Configuration of Human-Facilitated Remote Service: a VMC-Based Kiosk Interface for Information Systems

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ABSTRACT. Self-service is seen as effective, and thus, pervasive in all walks of human life, where crowds of people independently use public or private services offered by local kiosks, the Internet, or mobile devices. There is growing interest in delivering complex information-intensive interactive services via kiosks. This complicated service design, along with multiple choice interfaces, has diversified customer groups and situations where people are dependent on available kiosks. This work introduces a new video-mediated communication (VMC) based kiosk system, which is a functional solution for the problem. This kiosk can be staffed remotely using VMC and service personnel working over the Internet to personally serve each customer and facilitate the use of the kiosk interface when needed. Experiences with the kiosk show that the VMC-kiosk interface is appropriate for public use. Providing a real configuration example of a modern kiosk system, our work contributes to the design of remote services, kiosk interfaces, and information systems, and brings into focus a new way of using information systems with VMC over the Internet.

KEYWORDS: video-mediated communication, self-service, kiosk interface, facilitation, information systems

1. INTRODUCTION

Increased mobility and changes in lifestyles are setting new demands for the availability of various services. Providing human services is expensive, which has led to increasing popularity in public and private self-services offered by local kiosks and the Internet (Engeström & Escalante, 1996; Nicholas et al., 2001; Rowley & Slack, 2003; Karla, 2004; Proença & Silva, 2007; Löfstedt, 2007; Tan & Chen, 2008; Kang et al., 2010; Payne et al., 2012).The number of service kiosks and application areas is constantly increasing, and kiosks are ubiquitous in some public places, including travel and shopping centers and anterooms. According to studies of self-service, the success of kiosk services rests on two key factors: an intuitive, easy to use user interface and the effortless availability of the service in public places where people do business or stay. The studies also show that the perceptions of service are blurred and there is a genuine

effort being made toward support for real-life customer expectations, but diversified customer groups have recurrently challenged self-service interface designs as personal remote services.

There is growing interest in delivering even very complex, information-intensive (Glushko & Tabas, 2009) and socially interactive (Nicholas et al., 2001; Alcock & Millard, 2006) services with kiosks. While the physical interface of a kiosk can be well defined by input and output functions, interaction and service are deeply situational and affected by people's skills in using technical systems, their social roles as customers, and by their service expectations (Alcock & Millard, 2006; Reinders et al., 2008; Tan & Chen, 2008). In remote services, *interaction* not only takes place *with* and *by* some interface, but also with certain service providers. While an interface is directing and mediating the user's activity on a computer-based kiosk, it also defines the individual user in relation to a *certain* information system (Holfelder & Hehmann, 1994), and makes his or her user role *special,* as the digitally identified customer of the remote kiosk service. Quite often this fact is ignored in kiosk systems and service design, and customers are seen as a vague group of people who all fit the same user profile.

The success of the Internet and online communication have blurred the lines of the digital divide in social and economic development (Lee et al., 2011) when worldwide information services are widely available to continuously diversified customer groups. Contrary to private users using the services at home or on their own mobile devices, users of public self-service kiosks are dependent on the kiosk technologies. Especially in situations where people do not have any option for self-service, this problem is serious, not only temporally for the self-service technology (STT) user, but it also has long-term consequences for the whole service chain (Reinders et al., 2008),from producers and deliverers to designers of interactive information technology. In this sense, the primary design issue remains of how to define human-computer interaction with regard to the skills of the individual users, and in relation to their information and social needs as customers of remote services. The challenges are real and common, and clearly visible in the snapshot (Figure 1, recorded in 2010 in a bus station of a large international airport) where full-time helpers are assisting people to buy bus tickets using interactive self-service kiosks. Despite the help offered, the kiosks were not popular, and there were tens of people queuing to be serviced personally by actual front desk clerks at the ticket counter.

If an interactive kiosk cannot deliver a service alone, providing a full-time human facilitator next to each kiosk is not a viable solution either, at least with fewer customers than in the case of masses of travelers leaving an international airport. This has motivated a search for intermediate solutions for remote services where an identification of customer/service producer and fact-oriented substance involves mutual trust, multiple choices and decision-making, and work with information systems (IS). One solution is a remote service kiosk using video-mediated communication (VMC) (Finn et al., 1997) over the Internet, through which a service clerk facilitates and personalizes the service for each customer (Paradi & Ghazarian-Rock, 1997). Kiosks as interfaces for information systems are not new in service fields, but these kinds of intermediate solutions have remained scarce, and the potential for VMC in kiosks is relatively untapped. Consequently, case studies of VMC-kiosk systems and services are scarce and examples of how such distributed business-to-customer (B2C) services via kiosk networks can be appropriated for customers, with regard to the business goals of service organizations.

