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Extending the Business Model Canvas: A Dynamic Perspective

Boris Fritscher[1] and Yves Pigneur[2]
[1]HEG-Arc, HES-SO // University of Applied Sciences Western Switzerland, 2000 Neuchâtel, Switzerland
[2]Faculty of Business and Economics, University of Lausanne, 1015 Lausanne, Switzerland
boris.fritscher@he-arc.ch, yves.pigneur@unil.ch

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Abstract: When designing and assessing a business model, a more visual and practical ontology and framework is necessary. We show how an academic theory such as Business Model Ontology has evolved into the Business Model Canvas (BMC) that is used by practitioners around the world today. We draw lessons from usage and define three maturity level. We propose new concepts to help design the dynamic aspect of a business model. On the first level, the BMC supports novice users as they elicit their models; it also helps novices to build coherent models. On the second level, the BMC allows expert users to evaluate the interaction of business model elements by outlining the key threads in the business models' story. On the third level, master users are empowered to create multiple versions of their business models, allowing them to evaluate alternatives and retain the history of the business model's evolution. These new concepts for the BMC which can be supported by Computer-Aided Design tools provide a clearer picture of the business model as a strategic planning tool and are the basis for further research.

1 INTRODUCTION

Competition for companies and start-ups has evolved in the past decade. Today, success cannot be achieved on product innovation alone. At a strategy level, having the means to improve the design of business models has become a real issue for entrepreneurs and executives alike. Business models methods are a good way to share a common language about part of a strategy across a multidisciplinary team. These methods enable quick communication, and help improve the design of a new business model, as well as assess existing ones.

There are many different business model ontologies which focus, for example, on economics, process, or value exchange between companies. One such business model tool which is getting popular is the Business Model Canvas (BMC) (Osterwalder & Pigneur, 2010). Its visual representation and simple common language are two essential characteristics which have helped spread its adoption and make its book a bestseller. The current version of the BMC is an evolution from the original academic work the Business Model Ontology (BMO) (Osterwalder, 2004). The need to evolve the model took place to better fit the needs of practitioners over academics. The visual representation was improved under the influence of design thinking practice.

Through observation gained from, giving workshops, teaching to students and a survey, it appears that the building blocks of the BMC are covering the main needs, however usage itself of the model seems very basic and is limited to static analysis of one business model at a given time. This can be linked back to its original ontology which is used to describe a static model.

In reality, companies have to change and adapt to internal and external changes which impact their business. Therefore, a business model method should also consider the dynamic nature of transformation and evolution of the model.

This brings us to the following research question:

How to represent and help to design the dynamic aspect of a business model with the Business Model Canvas?

Before answering the question we provide a detailed history of the transformation of the BMC and provide some lessons learned for business model designers. Then in order to answer the question we first contribute to a definition of the maturity level of BMC users. Based on the three identified levels: novice, experts and master, we split the main question

into three sub questions. For each, we contribute to a concept on how to handle a particular dynamic aspect.

On the first level, the BMC supports novice users as they elicit their models; it also helps novices to build coherent models. On the second level, the BMC allows expert users to evaluate the interaction of business model elements by outlining the key threads in the business models' story. On the third level, master users are empowered to create multiple versions of their business models, allowing them to evaluate alternatives and retain the history of the business model's evolution.

We adopted the following design science structure for our paper: After this introduction, we present the prior work on the business model canvas with a focus on its origin, evolution and adoption. Followed by a short presentation of the methodology and how we address the research question in multiple parts. The main artifact section presents two new concepts: business model mechanics and business model evolution, to help address designing the dynamic aspect of a business model. In the evaluation section we present the validity of the concept. We end the paper with a discussion and a conclusion on the implications for future research in business model design.

2 PRIOR WORK

In this section we present the origin of the business model canvas and how it evolved through the years influenced by its adoption. Business model ontology has evolved since its initial design. Retrospectively, we can distinguish there distinct stages: 1) the creation of Business Model Ontology (BMO), 2) followed by its first confrontation with reality, 3) which then paved the way for its design-influenced redevelopment.

