



HAL
open science

Guideline to Develop Smart Service Business Models for Small and Medium Sized Enterprises

Mike Freitag, Christian Schiller, Oliver Hämmerle

► To cite this version:

Mike Freitag, Christian Schiller, Oliver Hämmerle. Guideline to Develop Smart Service Business Models for Small and Medium Sized Enterprises. IFIP International Conference on Advances in Production Management Systems (APMS), Sep 2021, Nantes, France. pp.369-375, 10.1007/978-3-030-85914-5_39 . hal-03897855

HAL Id: hal-03897855

<https://inria.hal.science/hal-03897855>

Submitted on 14 Dec 2022

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Distributed under a Creative Commons Attribution 4.0 International License



This document is the original author manuscript of a paper submitted to an IFIP conference proceedings or other IFIP publication by Springer Nature. As such, there may be some differences in the official published version of the paper. Such differences, if any, are usually due to reformatting during preparation for publication or minor corrections made by the author(s) during final proofreading of the publication manuscript.

Guideline to develop smart service business models for small and medium sized enterprises

Mike Freitag¹, Christian Schiller¹ and Oliver Hämmerle²

¹ Fraunhofer IAO,
Nobelstraße 12, 70569 Stuttgart, Germany

² Universität Stuttgart, Institut für Arbeitswirtschaft und Technologiemanagement IAT
Nobelstraße 12, 70569 Stuttgart, Germany

Abstract. The shift from product-oriented to service-oriented business requires a re-think, especially in traditional companies in the mechanical and plant engineering industry. This guideline for the development of Smart Services business models is intended to illustrate the complexity and thus improve their handling, supporting the planning and modelling of a Smart Service. The focus of this paper is to introduce a step-by-step model to develop business models for small and medium sized enterprises in the manufacturing industry and on the selection of suitable service business model patterns. Therefor it will show alternative service business model patterns and at the end to select the right one. This is an important process before starting smart service engineering.

Keywords: Smart Service, Service Business Model, Service Lifecycle Management, Service Engineering, SME

1 Introduction

This guideline describes a step-by-step development of Smart Services, especially in manufacturing sector. The term "Smart Services" refers to data-based, individually configurable service offerings consisting of services, digital services and products that are organized and provided via integrated platforms [1]. The product systems of SME are basically stable, but the service systems offer potential for improvement. So, the focus of this paper is on the development of smart service business models and not on the development of business models for a product service system or on development of an engineering process for product-service systems [2, 3].

It is becoming increasingly important to offer suitable Smart Services to complement the products of manufacturing enterprises. Therefor an integrated development and subsequent management of these Smart Services is of central importance. Figure 01 illustrates the essential elements of this guideline for the development of Smart Services on the basis of the 3 phases:

- Service Design Thinking [4,5,6],
- Service Business Model [7] and
- Smart Service Engineering [8].

When a Smart Service is developed, both the three phases and the sub-processes in these phases can be repeated iteratively. Each of these three phases is already iteratively in progress. Especially in Design Thinking and Smart Service Engineering, the iterative approach is a core element of the process model. The development of alternatives also plays an important role in business modeling. In the approach presented in this paper, the possibilities of iteration are limited (dark arrows) due to small and medium-sized companies.

