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# Achieving Business Model Innovation with the Personalized Product Business Model Radar Template

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**Abstract.** Industry 4.0 is changing companies' business by introducing new manufacturing techniques. Personalization is one key goal of Industry 4.0 that is transforming companies' business models by bringing the customer's preference in the production process. Companies require to adapt their business model to these disrupting manufacturing approach. In this paper, we present a management tool for guiding the business model innovation towards personalized products: The personalized product business model radar template. This template implements a pattern that guides the business model design process by introducing predetermined values that are common in the personalized product business model in Industry 4.0. We apply this management tool in a business case scenario in a workshop setting with professionals from smart manufacturing.

**Keywords:** Business Model Radar · Service-Dominant Business Model · Digital Transformation.

## 1 Introduction

Digital transformation and Industry 4.0 (I4.0) are disrupting production management from design and production processes to the underlying business models. The digital transformation is bringing tailored and affordable products to customers by digitalizing the manufacturing process. I4.0, also known as the fourth industrial revolution, drives the digital transformation within the manufacturing context [7].

Academics are researching highly automated processes driven by robots and cyber-physical systems. I4.0 recognizes the transformation towards personalization as a strategic goal [12]. Furthermore, smart manufacturing promise advances in production towards mass-customization and personalization at a competitive cost [7]. However, small and medium enterprises (SMEs) get less attention. Challenges for SMEs include limited financial resources and staff qualifications. Conveying the benefits of I4.0 from vision to practice is difficult because most I4.0 findings are laboratory experiments results. Hence, we notice a knowledge

gap in solving current SMEs' challenges regarding personalization with I4.0 for designing cost-effective solutions.

Most academics are focusing their attention on the shift from products towards services with servitization [8]. However, the inclusion of products to services known as productization has less attention from academics [2]. Through productization, firms try to improve the implementation of the service [21], facilitate the dissemination of the service across the organization through replication [5], improve the efficiency of service operations, and render the service more accessible for customers to perceive and use [4]. Productization is important in I4.0-driven innovation because it enables non-manufacturers to adopt smart production technologies for offering complete new solutions. For instance, additive manufacturing is a smart production technology that is ideal for offering personalized products.

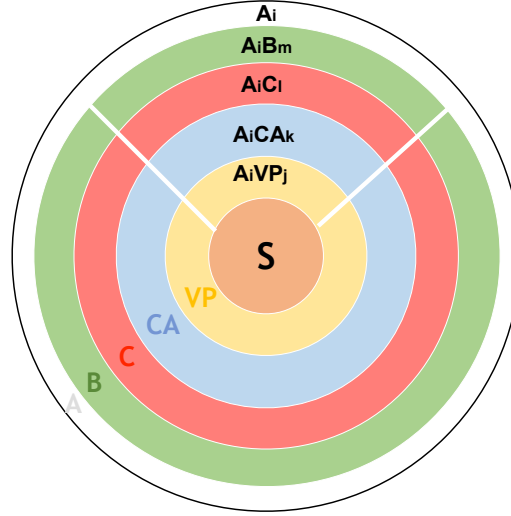
In this paper, we present a pattern for designing personalized product business models in Industry 4.0 by using a networked business model management tool as a foundation. We use the pattern for achieving business model innovation of a service company towards a solution-driven by additive manufacturing.

This paper is structured as follows: In section 2, we present a tool for designing networked business models: The business model radar. In Section 3, we present a business model pattern for designing personalized product business models: The personalized product business model radar template. In section 4, we apply the personalized product business model radar pattern in a workshop setting. Finally, we end this paper with conclusions.

## 2 The Business Model Radar

The business model radar (BMR) is a novel business model tool for analyzing and designing business models as ecosystems, also known as value networks [14], [13]. The BMR implements the concept of service-dominant business models [16]: A business model that uses a value network as an organizational structure for the value co-creation between the business network actors. This organizational structure enables the adoption of an actor-to-actor value co-creation perspective instead of the typical firm-to-consumer creation one. The actor-to-actor value co-creation implies a shift from a passive customer role as a value receiver towards an actual value co-creator [10]. This co-creation perspective is derived from a strategic focus on the service-dominant logic [15], [17], [18].