2.1 Business Model Languages

Whilst many other business model languages exist, this paper does not include a detailed comparison of them. We have, however, sought to highlight the differences between Business Model Ontology (BMO) and its closest alternatives. Starting around the same time as BMO, e3-value (Gordijn & Akkermans, 2001) includes many similar concepts, many of which can be mapped between them (Gordijn, Osterwalder, & Pigneur, 2005). In particular, e3-value goes into more detail about the interactions between the components. In addition, it specifies the value which is exchanged in both directions and the way in which it flows. Using e3-value, it is possible to go beyond creating a single business model; indeed, it is also possible to model the interactions between business models within a sector. This detailed modeling of interactions comes with the necessity to specify ports through which the connections flow. Consequently, this makes visual representation more complex. The relationship between elements can further be described with types and values that allow for the basic financial calculation of the model.

Whilst BMO is concerned with providing a small but complete set of strategic components to describe a business model, another modeling language, known as SEAM (Wegmann, 2003) also exists. SEAM focuses on enterprise architecture and addresses the issue by providing a hierarchical decomposition. It uses a visual representation to handle the encapsulation of its hierarchies, which allows an exploration of the underlying resources and processes that contribute to the high level element. In the past few years, SEAM (Golnam, Ritala, Viswanathan, & Wegmann, 2012) and BMO (Osterwalder, 2012) have both evolved ways to better describe and explore the connection between the value proposition and customer segments. An essential part of both models is to be able to visually display the elements and show their connections at the same level as the concepts. The visual handling of encapsulation does, however, generate complex diagrams, which can be hard to read for the non-initiated.

Weill and Vitale (2001) illustrated a method for the schematic description of e-business models. The focus is on the simple interactions between the firm and its customer and suppliers, which are drawn on a blank canvas. An indication of the direction of interactions is given, along with the type of flow. Thus, it adds value to an interaction in a way that is similar to e3-value; however, it is more general since it does not define ports or go into more detail about the flow itself.

2.2 2000-2004: Business Model Ontology

The development of BMO emerged from the need to define new business models for e-commerce around the year 2000. Following academic research, a first version of BMO was published in 2002 at the 15th Bled Electronic Commerce Conference by Osterwalder and Pigneur; it took the form of a framework that was specially targeted at e-businesses. Over the next two years, the work further matured, resulting in the publication of Alexander Osterwalder's thesis (Osterwalder, 2004) in which he described the key building blocks and their interactions. The model was presented as an ontology

with elements of the modeled case becoming instances of the meta-level elements defined by the ontology.

Business Model Ontology in its original version uses nine building blocks to describe a business model: Value Proposition, Customer, Channel, Relationship, Revenue, Value Configuration, Capability, Partnership, and Cost. The model's scope is limited to the business itself and does not directly cover any environmental factors. Its key strength is the emphasis it gives to the relationship between the components. A coherent business model is created by correctly connecting elements from within the nine building blocks. Exploring these connections can help to identify missing elements or discover ambiguous assumptions within a model. In summary, BMO focuses on identifying **what** is provided to **whom**, **how** it is produced and **how much** profit it generates.

2.3 2004-2008: Use and Simplification

Following its academic publication (Osterwalder, Pigneur, Tucci, 2005) the model was used in two different contexts between 2004 and 2008. It was applied to tutorial cases delivered to IS students; thus, it was simplified, but still used in an academic context. The model was also used with practitioners in workshops and consulting sessions. Here, the model was applied to actual business problems in order to gain an understanding of how the model is used within a wide spectrum of business types, beyond just e-business models. Both of these applications sought to constraint the model as a one-page diagram. Special positioning was used to identify the type of each element and best practice was further strengthened by using keywords to describe each element. The changes were not only visual; the names of some of the elements themselves were also changed to better fit the vocabulary of its users. The nine names are: Value Proposition, Customer Segment, Distribution Channel, Customer Relationship, Revenue Stream, Key Resources, Key Activities, Partner Networks, and Cost Structure.