Figure 1. Full-time helpers assist customers in using self-service ticket machines at a bus station.

This work explores a VMC-based service kiosk interface and its use in a public place; in particular, how facilitation affects the interaction situation, and how people experience the facilitated kiosk use. Our empirical research is based on situated analyses of Avis's new remote car rental service using VMC-based kiosks. Our work contributes to case studies on VMC-based kiosk solutions, and to the design of services, kiosk interfaces and information systems. The work also highlights a new mode for information system use, serving people to whom such use is not otherwise affordable.

2. RELATED RESEARCH

In a face-to-face (F2F) situation, people observe, interpret, and communicate with each other, and coordinate the situation toward a certain outcome. A typical situation is a service interaction which involves participants as social actors. In human-computer based self-services, interaction must take place without social interaction, which makes the interface critical for self-service systems, as in kiosks used in public places. Untapped potential includes VMC-based kiosk interfaces from which human-facilitated face-to-face services can be offered for the customers who need help and personal service.

2.1 Face-to-face Service Interaction

According to Clark and Brennan (1991), shared information and its continuous updating is the common ground upon which people rely, and build their mutual understanding for accomplishing certain collective purposes. The authors define how different personal media, such as F2F conversations, telephones, video conferencing, letters and emails, affect interaction. The success in the sharing of conversations socially is dependent on the capabilities of the used medium to mediate the content, evidence, and references needed for participants' turn-taking in

their information exchange. An F2F situation is seen as the everyday standard for negotiating, decision making, and agreement based services, with the appropriate costs of producing and achieving the desired outcomes (Clark & Brennan, 1991; Glushko & Tabas, 2009).

Regarding service as a social setup, the F2F situation is defined as a complex interplay of actors' verbal and nonverbal behaviors, where interaction rituals and the physical setting also play a vital role (Goffman, 1967). The situation unfolds as immediate events where actors respond to each other using their interpretations of the meanings and affects of given interaction. Thus, the verbal and nonverbal communicative expressions exist in a continuum where they overlap with each other (Knapp & Hall, 2010). For instance, Whittaker and O'Conaill (1997) classify people's nonverbal communication based on its function in a F2F situation and identify two main classes, the coordination of situation and coordination of communication content. Participants use nonverbal cues for supporting turn-taking (transitions between speaking/listening), availability (when to start or end verbal communication), references, and feedback, and by showing their emotional states, impressions, or motivations. Therefore, humans are very skillful at maintaining and repairing discussions using interpersonal cues, and Goffman (1967) shows that such reciprocal action and rituals shape also the F2F service.

F2F contact defines the norm of modern service experience in which one person provides a service to another (Glushko & Tabas, 2009). This role differentiation also makes the situation rather complex as intercourse. It is generally recognized that the F2F service quality is socially co-produced, involving interactions between the customer and the service producer (Berry, 1999; Löfstedt, 2007; Reinders et al., 2008; Tan & Chen, 2008; Gabbot et al., 2011), but an imbalance in the co-production appears as soon as one partner is more dependent on the service outcome than the other. For the customer, this reliance is meaningful as service expectations, and for the service producer, as the capacity to respond to these expectations. Consequently, showing service willingness with one's own initiative and flexibility in the adaptation of service for each customer is a vital factor in service quality (Glushko & Tabas, 2009). The appropriate interaction is the key and most challenging element of any service situation.

2.2 Human-Computer Based Self-Service

Human-computer based kiosks are typically either individual machines or embedded interfaces for public, local, or remote services by the Internet (Tung & Tan, 1998),offering a degree of privacy and security. Usually, the user is standing at the kiosk interface, using the kiosk service for a relatively short period of time, and must verify his or her identity as a customer (Holfelder & Hehmann, 1994). For example, kiosks can be used for banking, ticket machines with credit cards, or for reserving or renting things. As a rule, these service kiosks use standard SST and fixed human-computer interaction (HCI) interfaces where users cannot select or change the interaction media and ways through which they verify their identities as service customers. Rather, the interaction is designed to function in a similar manner with all customers, although this practical setup is questioned in services (Berry, 1999; Reinders et al., 2008), along with people's diverse skills, and identity verification means, and the numerous on-going attempts to contribute to the situation (Chowdhury & Noll, 2007), but thus far most plans rest on HCI.

