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Interaction as a Concept for Social Service Engineering

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ABSTRACT

Purpose: Human factors play a central part in the design and management of services and service systems. This paper asks the conceptual question of the role of human factors in service science, speaking about the dimensions of human interactions in service design.
Design/methodology/approach: Our research is deeply embedded in the approach of design science research (DSR). In contrast to the DSR which focuses primarily on designing and evaluating practical solutions, this work concentrates on theory building during DSR cycles. Hence, it systematically develops practical solution experiences and theoretical conceptualizations accordingly.
Findings: While current research in service science focuses on service systems with service as the central element, the present paper evaluates the importance of interaction as the basis for the co-creation of value and, thus, linking service system and work system. It introduces the concept of interaction as a phenomenon that describes the in-actu situation in which actors co-create value by exchanging service – especially in human-human interaction. Work and service design as well as service engineering means to design all conditions for a successful interaction – avoiding value destruction (e.g., stress and unhealthy work conditions) as well as promoting co-creation of value (e.g., wellbeing, satisfaction as well as monetary value).

Keywords: Service engineering, Human systems integration, Service science, Interaction

INTRODUCTION

The origins of systematical design and engineering of services lay in the 1970s and 80s' Pioneers like Shostack (Shostack 1982) developed methods and tools, e.g., the service blueprint, to develop services with the aim to visualize the complex interplay of actors over time and, by that, gain insights into the customer's experience. Since then, a lot of work has been done parting from different viewpoints. Major milestones in service science(s) emerged from Service Marketing, mainly the New Service Development and the Service Engineering approach. Further, the servitization movement – going in line with overall social developments like digitalization and environmentalism – as well as X-as-a-service developments and the ecosystems perspective on service systems, may be the cornerstones of nowadays Service Design, Engineering, and Management. Moreover, Troisi et al. recognize the high scientific

relevance of service-dominated logic (SDL), first claimed by Sporer (2007), for the "Fundamentals of service science." The paper's main purpose is to assess the importance and conditions of interaction as a concept for linking service and work systems and to propose a basis for the co-creation of value. A starting point for this theoretical analysis was the practical question, how to meet the requirements of the complex actor interrelationships (e.g., the complex interplay of the diverse experiences of customers, e.g., service receivers, clients as well as employees and service providers within value co-creation processes) in personal-related services and service systems while (re-)designing them for better service outcome and good working conditions alike. Troisi et al. (2019) highlight that interaction is a prominent concept within Service Science Management Engineering and Design – which is surprisingly not an object for theory. Therefore, the paper asks the general and conceptual question of the role of human factors in service science, service/work systems in terms of understanding interaction. The question implies the theoretical embedding of human-centered interaction and interaction work conditions for service science as a multidisciplinary approach (Social Service Engineering) for which this paper wants to present a starting point. To do so, we first give some methodological remarks. Second, we introduce our empirical insights and reflections gained through analyzing and designing concrete personal-related services in healthcare and daycare. Third, we will investigate in current theoretical works and how they deal with interaction. Finally, we will conclude with some assumptions about interaction, that can support the fundamental understanding of service systems in terms of a discussion of a micro-theoretical extension of SDL.

METHODOLOGICAL REMARKS

Our research follows a DSR approach, which is well established for designing and evaluating real-world solutions (Hevner 2007). However, this work focuses on the theory-building processes during DSR cycles (Kuechler and Vaishnavi 2008) to build bridges from the meta-theory of service-dominated logic (SDL) to middle-range and micro-theories. As described by Vargo and Lusch (Vargo and Lusch 2017), SDL is a meta-theory, which takes macro (e.g., societal), meso (e.g., industry) and micro level (e.g., transactions) of aggregation into consideration. Our work aims to support the SDL research transition from high-level abstraction to more specific theory and empirical research and design. Therefore, the work goes along with Sun (2020), which underlines the importance of more interdisciplinary approaches and theory building within service design.