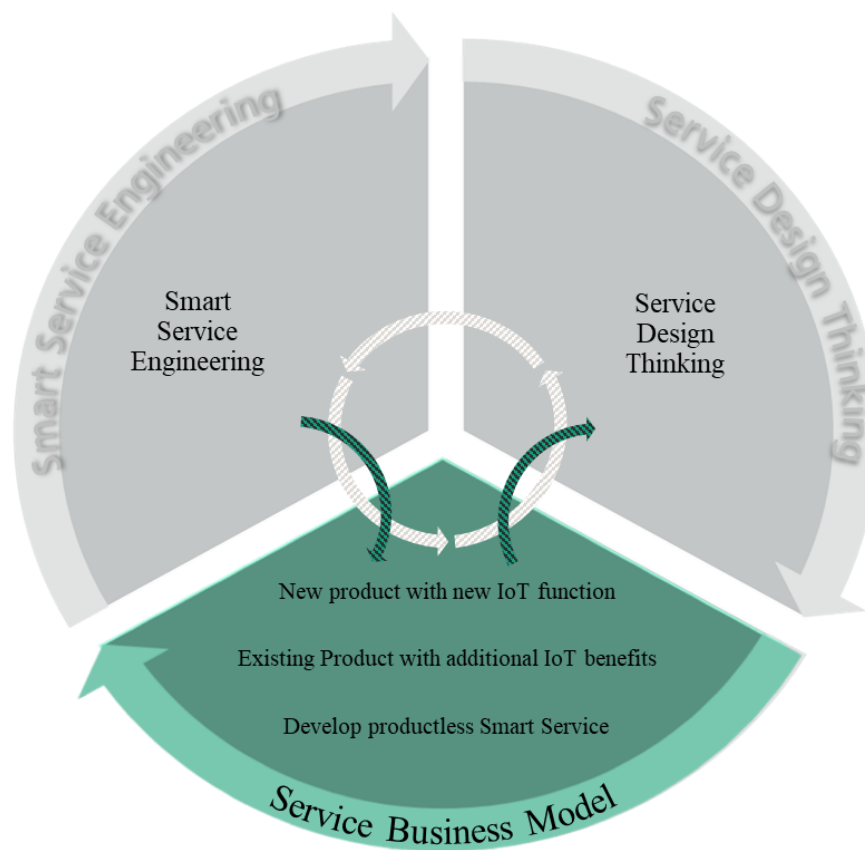


Fig. 1. The essential components in the development of Smart Services [1]

The design thinking process refers to Plattner et al. [4] and thus includes the 6 phases: understanding, observing, defining a position, finding ideas, developing a prototype and testing. These phases form the first development step of the smart service with the associated business model.

The further phases service business model development and smart service engineering form the main part of this paper and are described below in more detail below.

2 Develop new business models

In particular small and medium-sized companies (SMEs) often focus too much exclusively on technical aspects, right up to the management level. But, in addition to the technical potential, newly developed smart services must also exploit the economic added value they offer. This requires an appropriate and innovative business model. A business model depicts all the players involved, their respective roles and contributions to value creation, the benefits for customers and other players, and the sources of revenue resulting from the business activities. In part, it is also described as a management hypothesis about what customers want, how they want it, and how a company can fulfill the wants and make money in the process [8]. In this context, business models refer to the fundamental logic in a company and describe how a business functions and how company activities and elements interact [9]. An important element of business models is the central importance of customer orientation. Business models define the benefits for customers, how these benefits are delivered, and how a company generates revenue [9].

The mechanisms described must also be taken into account when developing new smart service concepts in mechanical and plant engineering, such as in electroplating technology. In order to develop a business model systematically, it is first necessary to select a suitable business model scheme. In recent years, various procedures and methods have become established in (smart) service engineering to support business model development. These include the Service Business Model Canvas (SBMC) according to Zolnowski [11], the Business Model Canvas (BMC) according to Osterwalder & Pigneur [12] or the Service Dominant Architecture (SDA) according to Warg et al. [13]. Due to its easy-to-understand structure, the BMC according to Osterwalder & Pigneur [12] has become established, especially for start-ups and smaller companies. It also has the advantage that a completed BMC can be further developed into an SBMC at any time if needed and if sufficient data is available. A developed business model is an important component and forms the basis for the complete service engineering process [14].

In order to structure the process towards a business model and thus simplify it, especially for SMEs, a four-step approach was developed and applied in a company from the electroplating industry. The approach is designed to develop the essential aspects of a business model step by step. This also enables SMEs with limited human and financial resources to systematically address this topic.

In the approach described below, it does not matter whether the final business model ends up being represented by the Service Business Model Canvas, the Business Model Canvas, the Service Dominant Architecture, or by a completely different scheme.

Step 1	Identification of target groups
Step 2	Deployment of use cases
Step 3	Determination of the value proposition
Step 4	Development of the business model

Fig. 2. The four-stage model for developing a smart service business model

Stage 1. The first step is to define the primary customer target group. An important question here is; who in particular will be addressed by the new smart service and the corresponding business model? According to Osterwalder & Pigneur [12], differentiation of the target groups is necessary if their needs require and justify an individual offer, if they are reached via different distribution channels, if they require different types of payment, if they have significantly different profitability or if they are willing to pay for different aspects of an offer. In electroplating, for example, a distinction can be made between in-house and contract electroplating or between small, medium and large companies, depending on the service concept. Further target group definitions can be made with regard to the liquidity of the respective company or in the differentiation between "makers" and "out-sourcers" (make-or-buy decision).

