class of software that has been credited with great potential for supporting users in innovating business models (e.g., Ebel et al., 2016; Osterwalder & Pigneur, 2013; Veit et al., 2014). The potential of software-based tools to support creative tasks has been recognized in the information systems discipline for the purpose of developing not only business models, but also strategies and products (e.g., Schneider & Spieth, 2013; Kawakami et al., 2015; Kaplan, 2011). Some studies have started to explore functions that support business model innovation activities very early on in the development of BMDTs, but these functions remain at a basic, secretarial level of creativity support systems (Chen, 1999; Young, 1987), as they offer no functionality beyond that of an electronic whiteboard. One notable exception to the basic level of existing BMDTs is a decision support system for business model validation developed by Dellermann et al. (2018). Another is a BMDT which explicitly focuses on business model idea generation and implements pre-filled business models (by means of so-called solution-based patterns) to avoid idea generation having to be started from scratch (Athanasopoulou & De Reuver, 2018).

What is missing from the current literature is a theoretical foundation that enables the theory-driven implementation and evaluation of BMDTs in current and future research projects. This lack of knowledge is problematic in two respects: First, practitioners developing BMDTs lack guidance on how to implement creativity-enhancing functions. Second, researchers implementing and evaluating

BMDTs have no prescriptive (i.e., design-relevant) knowledge on the usefulness of such functions. Before the full potential of BMDTs can be realized, and BMDTs can further be developed into fully-fledged creativity support systems (e.g., Shneiderman, 2002) it is important to first address both of these gaps. The goal of this study, then, is to transfer knowledge from creativity support systems research to business model research. Thereby, this study prepares the ground for activating the next stage of the development of BMDTs for the best possible support of users who generate business model ideas by means of a software-based tool.

2.2 Search for Ideas in Associative Memory (SIAM)

Individuals search their memory for existing knowledge when trying to generate ideas (Ward, 2004). The complex, ill structured, and/or wicked nature of such creative tasks also applies to the generation of business model ideas. Business model innovation requires individuals to cognitively explore different potential business model ideas in uncertain, fast-moving and unpredictable market environments (Bojovic et al., 2018). Individuals will search their memory for relevant knowledge, such as about business models, which they may have experience of, either as a customer or as a developer.

The *Search for Ideas in Associative Memory* (SIAM) model provides a theoretical foundation for studying the research question. It has been used to elucidate the effects of other software-based cognitive stimulation tools (e.g., Knoll & Horton, 2011; Althuizen & Reichel, 2016). Two different memory systems constitute SIAM from which individuals can retrieve knowledge: long-term memory and working memory. Whereas long-term memory is permanent and has unlimited capacity, working memory is temporary and has limited capacity. SIAM posits that knowledge is structured in form of a highly interconnected multi-level network of images which in turn are composed of concepts as well as relations that link images and concepts (see Figure 1). These images build a network of knowledge that is characterized by fuzzy boundaries, overlapping parts and mutual associations (Knoll & Horton, 2011). To contextualize business models as cognitive models (Baden-Fuller & Morgan, 2010; Martins et al., 2015) we employ the Business Model Canvas (Osterwalder & Pigneur, 2010) in this study. Not only is its knowledge widely recognized by researchers and practitioners alike, but its nine components can also be considered as constituting a cognitive

network of knowledge. In the sense of the SIAM model, images of an individual's associative memory (see circles in Figure 1) represent the nine components of the Business Model Canvas. Correspondingly, the images (see squares in Figure 1) represent the sticky notes that are often used to describe the individual characteristics of the components of a specific business model. The lines connecting images and concepts represent the relation between them, and the different widths of the lines their frequency (see lines in Figure 1). The widths of the connecting lines vary for different reasons such as the frequency of a line's traversal (e.g., not all business models necessarily need to have key partners, but nearly all have revenue streams), the relatedness of certain images (e.g., the components customer segments, channel, and customer relationships are often thought about together) or whether it is a more traditional, common relation (e.g., for the continuity of revenue streams, many business models use subscription fees). Together, these images, concepts and links form the mental representation of a specific business model.