Access to a needed service and the realization of an expected service outcome are self-service dependent on the user's skills and understanding of the input-output structures (Bolchini & Paolini, 2006). In a self-service situation, typically none of the dynamic repair mechanisms used in F2F discussions is available, but instead, only a limited set of digital clues and advice

that a kiosk interface can offer via its formal, programmed procedures. In principle, it may be possible to consider HCI-based self-service as a dialogue between a service producer and a customer (Campbell et al., 2011), but for the customer, this may be difficult to grasp when this interaction disappears beyond layers of self-service systems. While using a kiosk, the customer must follow a step-by-step procedure, such as recognizing 1) whether the service s/he needs is available, 2) how the service should be initiated, 3) when and what form of input is needed from his or her side, and 4) how the service output can be received and the procedure ended securely.

Making the steps of a self-service process easy for diverse customer groups is a formidable design task. Simple kiosks selling small items work quite well, but disturbances are also common with them, and more complex services, such as the selling of travel tickets for different routes and different times, are very difficult to design in such a way that the service quality would be convenient and acceptable for the customers (witness the situation in Figure 1). According to Alcock and Millard (2006), customer surveys have shown that almost half of the customers perceive the required use actions with self-service systems as unpleasant. In addition, Chowdhury and Noll (2007) show that current forms of identity verification in remote services are inconvenient for both users and service providers, and Löfstedt (2007) argues that despite many user-driven visions, actual user involvement is still a critical factor in the growth of public e-Services. Similarly, as in private contexts, where the 'warmth' of face-to-face communication is valued (Lee et al., 2011), Alcock and Millard (2006) argue that many prefer personal services because of the immediacy of interaction with a real person, and having experienced only the complexity when using digitalized HCI-based self-services.

HCI is critical for systems where interfaces are applied both to *interaction* and *service* solutions (Paradi & Ghazarian-Rock, 1997; Tung & Tan, 1998; Reinders et al., 2008).

2.3   Video-Mediated Interaction

Remote video connections became publicly available in the 1980s, and since the 1990s there has been a lot of interest in VMC (Finn et al., 1997). Many concepts, such as situational awareness and interaction cues that are related to user or customer experiences (Esser et al., 2009; Kang et al., 2010; Dong & Fu, 2012; Lee et al., 2012; Payne et al., 2012; Yamauchi et al., 2012), date back to these early studies. VMC has thus inspired studies with multimedia and multimodal interfaces toward support for people's diverse modes of using senses, especially in activities where nonverbal interaction and a physical setting are vital for reciprocal visual communication. VMC is considered to be capable of transmitting interaction audiovisually, but as Knapp and Hall (2010) observe, its role in reciprocal intercourse has remained critical due to people's temporally mediated social behavior. The interest in HCI-driven VMC studies has been covering both social and technological aspects, as in computer-supported cooperation, where multimodal communicative expressions integrate affective information (Whittaker & O'Conaill, 1997).

There is a growing recognition of the usefulness of VMC in relative short-term audiovisual online communication with few participants (e.g., video banking, private chat, two-person conferencing) (Paradi & Ghazarian-Rock, 1997; Ames et al., 2010; Lee et al., 2011; Dong & Fu, 2012), but it is not yet clear what social factors or meanings VMC offers for successful communication. For instance, Lee et al.'s (2012) observations of online game players' micro-coordination show that seeing action on screen is not sufficient for understanding the meaning of communicative situations, and that even though talking is used to diagnose satisfaction, a lack of talking is not necessarily a sign of dissatisfaction. Their conclusion was that "talking more" is

not the key for video-mediated cooperation, but only one way of affecting the situation, and many varieties of non-talking were recognized as being just as important in directing interaction and affected experiences. Consequently, pair work studies show VMC as a solution to complex, multi-phase negotiation (Dong & Fu, 2012), consultancy (Esser et al., 2009), and instances where the physical setting, tasks, or objects are handled (Kraut et al., 2003).

Based on these studies, the benefit of VMC seems to be the possibility of more dynamic human-to-human mediation between distributed actors, in situations where their personal characters, nonverbal behavior, and social action are valued as resources in the production of the desired outcome through cooperation. One obvious application is in human-centered services. In addition, Knapp and Hall (2010) define a spectrum of everyday situations where personal characters are used for communicative purposes privately (e.g., family ceremonies) and publicly (e.g., advertising, politics, education, and health care). They also point out that the success of this communication results in the appropriate qualities of the total communication system.