2.4 2008-2012: Business Model Canvas

Insight gathered during the previous years and the emergence of a small community around Alexander Osterwalder's blog led to the creation of a book project to communicate the result of these transformations. Convinced that the visual aspect of the model is a key component and largely influenced by the design-thinking movement and "managing as designing" (Boland & Collopy, 2004), the book was intended to offer a visual perspective. In turn, this led to a designer being brought on board to redevelop the layout of the canvas so that it became the Business Model Canvas (BMC) we know today. New features include the pictograms that illustrate the nine building blocks from the theory, their rectangular layout and an axis of symmetry around the value proposition (left side, right side). By providing examples from different industries, the book project further helped to crystalize the ideas on the usage of the BMC. In particular, it showed how the BMC can integrate a design-thinking process and explored the notion of partial meta business models known as patterns (Osterwalder & Pigneur, 2010).

To strengthen the link between theory and practice, the book was written in collaboration with the community. This was done by setting up a community hub with forums. Early drafts were published on the hub for review by subscribed members. This created a following of those interested in business model generation and further helped to promote the book. Many followers also put business model generation into practice, which eventually led to its success. From the start, the community was global in nature. Now, with many translations of the book made available, it is expanding even further.

Teaching of the BMC has been adopted by managerial and entrepreneurship courses in over 250 universities. In turn, this has increased adoption. Furthermore, there has been a steadily increasing number of workshops and consultant-led master classes, as well as internal education programs in large corporations.

Since the release of the book Business Model Generation in 2010, adoption of the BMC has grown to become a worldwide phenomenon: the original community hub of 400 people which helped create the book has grown to 14,000 members. The book itself has been translated into 29 languages and sold over 1,000,000 copies. Other communities, such as Customer Development (Blank & Dorf, 2012), have started using the BMC as a supporting model for their theories.

3 METHODOLOGY

In this study, we used Design Science Research (DSR), as described by (Gregor & Hevner, 2013). They defined a process in which artifacts are built and evaluated in an iterative process in order to solve the relevant problems. The need to take a visual approach to creating the BMC was driven by design-thinking theories and we identified need for practitioners to have better tools that can be easily integrated into daily practice. Existing knowledge of business model ontology has been described in the previous section. It was shown that Information Systems (IS) has the

necessary body of knowledge to handle "strategizing as designing" (Osterwalder & Pigneur, 2013).

3.1 Users Maturity Level of Business Model Canvas Modeling

The BM canvas was evaluated using data and evidence from its use in the real world, books, canvas, hub, and the workshops and lectures that were used to inform the following three maturity levels inspired by the Common European Framework of Reference for Languages (CEFR), which also has three groups.

Novice – use the BMC as a simple common language and visualization help.

Expert – use the BMC as a holistic vision to understand and target a business model's sustainability. They understand the model's methods, such as high level links and colors, which helps to connect ideas and follow the interactions.

Master – use the BMC in the global Strategy, which is a process that evolves and adapts to its environment. They understand that the design of a model has to accompany such a process by supporting concepts of iteration, transformation (mutation) and choosing alternatives (selection).

Having defined these three level of proficiency we use it to decompose the research question into three sub-questions:

Novice level usage is the most commonly observed and fully applies to the static use of the BMC. Before moving to a dynamic representation of a business model, it should be guaranteed that at a static level it is already a coherent model. Which leads us to the following sub-question:

How can the static design usage of the business model canvas be improved (in relation to its coherence)?

Expert and Master level design of BMC are not observed frequently and lack representation due to their requiring a more dynamic aspect of the BMC.

For the expert with a focus on internal interactions this leads us to the following sub-question:

How to represent the dynamic aspect of interactions happening inside the business model?

Handling multiple states of a business model, due to internal or external changes, at the master level leads to the following sub-question:

How to represent the transformation from one state to another of a business model?

In the next section, we address these questions individually each with their own artifact.

4 ARTIFACT

In the next three subsection we consider each business model canvas design task of each mastery level by looking first at a metaphor of a similar design task in another design domain. Transposing the metaphor of house planning in architecture, plane building in engineering and evolution in biology to business model designing, we propose a concept to help answer each sub question. Each level builds on the previous and comes with their respective concept: BM Canvas Coherence, BM Mechanics and BM evolution, to address the dynamic nature of business models. We then illustrate how each concept applies to a small common example: the case of Apple's iPod business model. Each Artifact also describes in a short summary the essence of the mastery level to further offer a clear way to differentiate the three levels.

