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Modular Service Structures for the Successful Design of Flexible Customer Journeys for AI Services and Business Models – Orchestration and Interplay of Services

Christoph Peters and Mohamed Zaki

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In a world where artificial intelligence (AI) and other high-tech, digital services are on their way to disrupt the industries, the human side of things (still) matter. Person-orientation, user-centricity and customer orientation are key to every customer's experience and corresponding customer journeys. As new technologies such as AI provide great opportunities, companies try to leverage these potentials. Still, the use and smooth integration of such AI services as part of new or existing services and corresponding customer journeys is neither understood nor straightforward. While we know that seamless customers' journeys that span several channels are important, research on how firms can best manage and (re-) configure their customers' journeys in a flexible manner is still unclear. At the same time complexity of customer journeys as well as the speed with which both technology such as AI applications and consumer behavior are changing is increasing. Companies react to this with trying to implement more agile organizational structures as well as more flexible service provision and customer journeys. But this needed flexibility can hardly be realized with current service provision structures. Instead, this paper suggests modular service structures that allow for a "plug & play" capability of service modules within customer journeys. By doing so, flexible service provision configurations and customer journeys can be realized, thereby also laying the basis for new business models. The paper contributes by introducing the concept of modular service structures as a basis for managing the customers' journeys and by presenting five archetypical customer journey configurations.

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Modular Service Structures for the Successful Design of Flexible Customer Journeys for AI Services and Business Models – Orchestration and Interplay of Services

Christoph Peters[a] & Mohamed Zaki

[a] Visiting Research Fellow, Cambridge Service Alliance, Postdoctoral Researcher and Project Manager at Institute of Information Management (IWI-HSG), University of St. Gallen, Switzerland & Research Center for Information System Design (ITeG), University of Kassel, Germany

Abstract

While we know that seamless customers' journeys that span several channels are important, research on how firms can best manage and (re-) configure their customers' journeys in a flexible manner is still unclear. At the same time complexity of customer journeys as well as the speed with which both technology such as artificial intelligence (AI) applications and consumer behaviour are changing is increasing. Companies react to this with trying to implement more agile organizational structures as well as more flexible service provision and customer journeys. But this needed flexibility can hardly be realized with current service provision structures. Instead, this conceptual paper suggests modular service structures that allow for a "plug & play" capability of service modules within customer journeys. By doing so, flexible service provision configurations and customer journeys can be realized, thereby also laying the basis for new business models. The paper contributes by introducing the concept of modular service structures as a basis for managing the customers' journeys and by presenting five archetypical customer journey configurations.

1. Introduction

In a world where artificial intelligence (AI) and other high-tech, digital services are on their way to disrupt the industries, the human side of things (still) matter. Person-orientation, user-centricity and customer orientation are key to every customer's experience and corresponding customer journeys. That is why the interplay of artificial and human services becomes key priority for the design of future service offerings and business models.

As new technologies such as AI provide great opportunities, companies try to leverage these potentials. Still, the use and smooth integration of such AI services as part of new or existing services and corresponding customer journeys is neither understood nor straightforward. Also, the increased flexibility of service provision to react to new and rapidly changing customer demands is a great challenge.

In this context, existing rigid service provisioning structures do not seem appropriate. As a solution, this paper therefore introduces and suggests modular service structures for more flexible provision of services and design of customer journeys. Implementing such modular service structures aims to facilitate a "plug & play" capability for this to-be-engineered interplay of AI / digital and non-AI, non-digital services and corresponding customer journeys.

As customer journeys are also influenced by the actual types of services that are offered, the following research question emerges for the successful management of customer journeys in the

future: What are customer journey configurations for AI services? This question is answered and discussed within this paper and implications for future research are outlined.

2. Theoretical Background

Research on services and AI services, on service experience and customer journeys as well as on modular service structures is in existence. Still, these research streams have so far not been combined. Thus, this section provides the according theoretical background and outlines the existing research gaps.

AI Services and Service Experience

A service itself is "(a set of) activities being part of interactions between the components of service systems" (Leimeister 2012). It is a complex phenomenon. Within service industries, more and more service come into existence that comprise a combination of both, digital and non-digital services (Peters 2016). This also applies to AI services, given they are not standalone AI services. Such service combinations differ regarding their standardization and interface specification capabilities. That is why "innovative assembly" of AI / digital resources and non-AI / non-digital resources is needed (Srivastava and Shainesh 2015). This assembly or orchestration of such (AI) services is remaining a research gap.

In this context, one can also agree on the many-to-many service experiences (Chandler and Lusch 2015) that have to be orchestrated in customer journeys. These service experiences are made during the co-creation of services (Vargo and Lusch 2004; Vargo, Maglio et al. 2008). The path of co-creation is not simple or uni-faceted, but rather involves a "complex combination of activities and interactions between lead firms and network actors, characterized by both lead firm and network-based innovation" (Perks, Gruber et al. 2012) in which the service provider not only makes value propositions, but "can engage itself in customers' value fulfillment as well" (Grönroos 2008). Service experience that considers combinations of AI / digital and non-AI / non-digital services is still in its infancy.

