Please quote as: Kleinschmidt, S.; Burkhard, B.; Hess, M.; Peters, C. & Leimeister, J. M. (2016): Towards design principles for aligning human-centered service systems and corresponding business models. In: International Conference on Information Systems (ICIS), Dublin, Ireland.

Towards Design Principles for Aligning Human-Centered Service Systems and Corresponding Business Models

Research-in-Progress

Stefan Kleinschmidt [1]
stefan.kleinschmidt@unisg.ch

Barbara Burkhard [2]
barbara.burkhard@unisg.ch

Manuel Hess [2]
manuel.hess@unisg.ch

Christoph Peters [1,3]
christoph.peters@unisg.ch

Jan Marco Leimeister [1,3]
janmarco.leimeister@unisg.ch

[1]University of St. Gallen
Institute of Information Management
Unterer Graben 21, 9000 St. Gallen, Switzerland

[2]University of St. Gallen
Institute of Technology Management
Dufourstrasse 40a, 9000 St. Gallen, Switzerland

[3]University of Kassel
Research Center for IS Design (ITeG)
Pfannkuchstr. 1, 34121 Kassel, Germany

Abstract

To benefit from service innovation the service system and the corresponding business model (BM) have to be adapted or developed. Unfortunately, there are no guidelines that ensure that both development streams match, include, and align the same value for the customer. Therefore, we conduct a design science research (DSR) project, in which we develop design principles that guide the alignment between the two concepts of service systems and BMs via the value proposition. We build the design principles based on existing research in service design and BMs, and apply them in the field of human-centered service systems (HCSSs). The preliminary artifact shows that the design principles relate to concrete problems from both research streams. In conclusion, this research-in-progress will contribute to existing knowledge in combining the two research streams of service systems and BM research, and offer practitioners assistance for the systematic design of HCSSs and their corresponding BMs.

Keywords: Service Design, Business Model, Value Proposition, Service Innovation, Human-Centered Service Systems, Service Science, Design Principles, Design Science Research

Introduction

Information and Communications Technology (ICT) influences and triggers innovations toward a service economy (Peters et al. 2016; Rai and Sambamurthy 2006). To benefit from service innovation the service itself and the corresponding business model (BM) have to be adapted or developed (Witell et al. 2016). For both parts, service design and BM design, several approaches exist to develop a service system that creates value for the customer and that enables service providers to earn money. Thereby, the problem for those responsible for service innovation is that guidance for the alignment is lacking. In practice, only a few models are used to support the systematic development of services and their corresponding BMs (Peters et al. 2015). A commercialization of the service system is usually not a component of the service design (Witell et al. 2016). The existing approaches describe high-level processes for service innovation, but not concrete activities nor the methods to be deployed (Essén 2009; Meyer Goldstein et al. 2002). Also, a holistic approach to service innovation is needed to develop scalable service offers (Kindström 2010).

Matching service design and BM design is highly relevant in digital transformation as service-dominant logic puts service as the fundamental basis of value creation (Vargo and Lusch 2004, 2016). Expressions thereof are service concepts such as "everything as a service", where a changed value proposition affects the service delivery and the revenue streams (Banerjee et al. 2011). Similar innovations can be observed in different contexts such as the hotel industry (Airbnb) or the taxi business (Uber). Here, the value proposition is the key element of service design (Patricio et al. 2011), BM design (Osterwalder et al. 2015), and digital business (Al-Debei and Avison 2010). Once people have bought the mental picture of a service, organizations have to deliver a service experience and are in need for structural guides or methods (Meyer Goldstein et al. 2002).

This development is particularly relevant where human interaction gives opportunities for service innovation (Barrett et al. 2015). This is the case in human-centered service systems (HCSSs) that "depend critically on sharing capabilities" (Maglio et al. 2015, p. 2). HCSSs depend on interactions, shared information, and ICT (Peters et al. 2016). In our project context, the coordination of voluntary work to support older people is enabled by ICT. The design of service systems requires new representations and formalisms (Peters 2016). The challenge that remains is incorporating the value proposition in HCSSs, allowing to create and enhance customer value and business turnover (Kleinschmidt et al. 2016).