However, it has been difficult to find case studies on VMC service systems that have been intentionally configured as a comprehensive communication system between related partners. Several VMC solutions have been implemented, for instance, for general videoconferencing, e-learning, telemedicine, or chatting, which conversely show the great audiovisual potential of VMC. However, the studies where these aspects are appropriately integrated in kiosk interfaces, information system use, and business goals of service providers are still scarce.

2.4   Facilitated Service Interaction Using VMC

Advances in information and communication technology (ICT) have greatly improved the possibilities for VMC, and today an adequate technical communication quality can be achieved via standard broadband and Internet connections by personal computers. As the interest in kiosk design has been in STT (Rowley & Slack, 2003; Alcock & Millard, 2006; Tan & Chen, 2008), virtual kiosks and virtual assistance (Karla, 2004; Kang, et al., 2010; Payne et al., 2012), VMC-based human-facilitated remote service systems are still novelties, although their basic model was provided over a decade ago by Paradi and Ghazarian-Rock (1997).

A kiosk service can be configured so that one clerk serves several kiosk locations (Figure 2) while s/he is working over the Internet. As modern devices, databases, and networks transfer system data, a VMC-based kiosk interface remains simple for customers, and can be modified for many types of services and information systems (e.g., customer management system CMS). Service communication takes place by VMC, which makes it possible to add real-time F2F facilitation to a service process when needed. This can be seen as an example of HCI-based SST kiosks, which can be useful for customer relationship management (Alcock & Millard, 2006; Proença & Silva, 2007), and an option for current forms of identity verification which, in remote services, are seen as inconvenient for users and service providers (Chowdhury & Noll, 2007).
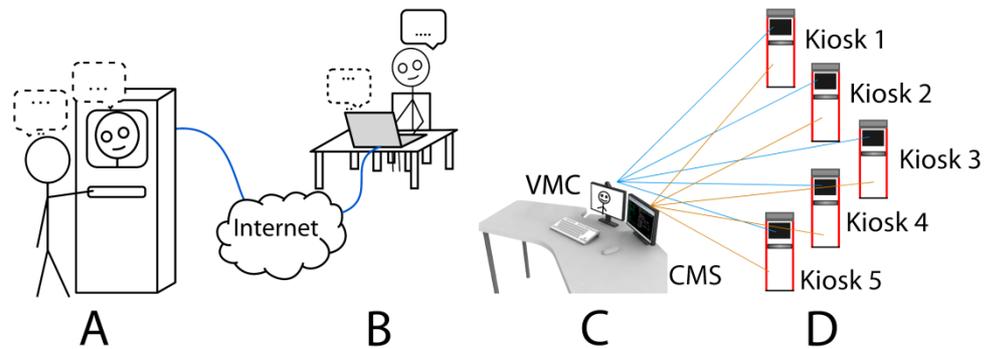
Figure 2. A: Customer's view, B: Service Clerk, C: His VMC & CMS views, and D: A kiosk network.

Compared with VMC in personal use (Ames et al., 2010; Lee et al., 2011) people involved in service interactions play very different roles (Nicholas et al., 2001; Esser, et al., 2009; Glushko & Tabas, 2009): a customer initiates interaction as s/he needs this service and pays the costs, and a service clerk serves and facilitates by responding to the customer's service expectations. Different types of online help (Åberg & Shahmehri, 2001; Kraut et al., 2003; Lai-Chong Law & Vu Nguyen-Ngoc, 2007) have been discussed in interaction research, but aspects of customer-service relations have remained peripheral with relation to varieties of physical task guidance in the roles of learner-helper, relatives, or work mates. These aspects offer a starting point for the extension of VMC video-mediated interaction towards a need-cost relationship, where the service setup, immediate customer attention, action, and intervention are intentionally combined for the production of the desired service outcome.

According to Schwarz (1994), the core elements of facilitation are what a facilitator verbalizes and carries out in a particular situation, which reveals a set of values and principles behind his or her actions and expertise (p. xi). The purpose of facilitation is to make the situation easy for the facilitated person (Schwarz, 1994; p. 14).This involves intervention into an ongoing activity (Argyris, 1970; p. 15) to be improved in the direction defined by the initiator. Usually, facilitation occurs in the immediate presence of the facilitated (Schwarz, 1994; p. 15) which separates it from asynchronic or virtual online assistance (Åberg & Shahmehri, 2001; Payne et al., 2012), and from longer-term support using several facilitators, modes, media, and sessions (Lai-Chong Law & Vu Nguyen-Ngoc, 2007).