The following three concepts are presented below:

BM Canvas Coherence helps the novice to improve static business model modeling by way of using guidelines to check coherence of the business model.

BM Mechanics helps the expert by proposing to use colors and arrows to outline the interactions happening inside the business model.

BM Evolution helps the master by offering a way to visualize business model transformation from one state into another. Applying these transformation multiple times results in a branch showing the evolution of the business model.

A mapping between level and concept can be seen in table 1.

4.1 BM Canvas Coherence

At the novice level, the focus is on the concepts of the ontology, meaning the nine building blocks that define a business model. The main task consists of designing a business model by filling in elements for each block. Designing a business model can be best described using the metaphor of an architect engaged in designing a house. The architect needs to know about the various components of a house, such as the walls, doors, windows, roof and stairs, and also how they relate to each other. A wall can have windows and doors. A room has four walls with at least one door. Beyond such constraints, however, the architect is free to produce a variety of designs for a house. During the design process, the architect puts forwards his ideas using sketches and prototype models. These prototypes are not finished products, but are specifically aimed at testing the interaction of a selection of concepts in the specified context of the

prototype. Transferring this design technique to a business model design means creating different business model variations of component interactions. For example, when prototyping a specific customer segment, the value proposition set could have its revenue stream type switched from paying to free, or from sales to subscription. This could then lead to further prototype changes to dependent components. This iterative validation of ideas leads to a business model that has all its components matching to become a "usable" business model. Checking the coherence between the elements is a key requirement for a valid business model. It is not enough to only produce a checklist of items without verifying their compatibility. Again, with reference to our architecture metaphor, stairs should be used to connect floors, and a door should lead to a room rather than nowhere. We call this "usability". Similarly, in a business model, a value proposition needs to offer added value to a customer segment requiring it. A value proposition without a customer segment indicates a non-coherent business model. The iterative validation of design ideas can go as far as "getting out of the building" and test the assumptions directly with the potential customer as is done in Customer Development (Blank & Dorf, 2012). The gained insights may help to validate the hypothesis of the prototype or else offer new ideas to make a pivot of the model to target different customers.

In order to facilitate the checking of coherence, there are a series of guidelines which we have proposed to help validate the business model's elements and interaction (Fritscher & Pigneur 2014c). They are split into three categories from element, to building block and interactions:

Guidelines applying to individual elements for example that the meaning of the element is understandable by all stakeholders.

Guidelines applying to individual blocks for example that the detail level of the elements are adequate (there are not too many detailed elements, nor too few which are too generic).

Guidelines applying to connections between elements in different blocks for example that there are no orphan elements: all elements are connected to another element (in a different block to themselves).

4.1.1 In Summary

At the novice level, the concepts of the model identify the right elements and how they are related to one another. An iterative process that explores detailed features of the elements helps to adjust the elements that make up the model in order to solve real problems. This leads to a coherent model that addresses the right job.

4.1.2 Apple iPod BM Canvas

In this example, we focus on Apple's iPod business model. A model can be described by its elements, with keywords for each of the nine building blocks. Alternatively, illustrations can be used, as shown in Figure 1. The value proposition is a seamless experience that includes listening, managing and buying music. It is targeted at consumers who want to listen to music wherever they go and have access to a computer. The distribution channels to reach these consumers is a store or online-shop where the device can be bought along with iTunes software to manage the music library. Sales of the device generate revenue with higher margins than sales of the songs, where most of it goes to the majors. The customer relationship is oriented towards the lifestyle experience of Apple products. In order to offer these services, the key activity is the design of the device. Key resources are the device itself, music contracts, the developers and the Apple brand which strengthens the customer relationship. Marketing and developers are the key cost structures. Music licensing and device manufacturing is carried out through the partners.

This business model slice is coherent since as described each element is connected to another. There are no orphan elements, nor any combination of elements not connected to the rest of the business model.