This paper aims at expanding the design knowledge in service systems and BMs by linking the two approaches via the value proposition. Therefore, we want to develop prescriptive knowledge (Gregor and Hevner 2013) that could guide those responsible for service innovation in HCSSs in implementing the same value propositions into service systems and corresponding BMs. The resulting research question (RQ) is the following:

What are design principles for human-centered service systems that enable the systematic alignment of the service system and the corresponding business model?

By answering the RQ, we provide an explicit prescription (Gregor 2006). This prescription allows startups and established service providers to design their service businesses more systematically by combining service design and BM research. Business developers and service designers can rely on familiar models, but these will become more concrete in the execution. Also, we are implementing this in service systems that coordinate voluntary work to support older people. Thus, we show this in the specific context of HCSSs, where service innovation is a rising opportunity. Value proposition as a key element of design provides the possibility to align the different research streams and to consider service innovation from a holistic viewpoint.

In presenting our research in progress, we begin by outlining the related literature on service design, BMs, and HCSSs. Second, we explain our design science research methodology to develop the design principles. Third, we provide an overview of the findings that have been made thus far. We then specify how the further development, demonstration, and evaluation will take place. Finally, we summarize the findings and give an outlook of the expected contribution.

Theoretical Background

Service Design

Service design is the "systematic application of design methods and principles to the creation of service concepts for new or improved services" (Holmlid and Evenson 2008, p. 341). Because service design is considered as multidisciplinary, this definition is, similar to others, kept open to fit a wide range of application domains (Nisula 2012). Concerning content, it comes down to two application areas. First, human-centered methodology includes the definitions of customer experience and expectations. Second, the methods for modeling, prototyping, and enacting include the definition of the participating entities with their activities and the testing and resolution of problems (Holmlid and Evenson 2008; Peters 2016). The latter is linked to the activities in new service development (Papastathopoulou and Hultink 2012). Service design is mostly customer and experience-centric (Teixeira et al. 2012; Zomerdijk and Voss 2010). A specific procedure for the service design is hard to find because it usually has to be adapted to the context of the service domain and customer problem (Edvardsson et al. 2011; Essén 2009). There are approaches like service systems engineering that employ engineer thinking to make service design more systematic (Böhmann et al. 2014). These approaches offer a comprehensive methodology to identifying linkages among service systems and structure the development accordingly.

Service systems can be found as the result of service design (Alter 2012). These service systems are "configurations of people, information, organizations, and technologies that operate together for mutual benefit" (Maglio et al. 2015, p. 2). Participants of this service systems apply specialized competences for the benefit of others (Vargo and Lusch 2016). This is in line with the service-dominant logic that understands service as a process cocreating a context-specific value (Vargo and Lusch 2004). The customer is involved in the value creation and is also the beneficiary of the service system. Thus, the value to the customer has a special significance in service design (Patricio et al. 2011). In the design and development of a service system, there are various artifacts that show a concrete representation of the value proposition and creation such as prototypes or beta versions (MacCormack et al. 2001). A commercialization of the service system is usually not a component of the service design (Witell et al. 2016). First attempts have been made to include BMs in service design (Zolnowski et al. 2014), but structures and methods for alignment are lacking (Witell et al. 2016).

Business Models

A BM is a "simplified and aggregated representation of the relevant activities of a company. It describes how marketable information, products and/or services are generated by means of a company's value-added component" (Wirtz et al. 2016, p. 41). This is useful for customers and service designers to understand the value of service systems as both have limited background knowledge (Noh et al. 2016). In practice, however, only a few models are used to define these relationships, such as the business model canvas (Osterwalder and Pigneur 2010) or the business model navigator (Gassmann et al. 2014). All of these approaches have different components representing the functioning of the BM (Wirtz et al. 2016). A fundamental component of a BM is the value proposition (Maglio and Spohrer 2013; Osterwalder et al. 2015; Wirtz et al. 2016). The value proposition "describes the benefits customers can expect from products and services" (Osterwalder et al. 2015, p. 6). Thus, it shows how a customer's problem is solved. This is naturally related to how a service is designed and can therefore not be considered separately (Osterwalder and Pigneur 2010).