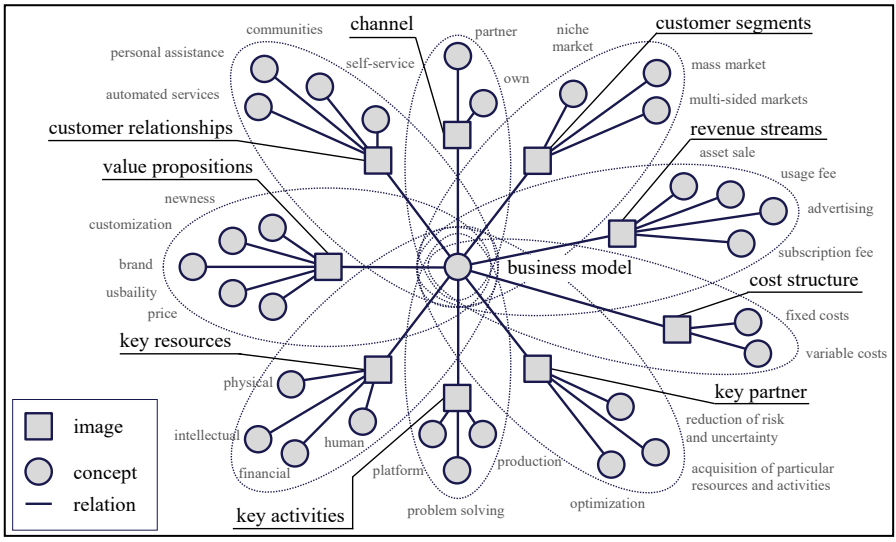

Figure 1: Network of knowledge based on Knoll and Horton (2011) applied to the context of business model innovation using the Business Model Canvas (Osterwalder & Pigneur 2010).

There are two phases in SIAM which describe the idea generation process of an individual: a knowledge activation and an idea generation phase (Nijstad & Stroebe, 2006). In the former, individuals activate and retrieve relevant existing knowledge from long-term memory by temporarily transferring knowledge from long-term memory to working memory. Which knowledge will be activated and retrieved depends on the search cues applied (e.g., knowledge already activated in working memory, previously generated ideas, understanding of the problem etc.). In the latter phase, individuals make use of knowledge now available in working memory (i.e., by applying images to a new domain) and recombine it in novel and unusual ways (i.e., by forming new relations between images). Knowledge that is already transferred to working memory is likely to be used again for idea generation. Applied to the context of business model innovation, an individual evokes the concepts of the image "business model". After transferring the image to working memory, an individual can then recombine related concepts and images with one another. Over time, individuals increasingly combine images that have already been employed for idea generation and thus business model ideas increasingly resemble each other. Thus, creating business model ideas tends to leverage the solution space only to a limited extent and mostly within the existing knowledge networks. To counteract this tendency, creativity-enhancing functions in BMDTs can be consciously used to transfer new knowledge to working memory and thus enable new (re-)combinations to be made. For BMDTs, however, it has not yet been researched whether, which, and when creativity-enhancing functions are particularly helpful. Regardless of how such creativity-enhancing functions are implemented, the additional knowledge thus elicited will be temporarily transferred to working memory and, through application and recombination, becomes available for the generation of creative ideas. Furthermore, creative tasks usually have a tremendously broad solution space as there is typically an extremely large number of alternative potential solutions. It is important to note that stimuli do not aim to make users search the entire solution space, but only a larger range of alternative potential solutions (see Figure 2). The key issue here is that, in order to be truly innovative – and hence successful – business models typically do not follow established traditional value creation, value delivery, and value capturing mechanisms (Chesbrough, 2010). For this reason, the purpose of creativity-enhancing functions in BMDTs is to get individuals to consider and explore non-traditional and unusual business model components.