Depending on the initiator's request, timing, and response, Schwartz (1994) has defined two general facilitation modes: help given for *ad hoc* needs and help given for the sake of longer-term effects on future needs (e.g., learning) (Lai-Chong Law & Vu Nguyen-Ngoc, 2007). In their VMC studies on physical collaborative tasks, Kraut et al. (2003) show that to help in being effective, one must receive it when it is needed, and when one is mentally, socially, and emotionally capable of receiving it. Equally, the timing of the intervention is critical, as well as the facilitator's awareness of the state of the task and objects handled for the conceptual grounding of the communication (Clark & Brennan, 1991).Facilitation, showing the service willingness (Glushko & Tabas, 2009), requires the capacity to sensitively observe the customer's situation, verbalize only the needed issues, and anticipate of what kind of helps/he will need, and how to ask for the customer's input or activity for the desired service outcome.

Facilitation is typically structured by diagnosis (observing, interpreting, and inventing the means for helping) and intervention (using the means) repeated as a cycle of appropriate steps (Schwarz, 1994; p. 68) which, in a successful service process, balance the roles of the actors and the use of resources and settings. Facilitation cannot be driven mechanistically, or be too interpersonal (Lai-Chong Law & Vu Nguyen-Ngoc, 2007) because the customer should perceive it as meaningful and satisfying (Schwarz, 1994; p. 8). As part of service work, facilitation involves a reflection of how the customer reacts to the help offered regarding the expected service experience, while the outcome is produced in a way that will be beneficial for both parties. The following case will show how users reacted to facilitation given by a VMC kiosk during their remote car rental service processes.

3. CASE STUDY SETTING

Our empirical study was conducted in 2012 with a car rental service, Avis (www.avis.fi). Avis offers remote services using VMC-based service kiosks in Scandinavia, in locations such as airports, shopping centers, and universities, and this concept is designed to simulate an F2F service. Our data was collected in a university where the participants and the kiosk were located in a large passageway, and a service clerk worked through the Internet (cf. Figure 2). We put up some boards between the walking area and the kiosk, as rental situations were simulated in the daytime. The kiosk is equipped with a video display, video and document cameras, fine adjustment speakers and microphones, and a remote controlled credit card reader, scanner, laser printer, and car key boxes. Kiosk use starts when a customer pushes a start button that opens a video connection, and a service clerk's face figure appears on the video display.

The data collection was carried out by a group of students and one of the authors working with the participants. The participants were selected from among university staff and students (seven women and nine men, ages 22-63 years, id1 – id16) who had driver's licenses. They were invited by emails containing information about the study and three themes for car rental, a business trip, winter holiday trip, and family visit. In each theme, a car renter might have special requirements for a car, route, timing, or belongings (e.g., a navigator, child seat, or skis) but s/he could branch off the theme freely, and the car rental process at the kiosk was not pre-scripted.

When arriving at the kiosk, a participant answered background questions (approx. 5 min), rented or reserved a car using the kiosk (approx. 10 min), and gave the first impressions to an interviewer who then interviewed (approx.15-20 min) him or her by using user experience adjectives. All communication was informal, and the participant could ask for help if needed. The study situations were video recorded and analyzed using an interpretative approach (Klein & Myers, 1999) to situated analyses of how people reacted to VMC use in a public place, facilitation, and talking to a kiosk, which is usually used alone and quietly.

4. HUMAN-FACILITATED SERVICE INTERACTION

The participants generally considered their ICT-use skills to be good or excellent, no one had used this type of a kiosk earlier, all had used F2F services and self-services, and nine of them were first-time car renters. Their rental processes (Figure 3) will next be analyzed by the