There are various approaches to specify the service system regarding the value proposition and the BM. Value proposition design is about "applying tools to the messy search for value propositions that customers want and then keeping them aligned with what customers want in post search" (Osterwalder et al. 2015, p. XIII). It focuses on the problem-solution fit, the product-market fit, and the BM fit. An alignment between the value proposition of the BM and service system does not happen (Chandler and Lusch 2015). BM implementation describes the process "from the informal first idea to a process of trial and error shaping its final design, or a continuous process of modification, where customers, technology, business system infrastructure and economics and profitability are all rethought" (Sabatier et al. 2010, p. 434). Although this is what everyone has to do, BM implementation or execution is a widely neglected issue (Hacklin and Wallnöfer 2012; Osterwalder et al. 2005).

Human-Centered Service Systems

HCSSs are service systems with a focus on human interaction and personal services (Maglio et al. 2015). They differ from other service systems because personal interaction between the actors is essential for the value creation. These service systems are of great importance because they cover areas that are essential for our society and our everyday life (Peters et al. 2016). This is the case in diverse industries such as hospitality, healthcare, retail, finance, government, and infrastructure (Maglio et al. 2015). Among these HCSSs are services that coordinate voluntary work to support older people, which are covered in our research project. These services are shaped by the rising expectations and demand for personal services as well as changing organizational and delivery structures (Barrett et al. 2015). Response to these challenges is service innovation in the service systems and their corresponding BMs. Service innovation in HCSSs does thereby not follow the same logic as other sectors, as they resist traditional optimization and automation (Maglio 2015). Here, coordinated action among people and technologies is needed (Maglio and Spohrer 2008).

In HCSSs, the characteristics of service systems that influence the design of the services and BMs have a great extent (Kleinschmidt et al. 2016; Maglio et al. 2015). They tend to be knowledge-intensive and customized, which requires customer participation and input for value creation (Maglio and Spohrer 2008). The more a service system depends on knowledge and customization to the customer needs, the higher is the customer involvement in the value creation (Maglio and Spohrer 2008; Peters 2016). Also, value cocreation takes place in use and exchange (Vargo et al. 2008). This means that value is created when resources are integrated and applied in a specific context. This is usually bound to human interaction. In the service system, an exchange takes place between the different participants, which can also be quite individual. For the design of service systems and corresponding BMs, a high level of interaction is important, but limits the efficiency (Chase 1981). Also, due to the person-related and non-standardized value creation, it is difficult to use a production line approach in those services (Levitt 1972).

Proposed Research Approach

The research presented in this paper was embedded in a larger three-year research project that aimed at developing and introducing online matchmaking platforms for volunteers based on existing offline services. The research project contained a technical part including the development and testing of the matchmaking software and a business part including the design and implementation of the service system and the corresponding BMs. After half of the time, the objective of the presented research is to expand the design knowledge regarding services systems and BMs by linking the two research streams via the value proposition. We have organized three workshops, where we challenged the respective operators of the platform to create problem definitions. Practically, we want to provide assistance for the systematic design of HCSSs and corresponding BMs that does not yet exist in this form. Therefore, we base our research approach on guidelines for Design Science Research (DSR) provided by Hevner et al. (2004) and the methodological basis for DSR as suggested by Peffers et al. (2007). Here, the focus is on creating and evaluating a useful artifact that enables organizations to address important information-related tasks. Overall, our completed research will provide a contribution to the theory of design and action (Gregor 2006; Gregor and Hevner 2013).

For the artifact, we propose design principles that are "knowledge about instances of a class of artifacts" (Sein et al. 2011, p. 39). They contribute to design knowledge beyond instantiations that are applicable in a limited use context (Gregor and Hevner 2013; Gregor and Jones 2007). In our context, the design principles should support the adoption or development of HCSSs as well as corresponding BMs. For the presentation of the artifact, we use the notation for design principles that was described by Chandra et al. (2015). An effective formulation of design principles can be achieved through a clear and precise structure. Therefore, our formulation contains statements about "*what* an artifact should enable users to do and *how* it should be built in order to do so" (Chandra et al. 2015, p. 4043) as well as the relevant use context or intended user group. We will describe actions of the service designers and materiality of the actions as well as boundary conditions under which the design will work. The level of abstraction and amount of detail is chosen to the extent that it is appropriate for application in HCSSs.