Customer Journeys

Customer experience and customer journeys have been studied for over 50 years now. Lemon and Verhoef (2016) provide one of the most comprehensive overviews of these two highly-connected topics in their 2016's article "Understanding Customer Experience Throughout the Customer Journey". It is especially the seamless experience of the customer journey that creates stronger customer experience. This can be achieved through channel integration. While this considers new technological possibilities and there is research that explicitly integrates these for analyzing customer experience, e.g. through text mining (Villarroel Ordenes et al. 2014), there is a lack of existing knowledge on how to integrate technologies such as AI into the customer journey and thereby respect their specific characteristics.

Customer journeys are often structured and defined along touchpoints that represent the interaction between customers and either service providers or resources of the latter. Still, no research exists that considers AI services as well as their specific, new touchpoints.

Modular Services Structures

Modular service structures and its according literature have been discussed by Peters (2016) extensively. The following paragraphs represent this accordingly. Modularization comprises the decomposition of one object into decoupled single components with specified interfaces that can be combined to create new single components (Böhmann and Krcmar 2006). First ideas go back to Parnas (1972), who postulated that decomposing systems into modules improves overall manageability, as not all (sub-) functions (of a module) need to be visible but can be hidden if the overall module function is clearly specified, i.e., information hiding.

Modularization rests upon the basic principles of cohesion and loose coupling (Balzert 1996). Cohesion describes the extent of intra-module dependencies. A high cohesion is a requirement for well-specified modules that can be reused and combined with other service modules. Loose coupling prescribes that there are only few inter-module dependencies between the elements of the different modules (Böhmann and Krcmar 2006). Thus, loose coupling relates to the independence of the modules. Modules serve a specific function (Schilling 2000) and are connected by interfaces which have to be specified appropriately (Ulrich 1995; Baldwin and Clark 1997).

The potentials of service modularization (Böhmann and Krcmar 2006) are manifold: (1) reuse – the repeated use of one specific module within different services; (2) faster development – the increase of overall development speed through higher manageability due to smaller objects of consideration (the modules) that have defined interfaces; (3) module-wide innovation – the possibility of concentrating innovation efforts within one strategically important module that is supposed to provide competitive advantages; (4) rapid reconfiguration – the efficient (re-) configuration of modules enabling a customer-centric service provision in a mass customization manner.

Although this efficient (re-) configuration potential has been identified, it has only been scarcely used. First approaches exist that guide service providers through the acts of modularization, i.e. creating modular structures out of existing, but non-modular service structures (Peters 2016, Peters & Leimeister 2013). The use of modular service structures that enable flexible customers' journeys is a clear research gap in relevant literatures, i.e. literature from information systems, marketing and service science.

3. Modular Service Structures and Archetypical Configurations of Customer Journeys

In order to create adequate and user-centered customer journeys for AI services, one has to acknowledge that typically, many AI services are not offered "standalone", but rather in a combination with other non-AI services.

From a service provision point of view, a prerequisite for modular service structures is the formation of modules. As the focus of this paper is on customer journeys based on such modules, the actual process of modularization, i.e. forming modules out of existing and planned so-far unmodularized services and service processes is only briefly described. It builds on existing approaches (Peters 2016, Peters & Leimeister 2013): In a first step the service processes of the relevant services are modelled. This leads to a process map of the services. So-called modularization parameters (Peters 2014) are defined, and all service processes are assessed using these modularization parameters such as "geographical proximity", "personal stakeholder interaction", etc. Thereby, dependencies between service processes can be analyzed leading to the formation of modules, i.e. groups of service processes. As one key characteristic of modules is that each module fulfills one dedicated function, e.g. "data transmission" or "personal greeting of customer", all relevant processes for one function are located in one service module. These modules can then be used for a flexible, "plug & play" service provision that also allows flexible design of customer journeys.

In this context, five archetypical configurations of customer journeys that are based on modular service structures could be identified. These are depicted in Figure 1. Just for illustration purposes, they all follow a customer journey with eight touchpoints. All five archetypes comprise a set of modules (each depicted as one puzzle piece) that are either white and / or black. A module is white if it comprises traditional services and black if it comprises AI or digital services.