discussion of VMC use at a service kiosk with facilitation, and the participants' comments and their reflections on the experiences.
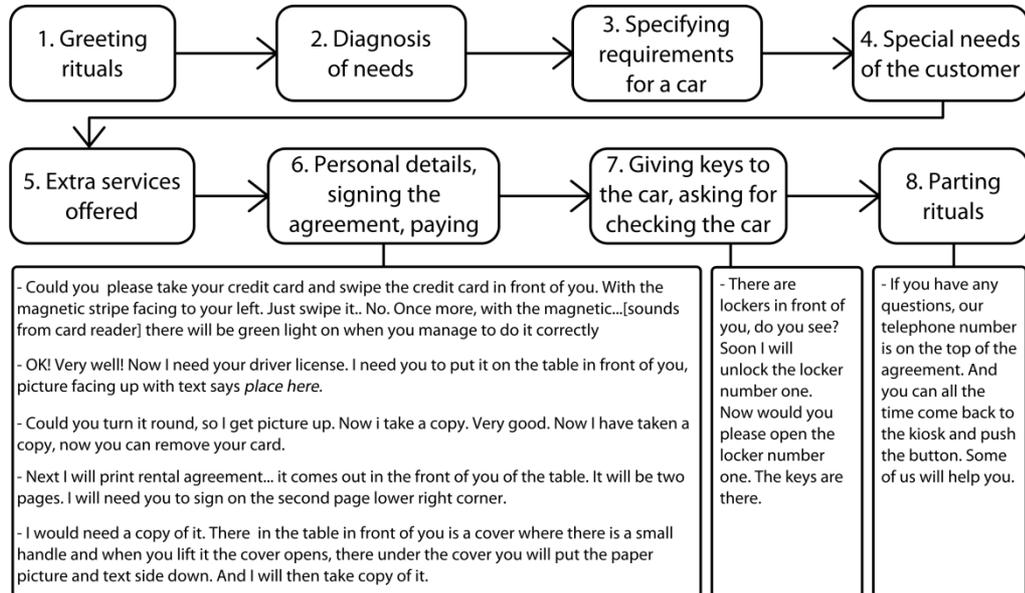

Figure 3.Typical steps in a car rental service at the VMC-based kiosk.

4.1   F2F Car Rental on Remote Service Kiosk

We identified eight main steps in the car rental service (Figure 3), and the general facilitation cycle (Schwarz, 1994; p. 68) which, however, contained features that are typical only in VMC-based kiosk use. The first five steps contained the usual service facilitation, as in the diagnosis of the rental needs and interpreting the means for helping. The sixth and seventh steps were clearly task-oriented (Kraut et al., 2003; Lai-Chong Law & Vu Nguyen-Ngoc, 2007), revealing the realization of a need-cost relationship as the service payment (Glushko & Tabas, 2009): a rental agreement where the customer guarantees that s/he will follow the national driving laws must be personally signed and paid before receiving the car keys. Otherwise, as is customary in F2F service, the rental could vary depending on the participants: "This was my first time with a customer attendant by a web camera. All the same things could be done here as in a live situation" (id4). Standing at the kiosk interface and talking by VMC were referred to as qualities of typical F2F interactions and "surprisingly personal because it's face-to-face" (id15), or "normal, it's not different from other car rental desk face-to-face situations" (id13).

The rental dialogue is seen as an F2F conversation type (Clark & Brennan, 1991), containing typical elements of social interaction with turn-taking and conduct rituals. Their function is vital in F2F services where people expect certain types of behaviors showing their perceptions of *service* and their relational statuses given in the division of social roles (Goffman, 1967; Alcock & Millard, 2006; Glushko & Tabas, 2009; Campbell et al., 2011): "The clerk was clearly a true customer service clerk" (id10) who could maintain a suitable intensity in showing service willingness to customers: "This was surprisingly flowing, the service clerk managed to give me

all the information before I even asked anything" (id6). This type of anticipation of customer needs contributed to the flexibility by "quick understanding about the customer requirements" (id15) and made the kiosk service convenient and easy (Alcock & Millard, 2006), since the service interaction was personalized for individual customers. To a great extent, this was due to the timely facilitation (Kraut et al., 2003) given for the user's input and output actions during the car rental processes as designed for the purpose (Glushko & Tabas, 2009).

Given that these typical F2F service aspects seem to be ignored in HCI-based self-service kiosks, which in this respect only allow an impersonal user profile for both customers and service personnel, VMC brings the human-centered aspects back for the production of the desired outcome in cooperation. In previous studies, it has been recognized that one factor in providing the expected social experience is the service producer's ability to embed personal aspects into technology design (Berry, 1999; Alcock & Millar, 2006; Knapp & Hall, 2010; Yamauchi et al., 2012).

4.2   Facilitation for Car Rental Process and Interaction with Kiosk

Given that in this case no one used the afforded local help, the rental processes contained two types of remotely given *ad hoc* facilitation, one for the car rental as producing the negotiated outcome (rental agreement), and the second for the interaction tasks with the kiosk interface.