As shown in Figure 1, each co-creation actor  $A_i$  from  $A_1$  to  $A_n$  is represented as a BMR slice. There is only one Solution ( $S$ ) in a business model radar:  $S$  is represented at the center of the BMR. The central position embodies that the solution is co-created by all the co-creation Actors in the business model. Each co-creation actor  $A_i$  can collaborate with the solution with value propositions  $A_iVP_j$ , performing co-creation activities  $A_iCA_k$ . Each co-creation actor  $A_i$  can incur in costs  $A_iC_l$  and gain benefits  $A_iB_m$  by participating in the networked business model. We describe further the BMR elements as follows[10]:



**Fig. 1.** Business Model Radar's multi-actor perspective

**Solution (S).** The solution is the goal of the business model. We can think about the solution as the co-created value between the co-creation actors of the business model.

**Co-Creation actors (A).** This element represents the entities collaborating in a business model. We denote each co-creation actor as  $A_i$ . We can distinguish between the following types: users (U), focal organization (FO), and partners (P). The focal organization is the co-creation actor that is behind the business model. The FO collaborate with partners and users for co-creating a solution.

For each co-creation actor  $A_i$  defined above, we can distinguish the following four elements:

**Value proposition (VP).** This element represents the value proposition of each co-Creation actor into the solution. We can see each actor's value proposition as a contribution to the overall solution. We denote the value proposition of a co-creation actor as  $A_i V P_j$ .

**Co-Creation activities (CA).** This element represents the activities that a co-Creation actor performs for delivering a value proposition into the solution. We denote the co-creation activity  $C A_k$  of a co-creation actor  $A_i$  as  $A_i C A_k$ .

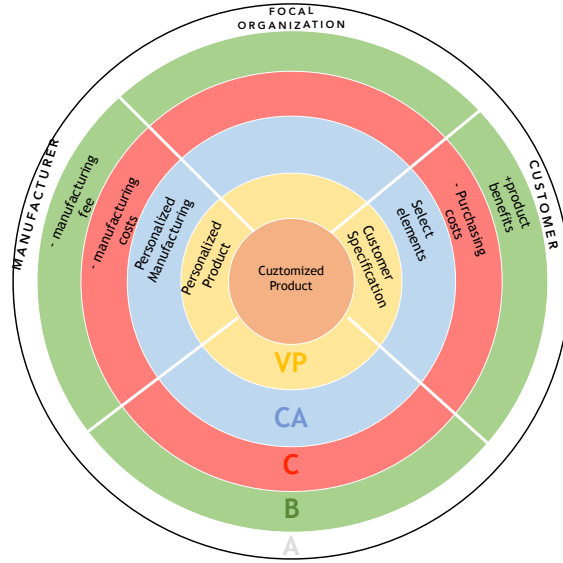
**Costs (C).** This element represents the costs that a co-creation actor incurs by performing co-creation activities and by participating in the business model. We denote the cost  $C_l$  associated to a co-creation actor  $A_i$  as  $A_i C_l$ .

**Benefits (B).** This element represents the benefits that a co-creation actor gain by performing co-creation activities and by participating in the business model. We denote the co-creation activity  $B_m$  of a co-creation actor  $A_i$  as  $A_i B_m$ .

### 3 Personalized Product Business Model Radar Template: A Pattern for Business Model Innovation

Business model innovation is the capacity to reframe an existing business model in new ways that create new value for the customers. Furthermore, business model innovation can be a path to gain competitive advantage [9]. Business model patterns are a tool for business model innovation [5]. Entrepreneurs and innovators can use these patterns to generate a new business model systematically or adapt an existing one. Patterns are reusing solutions that are documented generally and abstractly to make them accessible and applicable to others [1]. Work on patterns in the context of business models has been done by several authors [22], [3], [12].

