Design and Evaluation of a Service-Oriented Collaborative Consumption Platform for the Elderly

Philip Koene

Technische Universität München, Chair for Information Systems, Boltzmannstr. 3 85748 Garching, Germany philip.koene@in.tum.de

Felix Köbler

Technische Universität München, Chair for Information Systems, Boltzmannstr. 3 85748 Garching, Germany, felix.koebler@in.tum.de

Sebastian Esch

Technische Universität München, Chair for Information Systems, Boltzmannstr. 3 85748 Garching, Germany Sebastian.esch@in.tum.de

Jan Marco Leimeister

Universität Kassel, Chair for Information Systems Nora Platiel Str. 4 34127 Kassel, Germany leimeister@uni-kassel.de

Helmut Krcmar

Technische Universität München, Chair for Information Systems, Boltzmannstr. 3 85748 Garching, Germany, krcmar@in.tum.de

Abstract

Research indicates that social networking sites can be used to foster social interaction and reduce the risk of social isolation for the elderly demographic segment. Collaborative consumption, a new evolutionary step in SNS, enables the sharing of personal services, thus holding the potential to strengthen social integration and enable an independent lifestyle for the elderly. We therefore developed a local, service-oriented collaborative consumption platform called "Bring Dich ein!" with the purpose of facilitating social interaction across generations as well as the trade of peer-to-peer services. The platform was fully implemented in a participatory development process and evaluated in an extended pilot phase. The qualitative evaluation shows good usability for the elderly and high potential for the proposed concept within the target group.
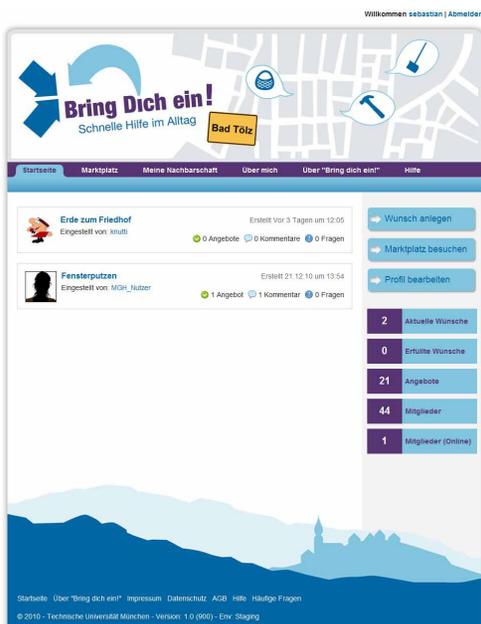
Keywords

Social Networking, Collaborative Consumption, Elderly

ACM Classification Keywords

H.3.5 [Online information services]: web-based services; H.5.3 [Group and organization interfaces]: collaborative computing, web-based interaction;

Introduction

In light of the demographic shift in many European societies, the proportion between the young and old population will change at an increasing rate. This incorporates significant challenges for the affected societies. Elderly individuals face changes within social structures brought on by, e.g., relocation or death of relatives or friends, as well as loss of social integration trough retirement. The risk of social exclusion for the elderly needs to be reduced, since mental fitness and social participation have a strong reciprocal influence, and social interaction satisfies basic human needs [3]. Therefore, in order to shape a sustainable society in the face of this demographic change, the bonds between generations must be strengthened. In recent years, efforts have been made to understand the phenomenon of social networking sites (SNS) and especially users' motivation for active participation, indicating benefits and gratifications, as well as incurred risks and costs (such as security and privacy implications) from participation [6]. SNS are platforms that share a set of functions to create and maintain a virtual network based on social-circles, post status messages and follow the lives of friends and family members (e.g., Twitter, Facebook and Google+). Current SNS can be distinguished from early virtual communities by the fact that they are primarily used for the maintenance of existing, real-world social ties [6]. Consequently, research indicates that SNS can be used to foster social interaction [5] and reduce the risk of social isolation. However, in most documented research, the target population has been predominantly young people who are usually the early adopters of such technologies. Current SNS do not necessarily consider specific requirements of an elderly target group [8]. Barring a few examples [4], there has been little research investigating online social networking among the elderly or across generations. The recent convergence of electronic commerce and SNS has resulted in online social commerce platforms (e.g., Ebay), enabling users to actively participate in selling and offering products online. They support interpersonal relations and interactions, occurring during and after product and service sales. A new evolutionary step in social commerce platforms enables users to allocate, share and offer products and services to other individuals based on a *collaborative consumption* paradigm [2] (e.g., Swaptree, Airbnb, Getaround and Taskrabbit). They facilitate the shared usage or consumption of products as well as service-oriented offerings, e.g., peer-to-peer lodging, car renting or service provisioning. However, the usage of IT solutions to support service provisioning for an aging population often fails due to anxieties, capabilities and emotional barriers of the target group. SNS have originated from a local focus (e.g., registered students at a university) to a global orientation (e.g., Facebook). However, most recently established contemporary social networks (e.g., Ohsowe and Nextdoor), show a reversal of this trend by the mapping of social networks that are limited by geographical factors and therefore inherit a highly local focus (e.g., neighborhoods and municipalities). Since the acceptance of SNS by elderly users has been insufficiently studied, we adopt a design-oriented research approach towards the development of a local, service-oriented collaborative consumption platform called "*Bring Dich ein!*"[1], abbreviated to BDe. We conducted a participative requirements elicitation for the design and