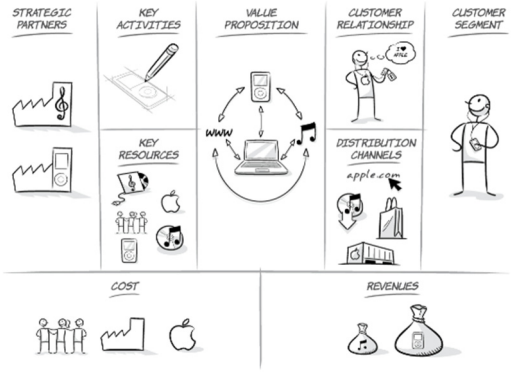

Figure 1: Apple iPod BM Canvas ©XPLANE 2008.

4.2 BM Mechanics

At the expert level, knowledge about the BMC and the requirement to design a coherent model is well incorporated into practice. The focus is on analyzing the interaction of the model's elements beyond the relationships between them. It is not just about how one element relates with its connected elements, but about how they contribute to the overall thread of the

business model story. A chain of interactions must be built from one element to another throughout their relationship. To continue with our comparison with other design domains, we move from architecture to engineering, where it is not enough to just know about the concept. An engineer needs to know about the underlying physics that supports the concepts. For example, it is not enough to know about the concepts that make a plane; we also need to know about their interactions. Without knowing how the aerodynamic properties of a wing generate lift, it would be impossible to design a plane that flies. Trial and error with prototypes that are not based on physical calculation would result in a large number of failures. What's more, the end result could not be explained fully. Similarly, in the design of business models, the activity has to move beyond prototyping and try to simulate the model to see if it is "workable". A good business model needs to both do the right job and be sustainable. Business model mechanics, outlines how elements influence each other beyond their relationship. The story can illustrate the flow of the exchange value between customers and the product and how it is produced. It is about understanding the underlying interactions which make the business model possible. In this context, explaining a revenue stream can for example depend on a partner (a relationship which is not defined in the basic ontology). These connections can be drawn using arrows at the top of the canvas to show the story. Elements can also be added to the canvas one after another while telling the story; this helps to strengthen the illustration. Another way to highlight the connectedness of elements is to use colors.

4.2.1 In Summary

At the expert level, the business model concepts of the canvas are well understood, and analysis has moved beyond the elements towards the interactions based on their relationships. The business model is coherent and does the right job. Above all, the interactions needed to make it work are understood. Thus, the model is the right one and has the potential to be sustainable if implemented correctly.

4.2.2 Apple iTunes BM Mechanics

In the case of the Apple iTunes, two stories can be identified (see Figure 2): the music part (shown using dotted lines), and the device (iPod) and brand part (shown using dashed lines).

In order to make the platform attractive, Apple had to offer a broad selection of titles, including all the popular songs. This was achieved by making deals with all the big majors. Skill and leverage were required to be able to make deals which will make the platform competitive on pricing and title selection. Initially, to get the majors on board Apple added Digital Rights Management (DRM) to protect the digital music files; this had the side benefit of locking the user in to Apple's devices and software platform.

On the device side, functionality and esthetics had to be combined in the design activity to create a product which is in line with the customers' brand expectations.

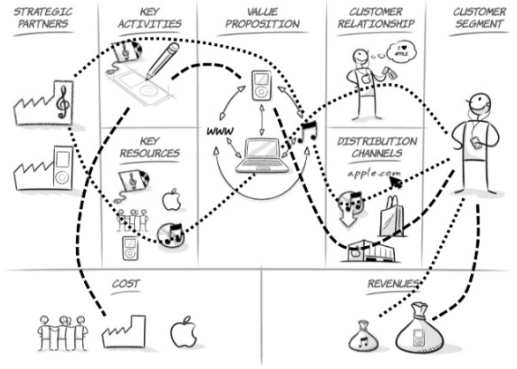

Figure 2: Apple iPad BM Mechanics adapted from ©XPLANE 2008.