In Figure 2, we present a template for the personalized product business model pattern based on the literature on business models in the industry 4.0 [6]: The customized product BMR template <sup>3</sup>. In the template, we have three predefined co-creation actors: The focal organization, the manufacturer, and the customer. The focal organization is the company behind the business model innovation towards a customized product solution, the manufacturer is a partner from the focal organization that brings personalized manufacturing capabilities for delivering personalized products, and, the customer bring the customer's specification or needs as value propositions.



**Fig. 2.** Personalization BMR Pattern as a template

<sup>3</sup> The template is available at [businessmodelradar.com](http://businessmodelradar.com)

The resulting BMR is not limited to three co-creation actors. The quantity of actors depend on the specific business scenarios. The BMR can be used in workshop settings with a printed poster and post-it notes to capture the values within the management tool [10]. For using the personalized product BMR template in workshops sessions, we established a sequence of steps as the usage method. The steps order can vary depending on the interaction between the workshop participants and the workshop facilitators. We describe the usage method as follows:

First, we need to answer the following question: Who plays the role of the focal organization? Then we place the name in the co-creator actor area in the template. Second, we identify the value that want to co-create as the solution by answering the following question: What kind of customized product do we want to produce?

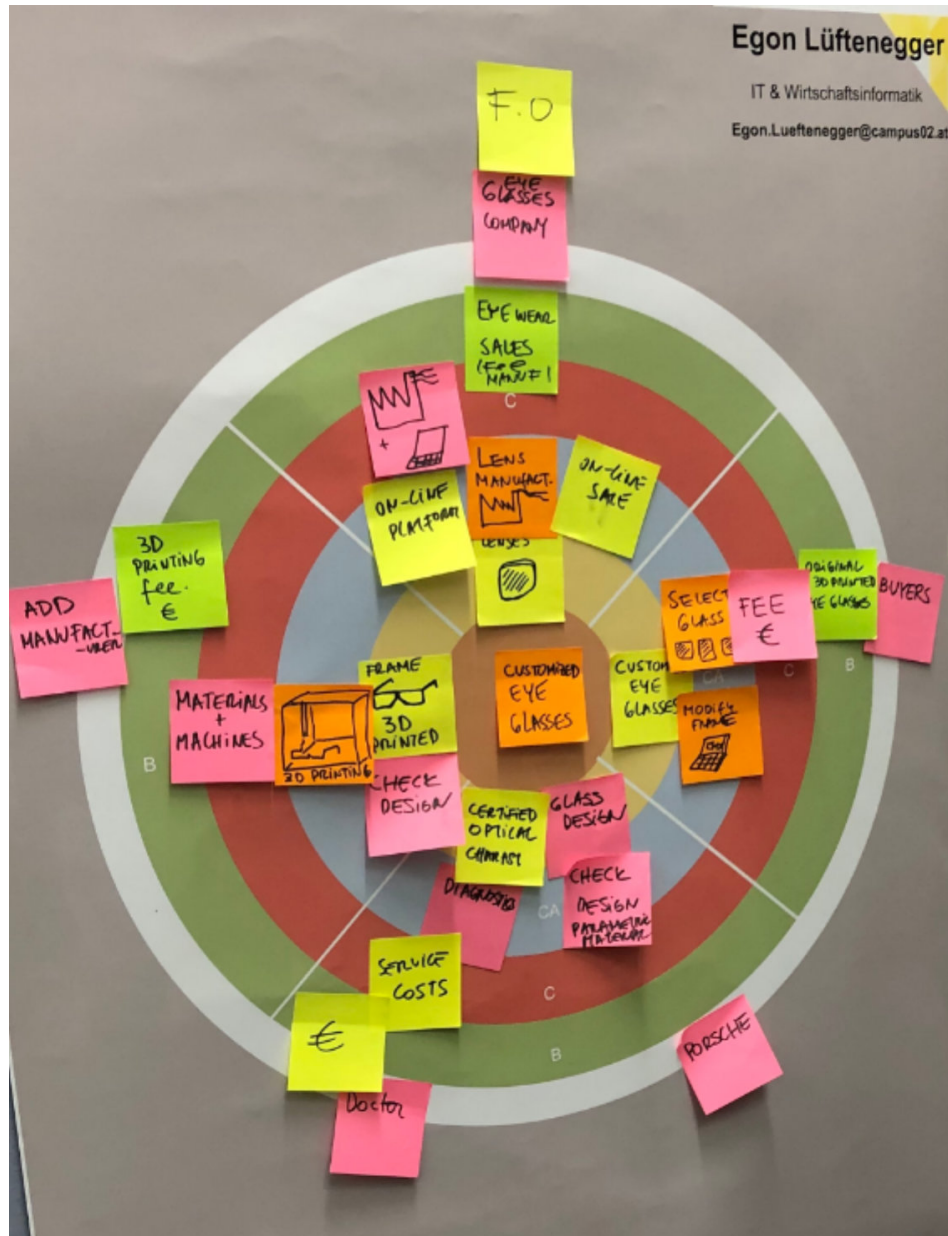
Second, by using the predefined values from the template, we modify the values according to our specific business case by answering the following questions for each predefined co-creation actor: the manufacturer and the customer. For the manufacturer, located at the left side in Figure 2, we need to answer the following questions: Who is the manufacturer? What is the manufacturer's personalized product? What is the manufacturing fee? What are the manufacturing costs? For the customer, located at the right-side in Figure 2, we answer the following questions: Who is the customer? What is the specification provided by the customer? What is the product element selection? What are the purchasing costs for the customer? What are the product benefits for the customer?