The first took place during the rental dialogue driven by small questions: "There is insurance, covering damage done by others. But there is all liability if you damage it … Would you like to have that kind of insurance?" (Clerk) "It's a business trip, so let's add that, for safety's sake." (id16). This type of facilitation produced within the service, piece by piece (Dong & Fu, 2012) is typical in services where people quote the immediate benefit for their main activity, in this case fulfilling the need of the customer to drive safely from one location to another, or as extra offers to save your time: "You can do it in one pack, many in one service" (id14). In other contexts, such as in education, where longer-term measures with mixed types of online facilitation setups are common, the perceived benefit has remained unobserved in students' performance while students could receive help from local facilitators and benefit from F2F situations (Lai-Chong Law & Vu Nguyen-Ngoc, 2007). The benefit of immediate online help in short-term, task-oriented cases with verbal feedback is reported (e.g., Kraut et al., 2003).

The second facilitation type resembles task-oriented modes, but differs from these due to the facilitation given for the kiosk interface using peripherals. This contained a variety of input and output help, invitations to the user to attend the interaction, describing what the next step would be, and explaining how to use personal items with interface functions. As a result, the VMC helped to coordinate the customer's real-time action and handling of the interface peripherals. On the other hand, the kiosk use involved the service clerk's indexical phrases (Robertson, 1997) regarding the virtual space between them and the user's situation at the kiosk location (Figure 3, steps 6-8), such as asking the user to show a driver's license and use a credit card and a scanner with rental papers. In the related functions of SST interfaces, users usually need help (Alcock& Millard, 2006). In this case, the kiosk "worked quite well, everything I needed worked and there was no confusion" (id16). "This is much better than the ATM, no worry about the interface. I could say what I wanted and use normal interaction"(id14).Facilitation given for the interface functions by speaking was therefore deemed to be "interesting because a live person explains very clearly and fast" (id13) and helped to grasp the information-intensive context.

In several rental processes, the facilitation types overlapped. Due to this, the use of kiosk technology was seen as easy, and the interaction experienced as flowing and flexible: "It is fully interactive ... user can be active" (id15), "the whole process was quick, not slow at all" (id2). "It would go slower on the Web, as there one has to ponder the issues. Now, I could ask about them" (id10). Principally, this quality was seen as ensuing from "the service clerk who guided the process, and that's why it went quickly" (id6). These comments show that the participants might expect some difficulties as the kiosk was new for them, and associated the help with remote facilitation. Based on that the Avis's service process is designed to resemble an F2F service, it can also be returned to the technology-mediated context of a car rental embedded in the service process (Orr, 1996; Schmidt & Bannon, 1992) as designing the service for VMC use.

In summary, in human-facilitated remote services, VMC supported facilitation of real-time information-intensive service dialogues during the exchange of car rental information (especially relative to rental steps 1-5), whereas talk about and references to technology with the user's things, rental papers, car keys, and interface functions epitomize the features of the technology-mediation, bended with the social service dialogue (especially relative to rental steps 6-8).The articulation of human-facilitated services is not only socially or technologically oriented or influential *per se*, but the analysis of various nuances would require more detailed discussions by several other lines of research than can be taken into account in the confines of this paper.

4.3 Summary of Experiences with Remote Service Kiosk

Based on the participants' comments, the configuration of the VMC-based service kiosk (Figure 2), the implemented equipment (Chapter 3) used during the rental processes (Figure 3), and the human-driven facilitation can be seen as an appropriate combination for kiosk users.

The car rental service contained two types of *ad hoc* facilitation provided for the service process and for the interaction with the kiosk interface. These overlapped in practice and gave the user the experience of being personally served by the remote kiosk, and they affected the flexibility of the service and kiosk use interactions. The users' comments show the importance of the mediation of articulation work in this information-intensive service context. Due to the audiovisual interactions, this remote kiosk service using VMC was generally received positively, and judged as novel, controllable, easy to use, and fast. However, one problem in this kiosk was its standalone mode, where the video display looks like a traditional computer-operated kiosk, but once the users started to use the kiosk, facilitation with a real person provided the social interaction experience simulating a "normal" F2F service situation (id13, id14).

When users described their experiences at the end of the study, facilitation within the rental process was the main talking point for most of them. One user distilled his interaction and kiosk experience into: "I use a lot of Internet and can do business there too, but this was flowing … In a way novel and dated as you talk with a customer attendant and work with a machine" (id8). Consequently, we argue that this captures the emergence of human-computer interaction as a medium (Löwgren & Reimer, 2013) for social information system use, enabled by the configuration of the VMC with other kiosk interface equipment.