4.3 BM Evolution

At the master's level, any considerations go beyond the current business model. Masters are not afraid of the unknown and are ready for anything. There is an understanding that the strategy has to have a longer-term vision that extends beyond the current business model, and that to survive, it has to be able to evolve. The focus is on actions that can be taken to evolve from one business model to another. In order to be aware of incoming changes, observation of the business model's environment is key. Our architecture and engineering metaphor has its limits; indeed, we would need to use analogies from the realm of science fiction to illustrate transforming behaviors. Therefore, a better analogy is the concept of biological evolution. Individual business models can become obsolete and die off; however, the "species" evolves and survives through mutation and selection. This means that in order to survive decay, new business models (mutations from existing ones) have to be tested continuously. When proven successful, they are selected. Sometimes, the previous business model might even be cannibalized by it.

A business model can do the right job and be sustainable and still fail if it is not adapted to its environment. Unlike our biology analogy, the variations of a business model can be planned so that it can be ready to adapt when the environment changes. This involves planning different business

models for a range of scenarios (Schoemaker, 1995) and then being ready to switch to them depending on the environment. The adaptability of a business model to its context is key.

Various external occurrences may affect the business model at any time; thus, different alternatives need to be kept should one of them become a reality. Keeping track of the mutation in relation to external stimuli necessitates the management of different versions of the business model. The creation of multiple versions of a business model to address different external environments is a first step. Another step is to know how to adapt from one version of a model to another. In this case, the transformation between them needs to be highlighted. For that purpose, we propose to use the concept of transparent layers to stack business models parts on top of each other. On paper this can be done with tracing paper, each new layer can show new elements and reuse of element which are visible in a semi-translucent fashion from lower layers.

Together, the two steps allow us to evaluate a model in the light of external factors, thus enabling us to select the business model that fits best.

The combination of multiple transformation from a given state help form a graph or a tree with branches of possible evolution paths to follow for the future business model. As well as to visualize the past transformations which lead to the current state of the business model.

4.3.1 In Summary

At the master's level, business model concepts and interactions (story) are well understood, both in terms of a single model and the analysis of multiple models. Decisions are made with the environment in mind in order to deploy the right model in the right context. Using this strategy, business models can be evolved to adapt to any change.

4.3.2 BM Evolution: From Apple iTunes to Apple App Store Business Model

The transformation from a music service to a software platform has many innovation drivers. A major one which can be highlighted in Apple's case was their capability to create a touch-based screen for a phone device by combining new external technology (touch hardware) with internal knowledge of the design of human friendly interfaces (custom software).

To create the App Store business model (seen in Figure 3), Apple evolved their iTunes business model by reusing existing components, expanding others and adding new ones. Apple capitalized on its knowledge of design, value chain management and store to build and distribute a new touch based phone (iPhone). New components included the extension of the distribution channel to also include the new partner, the mobile phone operators. Taking advantage of their knowledge of building software development kits for computers, Apple created a development kit for the phone which is targeted at a new customer segment of developers to create mobile apps. To manage the quality of these apps and handle financial transactions, a validation process and revenue sharing model had to be put in place. Putting these pieces into place helped to create an eco-system that connects phone users in need of specialized apps with a large developer community willing to provide them for a small price. This transformation was much more than a product innovation; rather, the whole business model moved to a double sided business model (Eisenmann, Parker, & Alstyne, 2006), connecting the developers with the phone users.

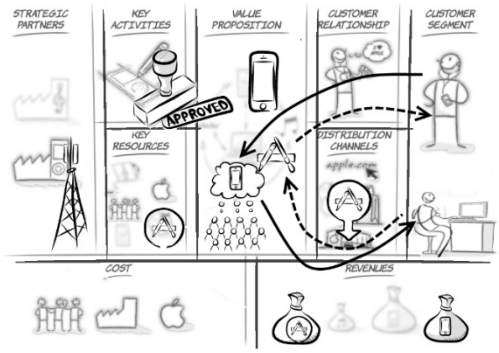

Figure 3: Apple iTunes to App Store adapted from ©XPLANE 2008.

5 EVALUATION

The first evaluation of the proposed concept is their instantiation into cases. Being able to use the concept to represent real world business models demonstrates the validity of the artifact. The second part is to show their utility having user employing the proposed technics to represent their own business models. Since the proposed concept are still very early ideas, a further step would be to refine them. This would allow for them, for example, to be implemented into a computer-aided design tools for business models. Providing advantages of automating some of the concepts' more tedious interactions such as validating constraints, editing arrows paths and changing visibility of elements.

