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## Collaborative Networks in Person-related Services – Designing Humane and Efficient Interaction Processes in Childcare

Julia Friedrich<sup>1</sup>, Vanita Römer<sup>1</sup>, Kristin Gilbert<sup>2</sup>, Christian Zinke-Wehlmann<sup>1</sup>, Anne Steputat-Rätze<sup>2</sup>, Ulrike Pietrzyk<sup>2</sup>

<sup>1</sup> University of Leipzig, University Computer Center, Research and Development Department, Augustusplatz 10, 04109 Leipzig {julia.friedrich, vanita.roemer, christian.zinke-wehlmann}@uni-leipzig.de

<sup>2</sup> TU Dresden, School of Science, Faculty of Psychology, Arbeitsgruppe Wissen-Denken-Handeln, 01063 Dresden {kristin.gilbert, anne.steputat-raetze, ulrike.pietrzyk}@tu-dresden.de

**Abstract.** Collaborative networks are becoming increasingly important in production and product-service-systems. By linking cooperation partners along the value chain, they offer the opportunity to make the product-related value creation process efficient and transparent. In addition, collaborative networks facilitate the work of employees by improving social and organizational working conditions. Driven by digitalization and its efficiency and work facilitation potential, providers of person-related services are also increasingly using collaborative networks. This raises the question of how collaborative networks must be (re)designed in the context of social services to support the core of work and value creation, the personal interaction between people. To answer this question, a novel social service engineering approach is applied that combines methods of work science with those of service engineering and design to address the specifics of designing person-related services. The potentials of the approach are exemplified by the concrete use case of childcare.

**Keywords:** Social Service Engineering; Collaborative Network; Person-Related Services; Interaction

### 1. Introduction

Person-related services are defined as services that create value through the interaction (value-in-use) of the service provider and the service recipient [1], for example medical or care services but also educational or cosmetic services.

In Germany, childcare, as a type of person-related service, is anchored in law to provide all children the opportunity of early childhood education and care and enable both parents to pursue a professional career [2]. Therefore, every child has a legal right to a childcare place in a “Kindertagesstätte” (Kita), a facility that provides care for children from the age of one until they start school. The partnership between Kita, child,

and parents or legal guardians<sup>1</sup> is as individual as the expectations and requirements of those involved. The value proposition associated with the service of childcare in Kitas focuses on promoting personal development, creating equal opportunities with regard to the future school career of the children, and providing protected space for playing and learning in a community of peers. It cannot be successful without trustful and transparent cooperation between parents and educators, describable as educational partnership. This term reflects a particularity and challenge of the childcare service, in which not only the child assumes the role of a value co-creator, but also its parents.

The use of collaborative networks in a Kita offers an opportunity to foster efficient communication channels between those involved in the child's care and therefore creates time for the core of the value creation process – the interaction with children and families. Designing “humane” digital networks might also contribute to the employability and health of service providers, e.g. by relieving them of monotonous routine tasks, providing opportunities for learning on the job, and fostering improved social relationships [3]. To achieve these goals, the requirements of all actors involved in the value network must be considered. A mere focus on technical innovation falls short and does not do justice to the demands of person-related services and the actors' roles as interaction partners and value co-creators. Therefore, a novel methodology is required.

The main objective of this paper is to answer the following research question: How can collaborative networks in Kita settings help improve the quality of person-related services while addressing all stakeholders' needs equally? For this purpose, the technology-driven, economic and customer-oriented approach of service engineering and the employee-oriented view of work science are combined in an approach we call Social Service Engineering.

## 2. Collaborative Networks in Person-related Service and Care Systems

Collaborative networks are used for the exchange of information between a variety of people and organizations that are “largely autonomous, geographically distributed, and heterogeneous in terms of their operating environment, culture, social capital and goals”[4]. Network examples in person-related services include clinical information systems used for structured collection and use of patient and administrative information [5] and expert networks to connect and share knowledge between science and practice experts [6]. In the context of childcare, studies on how to implement collaborative networks in Kitas are rare, and the existing studies only look at the process partially, as, e.g., in [7]. Scientific literature that deals with technology use in childcare facilities often focus exclusively on media usage concepts, media education, and media literacy [8]. Increasingly, collaboration technologies are coming into focus, not only to facilitate interaction between educators and children, but also to improve interaction processes with external parties, e.g., through digital documentation (ibid.).