For the users, this kiosk interface offered quite a non-traditional approach to information system use. Contrary to digital HCI-dialog based self-service kiosks, where interaction takes place through graphical user interface, no manipulation of objects or data on screen is required when the interaction takes place via VMC, and a service clerk interacts with related systems. This kind of set-up of computer-network systems for data transfer and VMC devices for mutual

intercourse can be seen as a social innovation (Löwgren & Reimer, 2013), i.e., as the interaction form where human intervention defines the service, and people can be identified as individuals, not only as system users, and be serviced personally by service personnel working over Internet.

5. CONCLUDING REMARKS

Studies on VMC-supported interfaces and service systems are scarce, even though VMC offers interesting possibilities to configure intermediate solutions for information systems use. With respect to solving real-life problems, our case confirms the benefit of VMC in the relative short-term, audiovisual online communication with few participants, and brings into focus the potential for dynamic human-to-human mediation between distributed actors. Potential applications include all cooperative work activities where the actors' personal characters are important as meaningful resources in the production of a certain outcome. This case shows one application area of human-centered services, human-facilitated remote car rental for service kiosks used in public places. In this remote service context, VMC supported facilitation of real-time information-intensive service dialogue, and the interaction with kiosk interface functions.

Experiences with the kiosk solution show that compared with digital HCI-dialog based self-services, where interaction takes place through graphical user interface and requires the manipulation of objects and data on screen, users of this kiosk interface with VMC are offered a non-traditional approach to information system use. VMC in kiosk interface solutions advances the emergence of human-computer interaction as a medium for a new type of social information system use: remote service taking place between people by audiovisual communication over the Internet, while modern computer-network systems transfer the needed system data between the distributed locations. For service providers, this is enabled by the configuration of VMC with other kiosk interface equipment, using network connections implemented for personal computers and standard broadband and the Internet.

The configuration of the VMC-based kiosk system introduced in this work is a new kind of unique interface solution for social information systems use, and is intentionally developed for the purposes of remote service production using human-facilitated service processes. The service process has been designed to simulate an F2F situation, and our study shows that for users the VMC kiosk system, using audiovisual channels, can offer a natural, two-way interaction mode which is appropriate for the exchange of information in personal service processes. For the service provider, this makes it possible to add personal, real-time F2F facilitation to remote service processes, and to extend a variety of services by offering extra choices. In this case, facilitations of service processes and interactions with the kiosk interface overlapped and affected the flexibility of the interactions. The service process facilitation followed a general facilitation structure, while the interaction facilitation contained a variety of input and output help given to the user. These can be seen as typical only for VMC-based facilitation, and involve the service clerk's professional and ICT knowledge and articulation skills.

Human-driven facilitation can be seen as an integral part of personal service with VMC, and facilitation is a useful concept when analyzing VMC-based remote service interaction, and when considering new approaches to or application areas for social information system use. We also argue that the application of VMC in remote service kiosks enables a service provider to take a new approach to personalized kiosk service production. Service experiences with the kiosk show the VMC-kiosk interface to be appropriate for public use. For the users, VMC-kiosks give the

opportunity to be serviced and facilitated when needed, and to participate in social information system use with the service provider taking care of all the necessary steps in the service process.

We considered that different kinds of users might benefit from audiovisual communication and service facilitation even more than the participants involved in this case, but this case shows that skilled ICT users may enjoy a new kind of technology-mediated participation. Conversely, in this work, we cannot provide related participation theories or theories for articulation work and technology-mediated cooperation with service work, which seem particularly challenging in this kind of remote service context. Also, the introduction of the service concept to other service areas with social information systems use still requires intensive research efforts. It is, therefore, important to increase remote service and systems design in several contexts, especially with people to whom systems use is not otherwise affordable, and in the context of public services where people are dependent on given technologies. We believe that related sociotechnical approaches would offer significant perspectives for these development efforts.

In conclusion, VMC is beneficial in supporting the facilitation of real-time information-intensive remote services, negotiations during information exchange, and for facilitating interaction with kiosk interface functions. For diversified customer groups and situations where people are dependent on the kiosk available in a public palace, VMC-kiosks enable social information systems use and personal services as a human-facilitated F2F remote service. By providing a real-life configuration example of how a modern VMC-based remote service kiosk system can be implemented, an example service context for it, and experiences of how it can be used, our work contributes to the design of remote services, kiosk interfaces, and information systems, and brings into focus a new way of using information systems with VMC and over the Internet.

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