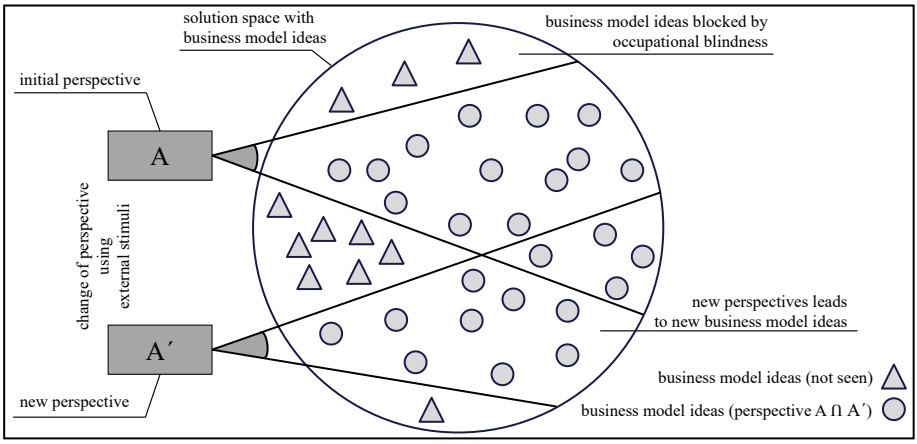

Figure 2: Change of perspective based on Knoll and Horton (2011) applied to the context of business model innovation using the Business Model Canvas (Osterwalder & Pigneur 2010).

2.3 Illustrative example: Netflix's business model

In the following, we briefly elaborate on the business model of Netflix, a firm that has used business model innovation consciously and successfully over the past years and is well known for its streaming service available in almost all countries across the globe (Abraham, 2013; Weill & Woerner, 2013; Gomez-Uribe & Hunt, 2016). In the remainder of this study, we will refer to Netflix's business model for illustration. When reading the illustrative examples, please be aware that in hindsight, business model innovation seems obvious and perhaps even trivial. It is, however, the very nature of successful business model innovations to create, deliver and capture value to customers in ways they adopt apparently seamlessly, but at the time of innovating its business model, the changes that Netflix brought about were not at all predictable. Indeed, by blurring the boundaries between television and cinema and introducing on-demand media programs (i.e., those that do not follow a schedule), its business model was seen as highly innovative and disruptive.

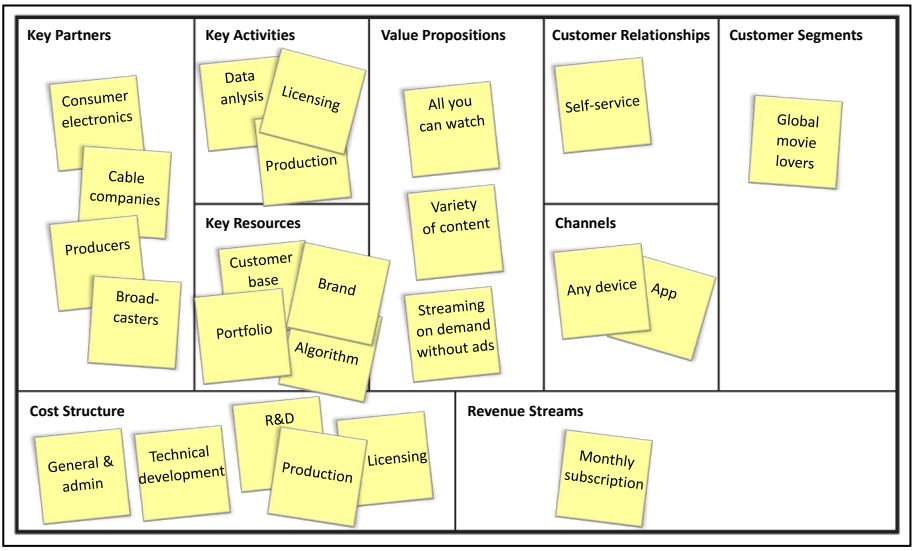

Figure 3: The Business Model Canvas for Netflix

Netflix initially started with an offline rental service and sent movies on DVDs through a postal service, before innovating its business model multiple times, each time changing its components. In this way, Netflix introduced non-established and unusual mechanisms into the movie rental industry. For example, it replaced pay-per-use by a monthly subscription (revenue stream), introduced on-demand streaming (value proposition), significantly extended the variety of content (value proposition), invented algorithms for their recommender system based on a data-driven analysis of customer needs, which pro-actively suggests movies (key resource), improved accessibility by allowing customer to use different devices (channels), and in a more recent development, even started producing films itself (key activity) (Abraham, 2013; Weill & Woerner, 2013; Gomez-Uribe & Hunt, 2016).