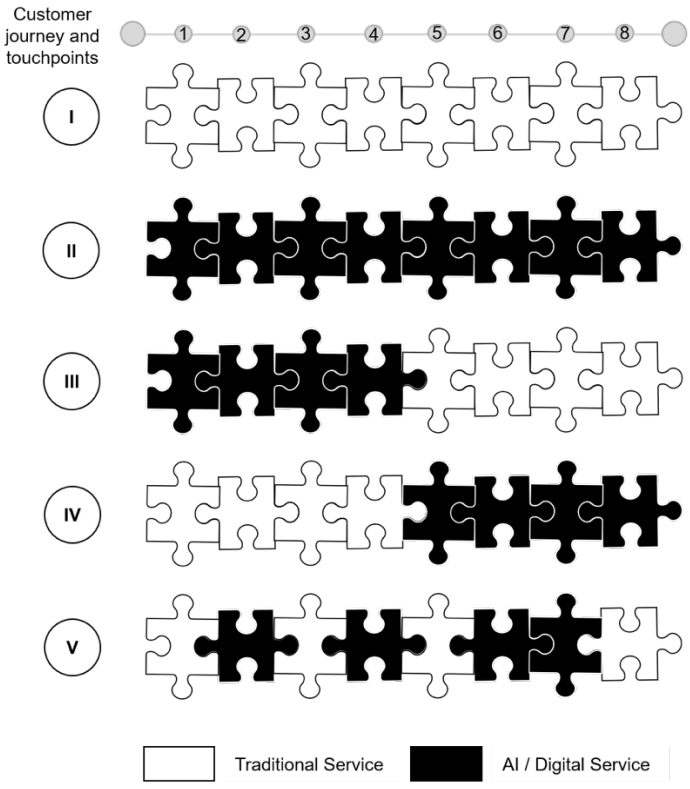

Figure 1: Five archetypical configurations of customer journeys

As depicted, the following archetypes can emerge:

- customer journeys that are fully comprised of traditional service modules (I),

- customer journeys that are fully comprised of AI / digital service modules (II),

- customer journeys that start with AI / digital service modules and follow-up with traditional service modules (III),

- customer journeys that start with traditional service modules and follow-up with AI / digital service modules (IV),

- customer journeys that are characterized by several changes between traditional service modules and AI / digital modules (V).

Depending on the different archetypes, the design of customer journeys is extremely different and can also be distinguished in regard to the novelty of challenges they involve during the design process. Still, the archetypes are supposed to help in implementing customer journeys for AI / digital services.

4. Discussion and Future Research

The engineering and provision of AI-enabled services as well as the design of corresponding customer journeys is in its infancy. Still, it becomes obvious that these new potentials also create new challenges for the design of customer journeys. As these must be more of a flexible manner due to increasing change of technological advancements (not only AI) and customer needs, a highly flexible configuration of such customer journeys deems appropriate. While this can hardly be realized with the current structures, modular service structures are suggested and presented in this paper.

One major contribution of this paper is the presentation of the five archetypes of customer journeys. In this context, we can state that for customer journeys that are fully comprised of traditional service modules, the current literature on customer journeys and service experience is expected to provide extremely valuable insights and advice. For all other archetypes, two major challenges are expected: (1) AI-specific consideration of customer journey design (for all AI / digital service modules; the black puzzle pieces of Figure 1). (2) the design of interfaces between AI / digital service modules and traditional modules or vice versa (for the interfaces between the black and the white puzzle pieces in Figure 1). As this is a conceptual paper and work-in-progress, the selection of cases and conduction of case studies to test and improve the concept is an important next step.

Also, the potential to design new business models in accordance to each of the last four archetypes and module-wide variations that might be applied to them needs further elaboration. As an example: the business models for two very similar customer journeys might differ considerably if

only one service module at any touchpoint is changed from traditional to AI / digital or vice versa. The elicitation of specifically new business models and underlying patterns as already performed in other fields (Peters, Blohm & Leimeister 2015) is considered promising.

Also, the current research made clear, that there are still many open questions that could not be answered so far and which call for according future research: how can interfaces be defined that foster the "plug & play" character of modular service structures? How does a systematic method look like that guides service providers through the flexible configuration of customer journeys? Which role does live data play in this regard? How can and should customer self-services and live data of customer interactions and experience be integrated in (self-) adaptable customer journeys?

5. Conclusion

This paper deals with modular service structures and the design of customer journeys for AI services. The concept of modular service structures is suggested to conquer newly arising challenges that call for more flexible customer journeys. In this context, five archetypical customer journey configurations are presented. These configurations integrate either pure forms, i.e. they comprise only traditional (archetype I) or only AI / digital service modules (archetype II), or hybrid forms, i.e. they comprise combinations and (several) changes of both module types (accounts for archeytpes III-V), throughout the overall customer journey.

The paper contributes by presenting the concept of modular service structures for the design and management of AI services and the five archetypes of customer journey configurations for AI- / digitally-enabled services. This builds a great starting point for the following issues and challenges that are relevant for practice and research: how need AI-specifics to be considered in the design of customer journeys for AI services? How to design the interfaces between traditional and AI / digital services modules within customer journeys and vice versa? Which consequences have these new customer journeys for corresponding business models and how should this be reflected in the design of these business models?

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