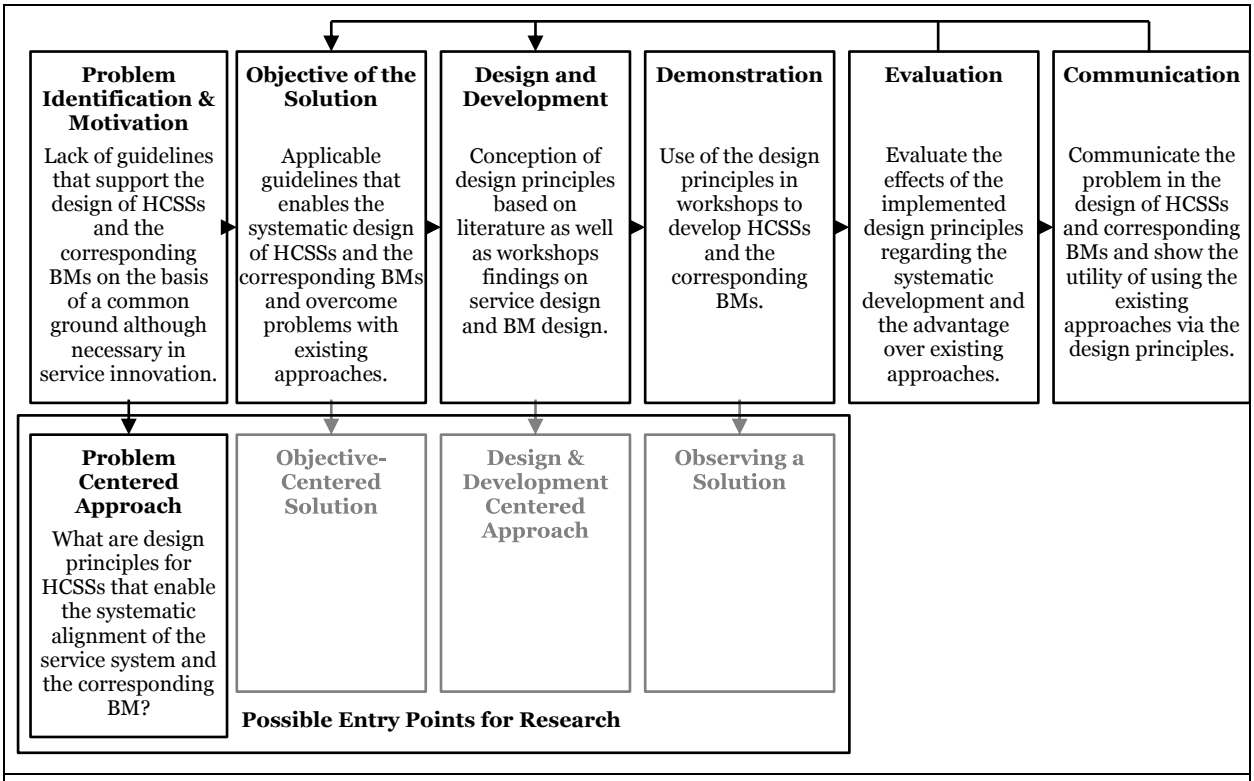

Figure 1. Research Approach for Developing the Design Principles. Adopted from Peffers et al. (2007).

Our DSR approach consists of six main activities (Figure 1) and is in line with the methodology of Peffers et al. (2007). In this research in progress paper, we present the activities until the design and development of first design principles. As presented in the beginning, our approach is problem-centered. The problem identification and motivation is the research entry point for the DSR project (Peffers et al. 2007). The second activity is the definition of the objectives of the solution. Here, the focus is on the applicability and usefulness for practitioners in the solution of the emerging problems. This will also be central to the evaluation of the possible solution ideas. The third activity is the design and development of the design principles. Here, we will refer to the presented notation and will describe the desired functionality of the design principles. The design and development is ongoing at the moment. After designing the artifact, we will demonstrate that the use of the artifact solves the initial problem. This will take place in the form of workshops, such as those used for the specification of the problem, to have evidence for different HCSSs. In the fifth activity, we will then evaluate how well the application of the design principles will help solve the problems compared to existing solutions. After the design principles have been improved in several iterations, in the last activity, the problem and the corresponding solution can be communicated in publication after completion of the project.