3 Mental principles

Grounded in cognitive psychology, the SIAM model provides a theoretical basis for researching why individuals often leverage the solution space only to a limited extent and think primarily within bounded areas of their knowledge networks. As already explained, the likelihood for generating creative ideas decreases when no new knowledge is transferred from long-term memory to working memory. External stimuli can help to activate and retrieve new knowledge and thereby increase the likelihood of generating creative ideas by allowing individuals to consider new images and corresponding concepts as well as setting up new relations among images and concepts. Based on the fact that such external stimuli can be used deliberately (Althuizen & Reichel, 2016), this study seeks to contribute a theoretical basis for implementing creativity-enhancing functions in software-based tools for business model innovation by introducing external stimuli. In a systematic review, Knoll and Horton (2011) identify and analyze more than 100 idea generation techniques that make use of external stimuli in a great variety of ways and derive three underlying mental principles. All three have in common that they support individuals in as Knoll and Horton (2011) call it changing perspectives. Such perspectival changes aid individuals to leverage the solution space to a larger extent by guiding them to different areas of their knowledge networks and establish unexpected and new connections to be made between images. As has been pointed out before, the ability to think outside the box and overcome occupational blindness is an important prerequisite for business model innovation.

In the following, we briefly describe the three mental principles and contextualize them for the creative task of generating business model ideas. For this, we first textually explain the underlying cognitive mechanism of each mental principle based on the previously introduced SIAM model. Second, we present the formal sequence of steps of each mental principle identified by Knoll and Horton (2011) and provide a context-specific application for business model innovation (highlighted in italics). Third, we visualize an example of each mental principle in the SIAM model, with examples borrowed from Netflix's business model.

3.1 First mental principle: Jumping

By jumping, an individual employs a mental principle that "refers to a cognitive mechanism called analogical thinking, in which the individual transfers information from different situations and uses it to generate new ideas" (Knoll & Horton, 2011, p. 93). The authors distinguish between random (task-unrelated) and analogous (task-related) "jumping", in our case the task being business model idea generation. For example, one typically "jumps" when applying value creation, delivery, and capturing mechanisms from other industries, e.g., by using business model patterns.

Applied to Netflix's business model, a formal sequence of steps for task-related jumping (Knoll & Horton 2011) involves:

1. Selecting a characteristic attribute of the creative task.
   A firm sells products/services on a daily basis.
2. Finding an analogous situation with the same attribute.
   A newspaper sells its issues on a daily basis.
3. Imagining how the task might be solved in this analogous situation.
   In order to get recurring revenue streams, the newspaper offers its customers subscriptions that are cheaper in total than the individual purchase of issues.
4. Generating ideas by applying a solution to the creative task.
   Netflix replaced pay-per-use (i.e., individually purchase each movie) by a monthly subscription.

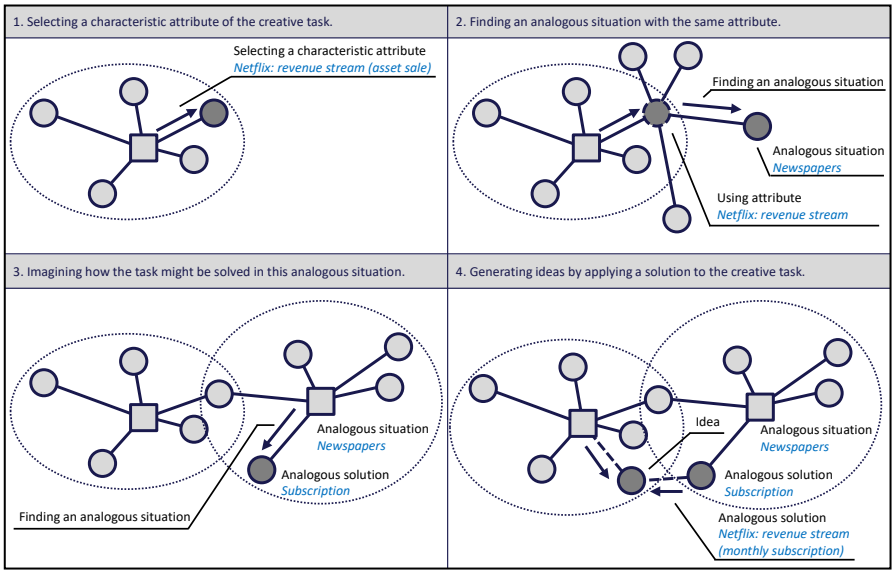

Figure 4: Mental Principle Jumping Using Task-Related Stimuli

Applied to Netflix's business model, a formal sequence of steps for task-unrelated jumping (Knoll & Horton 2011) involves:

1. Selecting a random element.
   Harry Potter.
2. Selecting a characteristic attribute of the random element.
   Harry Potter is able to read somebody's mind, as if by magic.
3. Selecting a characteristic attribute of the creative task.
   In order to be able to read customers' minds, Netflix invented a personalization algorithm as key resource of its business model. Netflix wants to be able to read customers' minds to personalize its value proposition.
4. Generating ideas by combining these attributes.
   Netflix introduced a personalization algorithm as key resource of its business model. The algorithm takes the individual customers' viewing habits, most watched movie genres and actors into account. The algorithm is not only used for the recommendation of movies, but also to provide customers' personalized thumbnails for suggested movies.

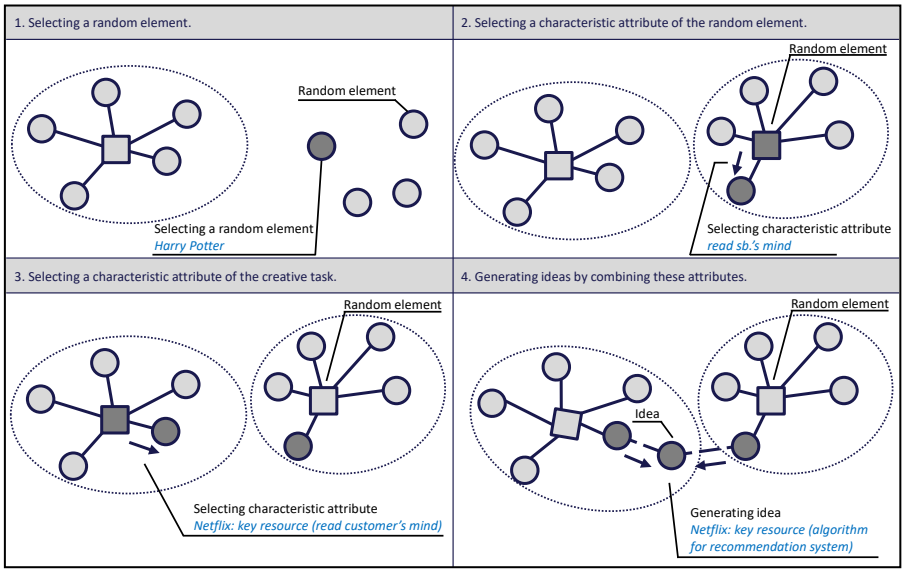

Figure 5: Mental Principle Jumping Using Task-Unrelated Stimuli

3.2 Second mental principle: Dumping

By dumping, an individual employs a mental principle that discards "assumptions contained in the creative task to generate a new perspective on the creative task" (Knoll & Horton, 2011, p. 97). Here, the external stimuli aim to question existing relations between images and concepts. As an individual focuses on one particular attribute, external stimuli are task-related. For example, one typically "dumps" the assumption that customers care about ownership of a product when generating business model ideas for the sharing economy. Usually, this kind of business model requires questioning the importance of ownership and focuses on the provision and exchange of services instead.

Applied to Netflix's business model, a formal sequence of steps for dumping (Knoll & Horton 2011) involves:

1. Selecting a characteristic attribute of the creative task.
   Customers watch movies mainly on big screens.
2. Challenging the characteristic attribute of the creative task.
   Customers watch movies also on small screens.

3. Finding consequences that result from the challenge attribute.
   Customers should be able to stream movies not only on big screens like TVs, but also on small screens such as notebooks, tablets and mobile phones.
4. Generating ideas by applying this consequence to the creative task.
   Netflix supports streaming movies on a wide range of big and small screens.