INTERACTION

Practical Perspective

The initial question of our research was about how high-quality services and humane work, in terms of healthy working conditions, can be designed in person-related services. To this end, various discipline-specific approaches are used to analyze and assess the working conditions and the service itself

(e.g., processes, quality) in highly interactive work systems. While service design methods focus mainly on the management of resources and operations in service processes and customer experiences (e.g., by mapping customer journeys), the focus of work sciences is on work tasks or work content, social relationships, work organization, and the working environment, including aspects such as ergonomics and work physiology in the work system. It hereby concentrates on the employees' perspective and their embeddings and interactions. We indicated a gap in the theoretical development of an integrated concept for an interdisciplinary approach of the service system on the one hand and that of the work system on the other. Both approaches imply a shared phenomenon, which they address from different points of view. Yet, it is not clear what exactly this phenomenon is. To answer this – and following Occam's Razor (criteria of elegance and simplicity) (Haynes and Carroll 2007) – we reduce the complexity of each perspective down to its core features and have a look at the overlap. By doing this, we can define participating actors in in-actu situations, framed by different material, social or institutional systems. In other words, person-related service system interactions are carried out by interacting parties in interaction systems. This leads to the empirical conclusion that if we want to analyze and design person-related services / interactive work systems in an interdisciplinary approach, we need to apply methods that focus on interaction, interacting parties, and the interaction system (a conditional frame). Based on this central insight, we examine the recent literature on service and work systems to provide a current theoretical perspective.

Theoretical Development

Human Factors and Interaction in Work Systems

Human factors (HF) research on work systems considers employees/worker-related aspects such as work organization, ergonomics, and occupational physiology (Carayon and Smith 2000). However, ergonomics and human factor (E/HF) research is widely a system-oriented approach that analyzes and designs work systems (sub-systems or ecosystems). Wilson (2014) proposes a definition of systems ergonomics and HF and explains its purpose as follows: "Understanding the interactions between people and all other elements within a system, and design in light of this understanding, a system being a set of inter-related or coupled activities or entities (hardware, software, buildings, spaces, communities, and people) with a joint purpose […]" (Wilson 2014). Thus, the system is mainly understood through goal-directed interaction, which is designed/shaped by the integration of other system components (human, technical, organizational). The object of research is thus the interaction within a complex system from a holistic perspective (Carayon 2006), which widely focuses on work systems and employee's interaction. Depending on the interest of specific research and design activities, relevant systems and sub-systems and their interactions are in the focus of the analysis. Interaction itself seem to be a fuzzy term including interactions of materials and/or people as well as interaction processes between different systems or at different aggregation levels (vertically) and with different dimensions

Table 1. Perspectives and the role interactions in service literature.

Focus	Role of Interaction	Literature
Customer and General Outcome	Interaction resulting from resource configuration/relationships as basis for service realization/outcome. Interaction as engagement for the customer value process	(Mele and Polese 2011; Spohrer et al. 2007; Toivonen and Kowalkowski 2019); (Saunila et al. 2019)
Actor	Interaction as processes in A2A networks in institutional/social embeddings	(Brodie et al. 2019; Edvardsson and Tronvoll 2013; Laud et al. 2015; Toivonen and Kowalkowski 2019)

(physical, cognitive, psychosocial/cultural) – depending on the sociotechnical model (Carayon 2006; Wilson 2014). Following Wilson (Wilson 2014), we can summarize that for E/HF, interaction is the critical phenomenon for analysis of work systems – whose basic premise is that employees interaction is designable through the integration of other system elements.