For each of the BM concepts explained in the previous section we present the goal solved by an artefact we built to demonstrate its instantiation. We give a summary of our related work findings and propose some further possible evaluations.

5.1 BM Canvas Coherence

Goal: evaluate how rules can help beginner build more coherent business models.

Useful validation questions and best practices emerged during the years of teaching workshops on the business model canvas. Some of which have been formalized into guidelines and applied to build an expository case business model (Fritscher and Pigneur, 2014c). This could then be evaluated to see how automated validation of the coherence of a business model can assist the creation of better business models. In the process of testing user experience and idea generation differences between paper and digital business model design, we also did initial testing on coherence guidelines on paper with a group of students. This showed that they lacked the perseverance to rigorously apply them manually and highlights the need to perform experiments with computer aided systems.

5.2 BM Mechanics

Goal: evaluate how visual help such as color tagging can help provide a clearer picture.

Drawing arrows on top of business models is also something that emerges naturally in design session. Therefore it is already somewhat in use although not in a guided fashion. However, it is not always used as described in the bm mechanics technique. Previous work has shown that formalized links do not get adopted by the users, instead color tagging of elements can be used (Fritscher and Pigneur, 2014b). We tested how tagging elements with different color can help get a better visual picture without increasing the visual legibility. This suggests that for formalizing the BM mechanics feature, attention should be focused on not making the arrow interaction too constraining or complicated.

5.3 BM Evolution

Goal: Evaluate the usefulness of the layer concept to represent business model transformations.

The business model evolution concept with its two parts: transformation (mutation) and path of possible (selection) is a somewhat complicated concept. Especially to create the visual representation on paper. Wanting to explore alternatives can lead to a lot of copy work and stacking multiple versions of transformation on top of each other can get visually cluttered. An initial instantiation into a Computer Aided Design (CAD) tool has been attempted and shows promising results (Fritscher and Pigneur, 2014d). The creation of the prototype tool lead also to the building of a case which describes a real world business model evolution over seven transformations and two business models evolving in parallel[1]. This illustrate the potential of using a layered visual approach to represent the dynamic nature of business model evolution.

[1] Valve Corporation – Business Model Evolution Case http://www.fritscher.ch/phd/valve/

6 DISCUSSION

Although we presented the three concept separately, each successive level of maturity builds on top of the previous ones. A business model has to be coherent in itself before exploring its dynamic aspect. The prototype built to support BM evolution visualization also supports drawing of arrows for BM mechanics. This shows that the feature of drawing arrows combines itself nicely with the layers that support the transformations of the evolution. This combination which provides means to decompose the internal story into states that from a temporal segmentation of the actions happening in the business model story. This can then be visualized with layers as the evolution of the story.

Implementing prototypes to support the concept required to identify how the different design technique can be support by CAD functions. We summarize them in the next section.

Documenting the transformation which BMO went through to get adopted by practitioners gave us some insight into elements which made it possible. We present our observation in the section entitled: Lessons learned for business model methods designers.

6.1 Design Techniques and Supporting Cad Functions

In table 1 we provide a summary of the key design techniques and supporting CAD functions for each concept of the three maturity levels.

At the novice level, BM Canvas Coherence can be improved by following guidelines. It is possible to formalize these guidelines into verifiable rules. This in turn allows to perform validation or trigger contextual hinting assistance with a CAD tool. In order for the tool to get a better model, it is needed to indicate some of the elements relationship. This can be accomplished by tagging them into different colors, which is simpler for the user than explicitly connecting them with links.

At the expert level, BM mechanics helps to provide a clearer picture on the internal interaction of the business model. In order to support such storytelling, functions like color and arrows can be used on top of the BMC. In addition, a CAD tool can help by toggling the visibility of elements as the story progresses allowing for a dynamic representation of another ways static canvas. This temporal execution of the models' story can then be tailored to the individual stakeholders, the dynamic management of the visibility allowing to support multiple stories on the same canvas.