Stage 2. In the second step, a concrete use case will be developed for the previously defined target group. It must be explained how the service is to be provided, how frequently it is expected to be provided, and what the goals of this business are. In addition, the Unique Selling Point (USP) of the business model idea should be clarified and defined.

Stage 3. The third step is to determine the specific value proposition of the business model idea. It is to clarify what benefits the new or enhanced smart service will provide to the customer and which customer problems can be solved in specific terms. For this step, it makes sense to get a comprehensive picture of the customer in advance and not to develop without taking their actual needs into account.

Stage 4. In the fourth step, the business model is completed. According to Freitag & Hämmerle [15] the following three options have to be considered when developing business models for smart services:

- Existing product with additional IoT benefits,
- New product with new IoT function and
- Develop productless Smart Services.

Finally, in step 4, the core aspects of the business model developed in steps 1 to 3 are brought together and logically linked with a suitable method like the Service Business Model Canvas or the Business Model Canvas. In addition, a viable price and cost structure must now be developed.

The business model is the foundation of a proper service engineering process [16] and for the subsequent further development of the smart service.

3 Agile Service Engineering

As shown by Moro et al. [3], there are many approaches and guidelines to the design of product-service systems, such as Muto et al. [2]. As announced in chapter 1, the focus of this paper is on smart service, where are also many different ways of management. A small selection of these is briefly described below.

In their framework, Zheng et al. [17] propose an integration of value networks, service ecology thinking, and ICTs and offer future perspectives and possible guidelines for the transformation of industry and the further development of new service-based business models.

DIN SPEC 33543 [18] describes a process model for the agile, flexible and rapid development of digital service systems in an industrial context. Starting from the concrete development of a service as a performance result, the process model considers the holistic design of digital service systems. Updated methods from service engineering as well as suitable methods from related areas such as business analytics and software development are presented to help companies structure the development process for their own needs and carry it out in a customer-oriented, efficient and successful manner.

Jussen et al. [19] also present a smart service engineering approach for industrial smart services. The focus here is on the individual steps in service development and the connections and iterations of the single elements of the smart service - based on a case study. The model delivers high speed and quality in project implementation by combining agile working methods and focus on customer centricity.

For the suitability for small and medium size enterprises, it seems reasonable to choose a process model based on these approaches. One possibility to do this is described in the 20-page guideline of Freitag und Hämmerle [20]. This guideline for development of smart services is also based on the Service Lifecycle Management [21, 22, 23].

The entire process is therefore not focused on the smart service alone, but aims at the smart service as a holistic solution. This means that the levels of business model management and network management are also taken into account.

4 Summary

The shift from product-oriented to service-oriented business requires a rethink, especially in traditional companies in the manufacturing industry. The three different main phases Design Thinking, Service Business Models and Service Engineering are important to develop a Smart Service. Here in the paper the focus is on the Service Business Models for small and medium size enterprises. A four-step model for developing a smart service business model is presented. In the final, fourth step, three different options for a smart business model patterns for small and medium-sized enterprises were presented, so the right one can be selected for the chosen use case. Based on the chosen business model pattern, the Smart Service in the manufacturing industry will be developed.

Acknowledgements. This work has been partly funded by the German Federal Ministry of Education and Research (BMBF) through the Project “SmARtPlaS (No. 02K18D112), the project “DigiLab NPO – Digitallabor für Non-Profit-Organisationen 4.0” (No. 02L18A230). The authors wish to acknowledge the Commission, the Ministry and all the project partners for their contribution.

References

1. Freitag, M.; Wiesner, S.: Smart Service Lifecycle Management: A Framework and Use Case. IFIP International Conference on Advances in Production Management Systems. Springer, Cham (2018).
2. Muto, K.; Kimita, K.; Shimomura, Y.: A guideline for product-service-systems design process. *Procedia CIRP*, 30, pp. 60-65 (2015).
3. Moro, S.; Cauchick-Miguel; P. A.; Mendes, G. D. S.: Product-service systems benefits and barriers: an overview of literature review papers. *International Journal of Industrial Engineering and Management*, 11(1), pp. 61-70 (2020).
4. Plattner, H.; Meinel, C.; Weinberg, U.: Design-thinking - Understand-Improve-Apply. Landsberg am Lech: Mi-Fachverlag, Springer-Verlag Berlin Heidelberg (2009).
5. Brenner, W.; Uebersnickel, F.; Thomas, A.: Design thinking as mindset, process, and toolbox, *Design thinking for innovation*. Springer, Cham, pp. 3-21 (2016).
6. Schallmo, D.R.A.: Design Thinking erfolgreich anwenden. So entwickeln Sie in 7 Phasen kundenorientierte Produkte und Dienstleistungen, Springer Gabler, Wiesbaden (2017).
7. Wirtz, B. W.; Schilke, O.; Ullrich, S.: Strategic development of business models: implications of the Web 2.0 for creating value on the internet. *Long range planning*, 43(2-3), pp. 272-290 (2010).
8. Teece, D. J.: Business Models, Business Strategy and Innovation. In: *Long Range Planning*, Volume 43, Issues 2–3, April–June 2010, pp. 172-194 (2010).