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<sup>1</sup> For better readability, only the term “parents” is used in the following.

Still, collaborative networks need to be subject of further research in order to realize their full potential for improving person-related service quality. Therefore, it is necessary to develop a methodological framework and tools for the development, implementation and evaluation of collaborative networks in childcare facilities. Neither classical service engineering nor labor science alone provides the theoretical and methodological framework required for the analysis and design of a collaborative network in this particular field of work. For improving the quality of interaction for both, the service provider (work quality) and the receiver (service quality), an interdisciplinary methodological approach is needed, as proposed by [9] for the topic of collaborative networks in general.

Therefore, the study combines two significant perspectives on services, namely (I) the design of good work as aimed at by the methods and models of labor science and (II) the engineering of efficient and customer-oriented services as aimed at by service engineering.

### 3. Methodology

We applied an iterative design science research approach as suggested by Peffers [10], combined with a work analysis based on criteria for evaluating the extent of human-centered work design [11]. For this paper, only the steps problem analysis, objective description and design & development will be considered, as they represent the current status of the research.

The study was conducted in two Kitas of different sizes, one with 280 children and 45 educators, the other with 140 children and 21 educators. The larger Kita is divided into three administrative units in three buildings for children of different age groups. Both Kitas are divided into different care areas: nursery (for children under three years) and kindergarten (for children three years and older).

To identify the requirements for the design and implementation of a collaborative network in the daycare setting, the current situation of collaboration and communication was analyzed. For this purpose, nine qualitative semi-structured interviews with educators and the daycare management staff were conducted in the two Kitas. Process flows and framework conditions of the Kita work were determined concerning daily documentation, communication and administration processes, as well as the subjective perception of working conditions and all aspects of the interaction between the stakeholders involved. Additionally, two quantitative online surveys were conducted. The first one was about the current satisfaction with communication processes, the second asked about the work design as perceived by the employees. Furthermore, 160 documents were reviewed, of which 47 were coded and analyzed in terms of work design. From the service engineering perspective, a process and interaction analysis were combined with customer journeys and touchpoint and stakeholder analysis. From a labor science perspective, analyses were carried out on working conditions, information flow, and occupational health and safety, based on the German alliance criteria or occupational safety and health (Gemeinsame Deutsche Arbeitsschutzstrategie – GDA) [11].

While the analysis was performed separately by experts from each scientific discipline, the methods were combined for the service design phase. Ten design dimensions were identified as fields of action for joint design activities, namely idea and change management, occupational health and safety, cooperation with parents, social relations within the team, work demands in the Kitas, process design, childcare ratio, qualification and training, feedback, design of information flows, and documentation.

#### 4. Results

The results of the analysis indicate complex and interconnected communication processes in the two childcare facilities.

**Analysis:** The stakeholder map in Fig. 1 gives an overview of the large variety of stakeholders and co-producers involved: The child as primary service recipient, its educators and family (parents, grandparents resp. other guardians) represent the core actors within the childcare service. They interact with each other and exchange information. External stakeholders like teachers from cooperating schools, therapists (e.g., speech therapists) or external service providers (e.g., photographers) are also involved in the childcare service, interacting with the child and exchanging information with educators and families. They can be understood as part of the extended childcare network. The Kita administration does not interact with the child but with its parents and educators. The administration interacts and exchanges work- and child-related information with the parents' council, the Kita association and official bodies such as youth welfare offices which thereby frame and influence the provision of the person-related service. We focus on the internal communication within the core group (grey in Fig. 1) as a starting point for implementing a collaborative network.

Families and Kita exchange a wide range of information on a daily base such as information about the emotional state of a child, events, or special occurrences. As the touchpoint analysis showed, the communication channels for the information exchange between parents and educators are primarily personal conversations but also notice boards, flyers, or even small notes in the children's wardrobe compartment.