At the master level, BM Evolution helps to address the transformation required by renovation and exploration of possible future states envisioned by scenario planning. Through layers, versioning and by allowing to compute custom views of superposing layers CAD tools offer dynamic visualization showing any chosen past, present or future state of a business model. Also by chaining the transformations, it can be known which change affects any descendant element's future state. A new computation of these updated views can be performed by the tool without any work from the designer.

6.2 Lessons Learned for Business Model Methods Designers

Based on the lessons gained from our experience we can share the following observations on the possible influences on the success of a business modeling methods. These will help to broaden the adoption of an academic enterprise ontology by practitioners:

Designing a method that can scale in complexity for various proficiency levels, from novice to masters, helps its adoption.

Performing design science evaluation cycles and evolving the method after each evaluation is key to identifying the right balance between simplification and the re-addition of elements at different proficiency levels.

Finding the right community is important: people need to be willing to quickly test and iterate the model's concepts. (In our case, entrepreneurs were the ideal test participants; it is in their nature to try out business model concepts, which allowed for quick iterations).

Providing a tool (free canvas and book) empowers teaching at a university level as well as in workshops, thus helping to spread the method.

7 CONCLUSION

Starting from observation on the evolution and adoption of the BMC we identified the need to address the issue of **how to represent and help to design the dynamic aspect of a business model with the Business Model Canvas**. Based on observations we *identified three maturity levels* of business model canvas design and addressed the issue by splitting the question into three sub-questions:

How can the static design usage of the business model canvas be improved (in relation to its coherence)?

At the novice level, the simple nature of the canvas helped in its adoption. This simplicity lends to the use of building blocks as a checklist. It is however necessary to keep in mind the relationship between the elements in order to maintain the underlying ontological nature of the business model theory. *Guidelines can help to verify these relationships and thereby help to create more coherent models.*

How to represent the dynamic aspect of interactions happening inside the business model?

At the expert level, it is necessary to understand the big picture. Showing a completed model to a person for the first time would overload them with information. Thus, design-thinking mechanics, such as storytelling, have to be used to present the BM mechanics of a model one step at a time. This allows users to understand all the elements of a business model, as well as the way they interact with each other. *These interactions can be further strengthened by drawing arrows to outline the main story thread in what we call BM Mechanics.*

How to represent the transformation from one state to another of a business model?

At the master level, it was found that making different versions of a business model could help in analyzing its reaction to the context. The management of these versions quickly became a constraining factor, particularly if only part of the business model changed. *Using layers to illustrate only the changes is a design technique that helps to overcome some of these constraints. Having the means to describe transformation from one state into another, can then be combined to form a chain of transformation leading to a tree of possible path of evolution for the business model in what we call the BM Evolution.*

Table 1: Summary of concept, design technique and CAD functions.

Maturity	Concept	Design Technique	CAD functions
Novice	BM Canvas Coherence	Guidelines, rules	Colors, validation,
Expert	BM Mechanics	Storytelling	Colors, arrows,
Master	BM Evolution	Renovation, what-if, scenario planning	Layers, versioning,

To conclude, we provide several opportunities that could be further investigated for each of the discussed levels.

7.1 Opportunities

The business model ontology can be directly extended in several ways. However, it is most advantageous to capitalize on the diffusion and knowledge of the current version. We argue that it is helpful to develop extension as a plugin. For example, a customer segment can be analyzed through the lens of such tools as personas and customer insight or through the framework of jobs to be done (Johnson, 2010). The current focus on plugins is mainly on the value proposition and the customers, or the connection between the two. There are many more elements, however, that could benefit from in-depth analysis at a component or relationship level. Those that come to mind include categorizing the channel based on the time and type of interaction of the client-to-customer relationship for this particular event; this would make better use of the customer relationship component. Key activities can be decomposed into types and supporting applications. This allows us to better align the enterprise architecture, its business processes and infrastructure to the business model (Fritscher & Pigneur, 2015).

Beyond small transformation of business model, research into a theory of evolution for business models is of great interest, particularly in identifying why some business models survive change better than others.

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