9. Stähler, P.: Geschäftsmodell als Analyseeinheit für Strategie. Last accessed 2021/04/07 (2015).
10. Rüger M.; Fischer D.; Nägele R.: Strategieorientierte Geschäftsmodellentwicklung. In: Bullinger, Hans-Jörg (Hrsg.); Bauer, Wilhelm (Hrsg.); Rüger, Marc (Hrsg.): Geschäftsmodell-Innovationen richtig umsetzen: Vom Technologiemarkt zum Markterfolg Stuttgart: Fraunhofer IAO, 2018, pp.18-31 (2018).
11. Zolnowski A.: Analysis and Design of Service Business Models. Dissertation. Universität Hamburg (2015).
12. Osterwalder A.; Pigneur Y.: Business Model Generation – A Handbook for Visionaries, Game Changers and Challengers. Wiley, New Jersey (2010).
13. Warg M.; Weiß P.; Engel R.; Zolnowski A.: Service Dominant Architecture based on S-D Logic for Mastering Digital Transformation: The Case of an Insurance Company. In: Russo-Spena T., Mele C. (Hrsg.) What's ahead in Service Research? New perspectives for business and society. Proceedings. RESER. University of Naples (2016).
14. Burger T.: Testen in der Dienstleistungsentwicklung. Stuttgarter Beiträge zum Testen in der Dienstleistungsentwicklung: Band I. Fraunhofer Verlag, Stuttgart (2014).
15. Freitag M.; Hämmerle O.: Agile Guideline for Development of Smart Services in Manufacturing Enterprises with Support of Artificial Intelligence. In: Lalic B., Majstorovic V., Marjanovic U., von Cieminski G., Romero D. (eds) Advances in Production Management Systems. The Path to Digital Transformation and Innovation of Production Management Systems. APMS 2020. IFIP Advances in Information and Communication Technology, vol 591. Springer, Cham, available at: https://doi.org/10.1007/978-3-030-57993-7_73 (2020).
16. Burger, T.: Testen in der Dienstleistungsentwicklung: Ergebnisse einer qualitativen Erhebung bei Anbietern produktbegleitender Dienstleistungen. Stuttgart: Fraunhofer Verlag (2014).
17. Zheng, M.; Ming, X.; Wang, L.; Yin, D.; Zhang, X.: Status review and future perspectives on the framework of smart product service ecosystem. *Procedia Cirp*, 64, pp. 181-186 (2017).
18. DIN SPEC 33453: Entwicklung digitaler Dienstleistungssysteme. Project: Design Thinking for Industrial Services (DETHIS), Beuth Verlag GmbH, Berlin (2019).
19. Jussen, P.; Kuntz, J.; Senderek, R.; Moser, B.: Smart service engineering. *Procedia CIRP*, 83, pp. 384-388 (2019).
20. Freitag, M.; Hämmerle, O.: Die Entwicklung von Smart Services im Maschinen- und Anlagenbau. Ein Leitfaden, Fraunhofer Verlag, Stuttgart (2021).
21. Freitag M.; Kremer D.; Hirsch M.; Zelm M.: An Approach to Standardise a Service Life Cycle Management. In: Zelm, M.; Sinderen, M. v.; Pires, L. F.; Doumeingts, G.: Enterprise Interoperability. Chichester: John Wiley & Sons, pp. 115.-126. (2013).
22. Freitag, M.: Ein konfigurierbares Vorgehensmodell für die exportorientierte Entwicklung von technischen Dienstleistungen. Dissertation, Universität Stuttgart, Fraunhofer Verlag, Stuttgart (2014).
23. Freitag, M.; Hämmerle, O.: Smart Service Lifecycle Management. In: *Wt werkstattstechnik online* 106, H 7/8, pp. 477-482 (2016).