Interaction in Service Science

A wide range of HF integration can be found in service literature: some approaches focus on the customer as the HF (Moon et al. 2016), more holistic approaches focus on customers and employees (and their relatedness) (Chicu et al. 2019; DeVine et al. 2012), or the entire service system or ecosystem (Warg and Deetjen 2021). While the importance of HF is apparently significant in service literature, the role of interaction needs further analisis. However, both concepts, HF and interaction, show similar aspects, as can be observed in the understanding of interaction within service systems, e.g., in the work of Brozović and Tregua (Brozović and Tregua 2022). According to them, the development goes from direct customer-provider-interactions (technologically mediated or not) – focusing on customers and the service outcome – to an actor-to-actor (A2A) perspective and value co-creation in service (eco)systems – focusing the actors. Table 1 shows the linkage between the different foci of the perspectives and the role interactions plays in them.

We will take the insights and conclude two pathways of interpretation of interaction in service literature, which will be introduced next. Some approaches are connecting service systems and interactions by defining service systems as "a set of relationships and a context in which interactions aimed at delivering service are taking place" (Brozović and Tregua 2022). Similarly, SDL in its early stages interprets interaction mainly as the interaction of a service provider with its customer in terms of delivery (Toivonen and Kowalkowski 2019). While interaction plays a prominent role in service systems,

where the "smallest service system centers on an individual as he or she interacts with others" (Maglio and Spohrer 2008)[1], this understanding is bound to the competencies that need to be put together for value creation. Thus, interaction can be seen as the basis for the service system's outcome "as value constellations in value creation" (Brozović and Tregua 2022). However, SDL also provides a meta-theory, interpreting value co-creation as a continuous integration of resources (Vargo and Lusch 2017). Emphazing resource integration, two categories of service systems are relevant: those with direct human interaction (value is created in the human interaction), and those, where only material resources are exchanged, (value creation happens individually in interaction with the resources) (Saunila et al. 2019). According to this interaction means to engage the customer to a customers value (co-creation) process. This engagement may refer not only to the delivery process or the realization of the service, but also to the interaction itself that plays a crucial role for value proposition (Mele and Polese 2011).

The integration of multiple resources can finally be abstracted to an A2A network approach, enriched with the idea of institutions that "enable the coordination of value-creating activities" (Toivonen and Kowalkowski 2019). In this understanding "interactions result in interdependences […] and serve as source of the dynamism and emergence in service ecosystem" (Brodie et al. 2019), while institutions are the given context for these interactions[2]. Interpreting interaction as an A2A process forms a micro-understanding of novel SDL value co-creation, resource integration, and service-exchange. Moreover, the "actor's service ecosystem embeddedness is center to the resource integration process" (Laud et al. 2015). These embeddings of actors and their activities are part of a social system resp. social structures with different roles and positions (Edvardsson and Tronvoll 2013). The actors of these systems interact and recreate the social structures and create value "collaboratively in interactive configurations of resources and actors" (Edvardsson and Tronvoll 2013). In this understanding, non-human objects (operant resources) do not have any value until they are used or integrated into a social context and human interaction. Thus, value is value-in-social-context. However, the actor perspective blurs the clear roles of the customer, provider or supplier and leads to a diffusion in roles of value creation (Tommasetti et al. 2017). Consequently, some works concentrate on actor engagement and value processes within the service ecosystem (Brodie et al. 2019) – which finally leads to the question of practical consequences for design approaches.

The Concept of Interaction – A Critical Reflection

Sometimes interaction is defined as "the reciprocation of actions" (Laud et al. 2015) in different degrees (structural, relation, cultural) as well as on different levels (micro, meso, macro) in the context of embedded actors (Laud et al. 2015). Laud et al (2015) argue, that actors use different practices to integrate

[1] "The relationship between the provider and the customer can be viewed as a simple service system – that is, a systematic interaction of parts that functions to perform a service." Mele and Polese (2011).