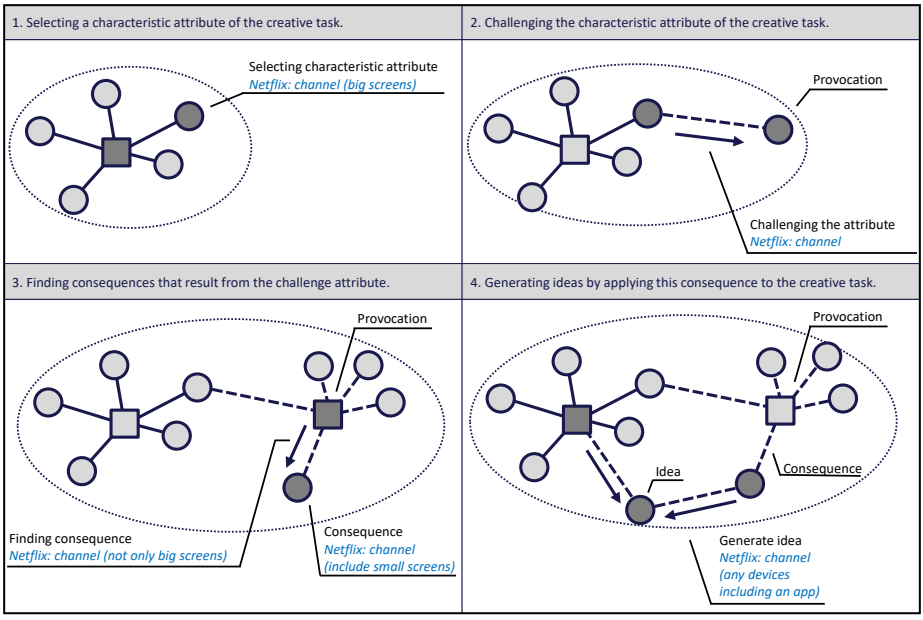

Figure 6: Mental Principle Dumping

3.3 Third mental principle: Pumping

By pumping, an individual employs a mental principle that "refers to a cognitive mechanism called application, the adaptive use of existing knowledge in its habitual context to generate new ideas." (Knoll & Horton, 2011, p. 99). For example, one typically "pumps" when going through alternatives of a particular component of a business model (e.g., to explore possible applications and usage scenarios of a technology as key resource in the context of a particular business model). External stimuli are used here to change the focus of the idea generation process to associate specific concepts within the image of a business model. For this purpose, for example, taxonomies have already been developed for various

domains that present typical characteristics of specific components in industry-specific business models (i.e., possible concepts to images).

Applied to Netflix's business model, a formal sequence of steps for pumping (Knoll and Horton 2011) involves:

1. Selecting an aspect of the creative task to focus on.
   A business model's value proposition: Variety of content.
2. Repeatedly select a characteristic aspect of the previous step until it inspires an idea.
   Increase variety of content by purchasing broadcasting rights for television series.
   Increase variety of content by purchasing broadcasting rights for cinema movies.
   Increase variety of content by purchasing broadcasting rights for regionally (i.e., in certain countries) successful movies, synchronize them into English and offer them worldwide.
3. Writing down the idea for solving the creative task.
   Netflix becomes a producer and produces its own series, documentaries and movies.