Artifact Description

Problem Identification & Motivation

We started the research project with the introduction of a service innovation in the existing HCSSs. Here, the service system that coordinates voluntary work to support older people is enabled with ICT. The reason for that was that the mediation was labor-intensive and did not represent the core value creation in the service system. The value proposition of this placement service is that it helps older people with first physical handicaps to deal with their everyday life with the assistance of their neighbors. This, including social contacts, helps with simple daily tasks and allows participation in various activities. Neighbors that accompany elderly people can thereby expand their competencies and receive cost compensations due to

legal regulations. The objective of the ICT implementation was to enable the transparency of people who need help and people who want to provide help and to improve the matchmaking of supply and demand. In the conception of the solution, it became clear that the adaptation of the service system was not sufficient. To offer a scalable service and to cover the costs of the implementation, the service innovation has to be extended to the BM. Both parts had to be aligned with each other to develop a continuous customer experience in the service system. The design of the service delivery is thus somehow separated from the considerations of the BM. Although some of the activities match, not all do.

The problems with existing solutions were revealed from a literature review and confirmed in three workshops. (1) In service design, the definition of customer expectations and experience runs in multiple iterations that require an alignment with the other existing parts in the service system (Holmlid and Evenson 2008). This means that the definition is very expensive and takes many resources. (2) A standard service delivery is defined between service providers, but do not reflect the individual service delivery in the individual cases (Patricio et al. 2011; Skålén et al. 2015). This standard service delivery can lead to many exceptions in the service process and can turn out not to be the best solution. The result is a constant adjustment. (3) Furthermore, BM design is done in iterations, where no alignment is done with the existing service system (Chandler and Lusch 2015). After completion of the iterations in the development, there is no inference whether the desired solution is delivered in the service system. (4) Also, the existing solutions do not address the implementation or execution (Hacklin and Wallnöfer 2012; Osterwalder et al. 2005). Iterations are the preferred way to operationalize the BMs. Thereby, there are special characteristics of service innovations in HCSSs that cause restrictions in the design and alignment. This is the case when end users are involved in human interaction. Then, the iteration is limited. (5) One the one hand, there is a trend towards ICT-support, but on the other hand, there are rising expectations and demands for personal services (Barrett et al. 2015). Value creation is dependent on human interaction and support through ICT (6) Also, the HCSSs resist traditional optimization and automation (Maglio 2015). Here, the dependence on the human interaction limits the substitution through ICT. (7) On top of that, people who work in HCSS have typically contact with customers and know their needs. They usually do not have design knowledge (Noh et al. 2016). The found problems are included in Table 1.

Table 1. Problems and Objectives for Aligning HCSSs and the Corresponding BMs.

Origin	#	Problems with Existing Solutions	Resulting Objectives of the Solution
Service Design	1	Definition of customer expectations and experience in several iterations that requires alignment.*	• Identify the competitive advantage. • Align service system after iterations.
	2	Individual service delivery cannot be planned.*	• Approximate scenarios and ranges of service experiences.
BM Design	3	Solution-product fit is not checked.	• Check promised customer value at the end of the service innovation.
	4	High-level implementation or execution processes.	• Planning and coordination of various approaches.
HCSSs	5	Rising expectations and demand for personal services.	• Define scale and scope of the service innovation.
	6	Resistance to traditional optimization and automation approaches.	• Coordinate actions among people and technologies in the service innovation.
	7	Little design knowledge of the employees in the service system that have the contact with the customer and their needs.	• Independent validation by design experts.
* This problem is true for service design and BM design			

Objectives of the Solution

The overall objective of the design principles is to have practically applicable guidelines. Those guidelines will enable the systematic design of HCSSs and the corresponding BMs and thus overcome problems in the combination of both parts. For this, we use, build upon, and connect the existing tools in service design and BM design. While the existing solutions indicate that the value proposition could be a link between the two innovation streams, service system and BM, they do not offer a way to align them. Based on the value proposition design (Osterwalder et al. 2015; Skålén et al. 2015; Vargo et al. 2008) we derive corresponding objectives for the design principles. The results are included in Table 1.