The analysis revealed that the informational needs of both the parents and the educators could not be satisfied in the current situation. Approval rates show that parents in the two Kitas do not feel sufficiently informed about the daily pedagogical work with the children (35 % / 46 %) and the individual development of the child (37

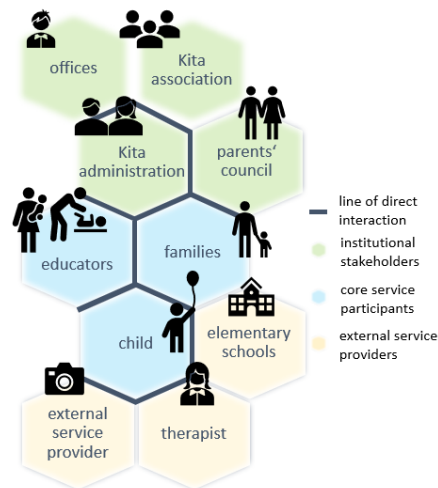


Fig. 1: Stakeholder map Kita network

% / 67 %). Likewise, educators expressed the desire for better structured, daily updated and accessible information about their children as well as the work organization.

We saw in both Kitas that internal information flows were quite complex and partly confusing. For example, in one case, more than 50 paper lists were stored and used to transfer information between educators or educators and the Kita administration. The numerous lists included information about the children (e.g., attendance, allergies, napping time behavior, pick-up authorization), contractual matters (e.g., exceedance of contractual care hours), and the Kita (e.g., educators' areas of responsibilities and contact information).

The Kitas face several information-sharing challenges, leading to insufficient exchange of information, information overload or missing information, including:

- high complexity and amount of information for all internal stakeholders
- highly distributed information
- exchange of information in parallel with other activities (e.g., supervising children and holding conversations)
- Overburdening of parents due to short time windows for receiving information when dropping off and picking up the child
- language barriers due to language diversity of parents

The survey carried out on communication satisfaction showed that the insufficient information exchange for both parents and educators lead to frustration and dissatisfaction (for the value-in-use and value-in-work). Although information processes are not primary value creation processes but supporting processes in value creation, the provision of information has a significant impact on job and service satisfaction.

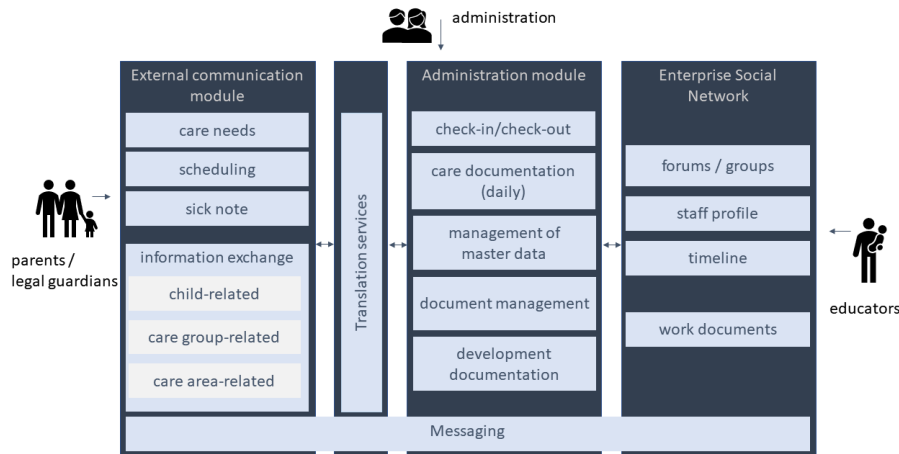
Herein shows the high need for a re-design and digitization of existing communication processes, which creates time for interaction between child, educator, and family by shifting some of the (mainly administrative and organizational) information into the digital space.

**Design of an Interaction Environment:** With the aim of improving the current situation by digitizing information flows and support documentation activities in the Kita network, a platform architecture was designed. As shown in Fig. 2, the Kita network is composed of three functional blocks (modules).

At the center of the platform is the administration module, supporting internal collaboration between the educators or the educators and the administration by bundling information and enabling it to be communicated and accessed regardless of time and place. It allows collecting all child-related information, from documentation of the child's development to the daily activities to organizational aspects such as check-in and check-out times. The module also supports the information logistics on group level and care area the children belong to. It is open to the educators via tablet in each Kita room to access and enhance information about the children.