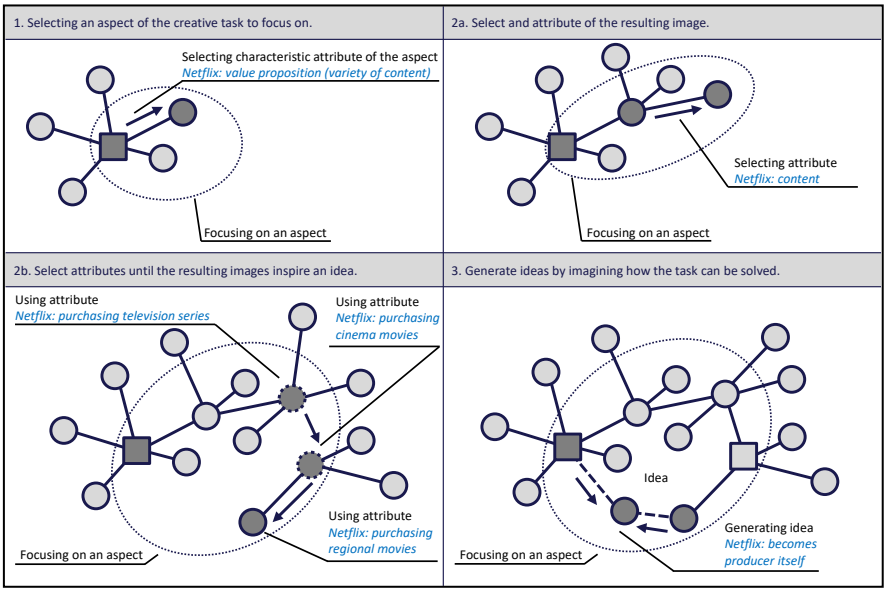

Figure 7: Mental Principle Pumping

4 Discussion and conclusion

This study aims to lay the foundation for a new stream of research by bringing together three different disciplinary perspectives for the study of idea generation in the context of software-based tools for business model innovation: a cognitive perspective, a creativity support systems perspective, and the business model perspective. In so doing we are bridging research silos as well as preparing the ground for further research. From a cognitive perspective, by applying SIAM to the Business Model Canvas, we are able to describe the process whereby individuals retrieve business model knowledge and how this process could be enhanced for the purpose of more creative idea generation, potentially leading to more innovative business model ideas. We are suggesting that stimuli can be used as part of a BMDT, as they would enable individuals to increase their available contextualized network of knowledge by combining related and unrelated business model knowledge in novel and unusual ways. The role of stimuli in the BMDT is to trigger a change perspective in individuals while they are engaged in the complex, ill-structured, and wicked challenge of business model idea generation. Our study makes several theoretical contributions. Cognition research benefits from an additional field of interest for the application of SIAM, which emphasizes its wider applicability. From a creativity support systems perspective, applying and contextualizing the three mental principles conceptualized by Knoll and Horton (2011) contributes to the future development of creativity-enhancing functions in BMDTs. The underlying mechanisms of how individuals can be cognitively stimulated while generating business model ideas can help researchers to build and evaluate software-based tools for business model innovation – in the sense of the design science research paradigm. Functions described in the creativity support systems literature are often abstract and require being translated to a particular context. For example, Shneiderman (2002) spans a broad range of generic functions that creativity support systems possess, including: to collect (search and browse information and existing examples), to relate (consult peers and mentors), to create (explore possible solutions), and to donate (disseminate results). The three mental principles by Knoll and Horton (2011) (Jumping, Dumping and Pumping) can form the starting point for formulating functions that promote creativity for business model innovation in software-based tools which lie at the interface between creativity research and computer science (Shneiderman, 2002). From a business model perspective, this study seeks to promote a theory-driven

approach to the development and evaluation of BMDTs. In so doing it would bridge the research gap between the great potential of BMDTs – which is well-established in the field of IT-based cognitive stimulations tools – and the comparatively young research on business model innovation. By introducing a cognitive model and describing examples of the application of its three mental principles to business model innovation, this study aims to provide a theoretical foundation for the further development of creativity-inducing BMDTs.

This brings us to the limitations of this study. Whilst it suggests a foundation for the future exploration of creativity-enhancing functions in BMDTs, our study does not itself investigate any specific function. Furthermore, this study introduces three mental principles to business model innovation, but without explaining how creativity-enhancing functions could be implemented in BMDTs to support individuals in generating business model ideas. One key challenge for the future development of BMDTs would be to develop rigorous experimental designs with which to evaluate the usefulness of certain creativity-enhancing functions. The next challenge would be to determine what usefulness actually means. Whilst the obvious gold standard is higher firm performance, it would be hard to measure whether a function has directly or indirectly contributed to this outcome, not only because the outcome is invariably long term, but because of the almost impossible task of tracing back such an outcome to a BMDT, let alone to one of its functions. Research on strategy tools faces the same challenge and has proposed to use more immediate outcomes, such as the degree to which a tool provokes exploration (Jarzabkowski & Kaplan, 2015). Likewise, BMDT researchers need to derive a set of outcomes for measuring performance when evaluating BMDTs (e.g., in terms of the quality of a business model idea). For example, perceived creativity (Eppler et al., 2011), willingness to adopt a business model (Eppler et al., 2011), and the evaluation of business model ideas using the Consensual Assignment Technique (Amabile, 1982), in which proven experts come to a joint verdict about the quality of the generated ideas.

With this study, we seek to lay the theoretical foundation for the development of creativity-inducing BMDTs. Its purpose is not only to directly improve BMDTs, but also to indirectly improve research on how to generate business model ideas which in turn will help firms to innovate their value creation, value delivery, and value capturing mechanisms.

Acknowledgments

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