The resulting objectives for the design principles are related to the value proposition of the service system and BM. In service design and BM design, the customer expectations and experience are defined in several iterations. (1) To improve these expensive and complicated iterations, Noh et al. (2016) advise to identify the core utilities in the service system and align the service system and the corresponding BM after each iteration. As the individual service delivery cannot be planned, we should use the best possible solution. (2) Based on Operations Research an optimization model with approximations could contain scenarios and ranges of service experiences (Bishop et al. 2007). As the solution-product fit is not checked yet, this is an easy to fix objective of the solution, (3) when the design principles include an alignment of the defined customer value in HCSSs and BM. As it is important to distinguish model (i.e. the business concept) and implementation (i.e. the form it takes in reality) the high-level process for implementation cause uncertainty. (4) Building on service design with different approaches (Holmlid and Evenson 2008), the planning and coordination of various approaches for implementation could help to make it more concrete. When referring to the various problems with HCSSs, existing solutions can be reused to find objectives for a solution. (5) As the rising expectations and demand for personal services cause problems in productivity, the definition of scale and scope for the service innovation is a suitable objective (Barrett et al. 2015). Resistance to traditional optimization and automation becomes the problem if the optimization cannot be completely planned in advance. (6) The objective should be, that there is a coordination in the design on what can be done by technology and what should be done by humans. Operative service employees in HCSSs are perfect for designing HCSSs and corresponding BM as they have contact with the customer and knowledge about their needs. On the other side, they have little knowledge in service and BM design. (7) An objective for the solution is that the outcomes are validated by experts in service and BM design.

Design and Development: Preliminary Artifact

As the validation of the objectives is ongoing, we present preliminary design principles to give a concrete example of our artifact. So far, design principles were developed for the scenario definition and the definition of scale and scope of the service innovation, as these aspects are quite fully validated. The two examples depict commonly used components of the design. From the feedback that has been collected, it is not clear whether for each objective a design principle will be developed. This feedback comes from the use cases in which the HCSSs are aligned with the BMs. It contains feedback on whether the problem relate to the particular objective.

The design principle "Define Scenarios" includes a definition of the different outcome scenarios with respect to the customer experience. This is an important dimension of the value proposition (Chandler and Lusch 2015). The scenarios enable the service designer to assess the opinion of the customer and to manage the outcome alignment between the service system and the BM. In our project context of coordinating voluntary work to support older people, this principle will help to figure out which different outcomes of the matchmaking may arise. This will help to define the value of the HCSSs for the different actors in the service system. The design principle "Define Scale and Scope of the Service Innovation" includes a definition of the core process for the service innovation. The degree of change allows the comparison of the change in HCSS and BM. The scale and scope of the service innovation should be described in a certain form to facilitate comparability. In the project context, this will help to align the design in the system and the BM by the comparison of the changes. A detailed description of the two design principles is given in Table 2.

Table 2. Developed Design Principles and Accompanying Descriptions.

Design Principle	Description	
Define Scenarios	Action	Service designers should define the outcome for the customer regarding the customer experience. Based on the scenarios value and pricing of the service can be obtained for the alignment in HCSS and BM.
	Material properties	Possible outcomes for the customers are defined in best, worst most likely outcome.
	Boundary conditions	The defined customer process should be included as a reference. For the remaining uncertain parameter, assumptions should be made and they are made visible.
Define Scale and Scope of the Service Innovation	Action	Service designers should define the core process for the service innovation and the degree of change as they can compare the change in HCSS and BM.
	Material properties	The scale and scope of the service innovation describe the start and end point of the service innovation in the form of type, process, involved actors, and measurement variable.
	Boundary conditions	The scale and scope of the service innovation should allow service designers to compare to the initial situation and the changed situation.