The second module, the external communication module, enables digital communication between the Kita and the children's families. Information can be distributed individualized so that families are only provided with relevant information or relate to their child. In this way, parents can participate in their children's everyday life at the Kita. Vice versa, families can communicate information regarding their

children directly and easily to the Kita, e.g. cancel their 'child's visit due to illness. The digital availability of a sick note, in turn, makes it easier for the Kita to plan the day. An optimized exchange of information creates transparency and contributes to the realization of the legally anchored ideal of educational partnership. Integration of a translation service allows information to be exchanged across language barriers.



**Fig. 2:** Platform architecture for the collaborative Kita network

The third module is an enterprise social network (ESN). An ESN combines various advantages of Web 2.0 and hereby allows its users to exchange ideas, organize, share information, and network [12]. Characteristic functions are user profiles, group chats and video conferences, micro-blogging, media sharing, screen sharing, and functions for tagging, rating, or marking (bookmarks) of content (contributions or comments). In the Kita context, an ESN allows educators and administration staff to document and reflect on their pedagogical work. This creates an opportunity for mutual feedback and recognition. Besides, the digital exchange of work documents within the Kita or between different Kitas of the same Kita association simplifies work processes, since the documents can be retrieved from any location and can be structured and displayed individually (e.g., via timeline) according to one's priorities (e.g., via subscriptions to channels).

## 5. Discussion and Conclusion

In person-related services, value-creation takes place in the interaction of the persons involved. Mutual understanding and trust are of great importance in this regard. Therefore, the design of service processes must consider the needs of both, the service provider (Kita staff), in order to experience value-in-work, and the service recipients (children and parents), in order to benefit from value-in-use. Currently, there are few established and validated methods for such an approach. We have chosen a balanced and structured interdisciplinary approach that considers work design on an equal footing with customer experience. This approach combined methods for analyzing and

designing services from labor science, such as psychological risk assessment, work observations, employee surveys, and from service engineering, including process analysis, stakeholder mapping, and touchpoint analysis. Subsequent research will expand the application areas of the approach and improve person-related services in other fields of action.

The results from the design phase show that the approach of digital collaboration is promising for Kita networks. It facilitates the crucial process of information exchange between educators and parents, which is considered a prerequisite for good educator-child interaction [13]. By facilitating communication among the Kita stakeholders, the platform-supported collaborative network can improve the work in the Kita, primarily by creating capacities (time, energy) and necessary information for the interaction processes between child and educator. By establishing digital information channels and collaborative spaces, relevant information can be exchanged quickly, and transparency can be increased.

The presented approach has the potential to increase both value-in-work for the educators and value-in-use for the families. For educators, the network improves the predictability of information exchange with parents and reduces parallel work (e.g., monitoring children communicating with parents, simultaneously). Furthermore, employees are relieved of the effort required to obtain information (by scanning through paper lists). For parents, the location- and time-independent provision of information can reduce information overload and stress since they get the chance to deal with the information at a time and place of their choosing. In addition, by using digital communication tools, it can be ensured that information reaches its intended recipient (such as the child's primary educator). Moreover, collaborative networks can facilitate communication by incorporating translation tools to remove language barriers.

The presented results are limited to the analysis and design of a collaborative network in the childcare context of two Kitas. Implementation and evaluation of the platform in the Kita are still pending. Evaluation should consider the perspectives of all stakeholders. The use of network technology must not lead to wrong expectations on the part of the parents (e.g., permanent availability of the educators and immediate response to questions) or increased pressure or stress on the part of the employees (e.g. disruption due to incoming messages). As part of further design loops, it will be necessary to examine how other stakeholders from the network, such as external service providers or the Kita association, can be integrated beneficially.

In conclusion, implementing a collaborative network is a promising approach in person-related services. However, sharing information on a collaborative platform has its limitations when it comes to sharing non-verbal (e. g., facial expressions) or non-verbalizable (tacit) information [13]. This can only succeed if the use of technology in the context of interaction work is seen for what it is, namely an enabler for interaction. The process of digital information transfer supports the actual core of person-related service work, the interaction, but never replaces it.

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