Third, for the focal organization, we need to complete the remaining questions: What is the focal organization's value proposition into the solution? What is the the co-creation activity that the focal organization performs for delivering the value proposition? What are the costs that the focal organization incur? What are the benefits that the focal organization gains?

Finally, if needed, we need to identify other co-creating actors participating in the business model. We identify them by using the standard BMR questions: Who is the co-creating actor participating in the business model? What is the value proposition that brings into the solution? What is the co-creation activity of the actor in the business model? What are the associated benefits gained and what are the associated costs involved by participating in the business model?

## 4 Case Study: Business Model Innovation with Additive Manufacturing

The BMR is a management tool that can be applied within I4.0 [11]. In this case, we can use the personalized product BMR pattern for achieving business model innovation with additive manufacturing. During a workshop session regarding smart production, we innovated the business model of the following business case: An eyeglasses retail company wanted to innovate their business model from selling standard eye-glasses towards customized eyeglasses. By this



**Fig. 3.** Resulting personalized product business model for an eyeglasses focal organization

way the company could differentiate their offer from the massive eyeglasses retail market. The design process consisted in two stages: First, we explained the pattern to the workshop participants. Secondly, we used this pattern as a guide for identifying the values for the manufacturer and the customer in this specific business instance: The Additive manufacturer and the buyers. Then, we proceeded to identify other actors in the business models. In this case, the focal organization behind this business model is an eyeglasses company that does not manufacture their own glasses. Then the additive manufacturer plays the role as a partner for the eyeglasses company in this specific business case. The resulting customized eyeglasses business model radar is shown in Figure 4. In the workshop, the smart production professionals identified additive manufacturers' 3-D printing as an innovative approach within the industry 4.0 initiative for producing customized products.

## 5 Conclusions

In this paper, we present a pattern for designing personalized business models. The pattern was implemented as a template by using the business model radar: A networked business model tool. The resulting pattern is the personalized business model radar template that serves as a foundation for innovating a business model towards customized products. The template enables a service provider the productization of their business models towards customized products. We tested the personalized product BMR template in a workshop setting. By using the template, professionals innovating business models are able to develop customized product business models.

The business model innovation is achieved by using the template as starting point and then changing these values according to the specific business case. For operationalizing and evaluating the resulting business models designed with the business model radar, we can convert the resulting BMR to a business process. Business processes are useful for performing cost-benefits analysis [19] and for tracking the performance in smart production [20]. As future work, the author will develop more business model radar patterns for facilitating business model innovation within different industries.

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