[2] Be aware of the contrast – while firstly interactions are enabled by the service systems relationsships Brozović and Tregua (2022) here interdependence are the result of interactions.

resources into the interaction, namely: accessing, mobilizing, internalizing, transformation. Similary to the description of HF in literature, the term interaction is very broad and used within all, micro, meso and macro, levels (with different types of interaction). However, the cited reciprocity of actions might lead to assume a high predictability of actions. Yet, human behavior in complex situations is not easy to explain and even more difficult to predict, considering all the factors influencing behavior, e.g. personality, current states, attitudes, or cognitive preconditions. For example, the HCI domain (Human-Computer Interaction) definition, "interaction concerns two entities that determine each other's behavior over time" (Hornbæk and Oulasvirta 2017) ignores many-to-many interactions and may underestimate the individual's freedom of interpretation of value and behavior. We do not intend to say that re-actions and interactions are not designable in the way in-actu situations (interaction systems) are planned/prepared. However, we do state within the next section that the interaction – i.e. the moment when values are defined and reproduced individually – is unique.

Interaction as an Important Phenomenon for Service Systems and Design

To summarize, first, the E/HF focuses on interactions as a practical relationship between system objects, that can be shaped by integrating other system elements, while the presented service approaches concentrate on actors, resources (integration), institutions, and value processes, where interactions are mainly understood as in-actu value processes. System and A2A approaches in E/HF as well as SDL emphasize the importance of all actors, while practical design approaches still need to concentrate on specific design objects/subjects – namely work systems or service (sometimes understood as delivery) systems. These foci may lead to a falling back on standard roles and considerations, focusing design activities only on employees or customers – and, therefore, underestimating the interrelationships as well as the complexity of the in-actu situation.

As stated earlier, the core object of person-related services is the direct interaction of people with people (human A2A) in which value is co-created (within a social context). In addition to the person-centered service systems presented in literature, interactions are carried out by interacting parties in interaction systems (namely work or service systems). To better understand the concept of interaction, we suggest interpreting interaction following the idea of symbolic interactions (a micro-theoretical framework according to Blumer 1969), with the ensuing assumptions:

> Assumption 1: If "value is always uniquely and phenomenologically determined by the beneficiary" (Ng and Vargo 2018), value needs to be ascribed by humans/beneficiary to the integrated resources (service) in interaction.
> Assumption 2: If (people-to-people) interactions are interpretative processes – set by the human actors itself who is embedded in a social and interaction system (Blumer 1969), these ascriptions (assumption 1) are given through an interpretative process within social/cultural preconditions and/or interaction.

Assumption 3: If interaction is uniquely and phenomenologically determined by the actors (conclusion assumption 1 and 2), modification and design of interactions in this understanding are only indirectly possible through designable parameters of the interaction system or via a modification of the integrated ressources (e.g., competencies) of the involved actors, which is realized in another service system (e.g., by continuous professional education).

The interaction system structures (intended or not) the (interactive) situations through the roles, materials, environments as well as expectations of the people involved. These interaction systems are related to institutions – as described in SDL – e.g., by giving reasons (norms etc.) to interpret valuable interactions. The design process targets the interaction system, more precisely, the conditions for interactions. These conditions are e.g. the informational and material framework, the working or service conditions, as well as the interaction points themselves.

The interaction system is a (micro) service system, if the the SDL follows the stated assumptions. This would mean that: (1) interactions are the core phenomenon for resource integration, where humans ascribe value, (2) ascriptions are made through socially embedded interpretative processes – enabling value-co(!)-creation, (3) interactions have institutional, cultural, social preconditions and (4) interaction conditions in terms of resources within the service system can be designed in a valuable form for all actors. A holistic design and engineering approach for service – Social Service Engineering – puts interaction (as an intangible value-co-creation situation) at its center and keeping it in focus, while designing the dimensions around it.

Limitations: The presented assumptions are limited to human-to-human interactions. Abstraction to other forms of interactions (e.g., interactions with objects, interactions with institutions or other business units) probably does not follow the same parameters and requires further analisis. In addition, technically mediated interactions are not analyzed in a targeted and detailed manner. The abstraction that is illustrated in this paper is hypothetical and needs to be confirmed empirically.

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