Further Work

We will finish the different activities in our DSR approach (Figure 1) for further work on the design principles. First, we will complete the design and development of the design principles in a first cycle. This includes the validation of the design objectives and the development of further design principles. Second, we will demonstrate that the design principle will solve instances of the found problems. Here, we will test their structure and content and use them in different workshops to adapt or develop HCSSs and corresponding BMs. Third, we will evaluate the effects of the implemented design principles in the workshops regarding the systematic development and the advantage over existing solutions. Finally, the completed status of the design principles will be published and communicated. Inputs from the evaluation and communication phase can lead to further design or the adaptation of the solution objective (Figure 1). To operationalize the further activities in the demonstration and the evaluation, we will use the framework for evaluation in DSR (Venable et al. 2016). The steps in the framework will offer feedback for further development and assure the rigor of the DSR project. Venable et al. (2016) name four steps in the evaluation that we applied to our project: (1) explicate the evaluation goals, (2) choose the evaluation strategy, (3) determine the evaluate properties, and (4) design the individual evaluation episodes.

The goal of the evaluation is to establish design principles that have benefit in real design situations and improve the aligned design of the HCSSs and the according BM over the long run. The major design risk is social and user oriented, as the users would probably reject the use of impractical design principles. The design principles need to be involved in the interaction of the workshops or other interactive design activities. The evaluation strategy is based on this risk. Therefore, we use formative evaluations early in the process to have a logical check and progress with more naturalistic and formative evaluations. At the end of the DSR project, summative evaluations will be used, which focus on a rigorous evaluation of the effectiveness of the artifact. We derive the properties of the evaluation form the identified problems. Here, we abstract from the problems, so that our properties are the user satisfaction, the quality assurance, and the resource utilization. The individual demonstration and evaluation phases for the validation of the specification, the proof of applicability, and the proof of usefulness. The exact description and the planned evaluation steps can be seen in Table 3.

Table 3. Phases for Demonstration and Evaluation of the Design Principles.

Phase	Description
Validated design specification (Formative and formal evaluation)	Formal evaluation of the procedure and the structure of the design principles. • Feedback from experts in design science research. • Feedback from experts in design principles.
Proof of applicability (Naturalistic and formative evaluation)	Quality assurance by experts in the fields of the involved domains. • Interviews with experts in business model design. • Interviews with experts in service design.
Proof of usefulness (Naturalistic and summative evaluation)	Test utility/benefit in the field settings with potential users of the design principles. • Field study of the usage of the design principles with application in HCSSs. • Utility tests in comparison with other approaches.

At the time of publication, the interview settings with the experts in the BM design and service design are not clear. The plan is that we discuss every design principle with at least four experts. The proof of usefulness will be done by using the design principles in the research setting and in student groups that solve real world problems with and without the design principles.

Conclusion and Contributions

This research in progress aimed at expanding the design knowledge in service systems and BMs by aligning them via the value proposition. Therefore, we proposed DSR as research approach and design principles as an artifact. Based on the theoretical background of service design, BMs, and HCSSs we could show special characteristics of the research fields. In the artifact description, we specified the different occurring problems with existing solutions and defined matching objectives for our design principles. We could then already show preliminary design principles for scenarios definition and definition of scale and scope of the service innovation. Finally, we were able to show the planned demonstration and evaluation of the design.

We expect that the completed research offers several contributions. We provide a theory of design and action according to Gregor (2006) as the design principles help to implement artifacts and to improve service system and BM design. Additionally, the design principles itself are a design theory contribution (Gregor and Hevner 2013). We contribute to literature with the combination of the two research streams of service systems and BM research. Thus, we offer solutions for the diffusion of service innovation. Further, the proposed artifact provides a practical contribution. We guide those responsible for service innovation implementing the same value propositions into service systems and corresponding BMs in the context of HCSSs. Therefore, the design principles improve the outcome of service innovations in a simple way. Additionally, the application in HCSSs makes the result more tangible for practitioners.

Acknowledgements

The research presented in this paper was partially funded by the Active and Assistive Living (AAL) programme and the Swiss State Secretariat for Education, Research and Innovation (SERI) under contract number AAL-2013-6-145.

We would like to thank Jan vom Brocke and Robert Winter for their valuable feedback during the research seminar on Design Science Research at the University of St. Gallen.

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