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[1] "Bring Dich ein!" is best translated from German as "Get involved!" and conveys an imperative statement.

functionalities of the platform. The SNS component of the platform facilitates social interactions among the elderly and across generations, thus reducing the risk of social exclusion. The online social commerce component enables trading of peer-to-peer services, i.e., the collaborative consumption of services tailored towards the target group. The research goal is to evaluate the acceptance of a local, service-oriented collaborative consumption platform for the elderly.

Methodology

The development and evaluation of BDe followed a design oriented research methodology called *design science* – creating things that serve human purposes and assessing them against criteria of value or utility [7]. The two basic iterative activities in any design science research are the building and evaluating of a "design artifact" [7] - in our research the BDe platform. Following the design science methodology, we (1) elicited requirements to ensure real-world relevance for BDe; (2) grounded the development and design of the artifact with the help of scientific methods, namely a participative approach including various focus groups, and (3) evaluated the artifact with qualitative methods. In the development phase of our design research for BDe, we conducted three focus group interviews for the elicitation of use-cases and basic functional requirements, the definition of a set of functionalities and the development and refinement of an initial look and feel based on mock-ups. Each focus group lasted approximately two hours, tallying to a rough total of 360 minutes with 8-10 participants in the development phase. The evaluation of BDe consisted of a pilot phase of the platform with a total of 52 registered users over four months, including five focus groups prior to the pilot phase and two focus groups after more than three

months to reflect on the pilot phase. The first five focus groups included the initial evaluation of the design rationales, set of features and general concept of BDe based on four different types of use-case scenarios and a high-fidelity prototype. The average age of the subjects in the evaluating phase was 64 years, the youngest subject being 48 years, the oldest 84 years. 52% of participants had a higher level of education (e.g., university or college degree) and 30% had an average level of education (e.g., high school degree). All participants were represented through an active user profile on BDe during the pilot phase. The focus groups lasted on average two hours with 6-12 participants, resulting in approximately 840 minutes of qualitative data in the evaluation phase. All focus groups were comprised of elderly people, and moderated by a research team member based on a script.

Requirements and design rationales

The first focus group interviews showed that the majority of participants were familiar with current developments in online social networking. However, most participants experienced significant problems in understanding the complexity of SNS, (e.g., SNS-specific terminologies). When asked about their expectations regarding SNS, participants indicated a preference for a network that restricted membership, minimizing the chances of possible harassment from unknown users. The major motivational driver to join a SNS was (cross-generational) communication with family members. The focus groups also showed a strong anxiety regarding data security in the elderly target group. The majority of the use-cases, elicited in the development phase focused on the support of peer-to-peer services, such as shopping, housekeeping or

repairs. The focus groups in the development phase of BDe yielded a broad set of general requirements of an elderly target group towards the platform and included the generation of potential use-cases for peer-to-peer service provisioning. These requirements were aggregated into a set of design rationales:

- *Intuitive interaction and navigation:* A shallow navigational structure is realized by the restriction to two hierarchical levels. Captions on navigation and interaction are adapted to the national and local language/dialect, and tested on comprehension. We consulted coloring and formatting guidelines to account for physical and cognitive restrictions of the elderly.

- *Geographically limited/closed community:* The platform represents a virtual mapping of an individual's living environment (e.g., neighborhood) guaranteeing a closed community. The social network restriction to a geographical area of moderate size is a necessity for the provision of most services, and can also assuage concerns of privacy that are associated with the elderly, using the Internet to establish relationships [1].

- *Transparent privacy settings:* Protection of privacy was of great concern to our focus groups. Specific contact data, necessary for service provision are only transferred once an agreement is made by both parties, initializing a service. Comprehensive privacy settings are implemented.

- *Community consciousness:* Users are initially connected to all active members of their virtually mapped neighborhood, providing easy integration of real-life social ties. This automation can be deactivated if users desire a more personalized social network. Requests, bids, comments and questions are displayed as status messages following the micro-blogging

scheme. This boosts activity by increasing the frequency of postings, ensuring an updated community consciousness with a less tech-savvy target group [5].

- *Request-based service trading:* The trading of services is restricted to, and initiated by, requests of users with service needs. This ensures that the provision of services is embedded in the communication of the platform members and that the platform will not degrade to advertisement space for service providers.

Implementation

SNS features of BDe were implemented in a fashion similar to contemporary and established SNS. The platform itself is constructed with Grails[2]. The underlying process of trading services on BDe is based on the requirements derived from the conducted focus groups. Registered users can post a wish that describes a specific service demand (figure 1). The process of matching services is always initiated by a request, shared in the form of a status message. A shared request consists of a detailed description and additional information, e.g., the fulfillment time, date, place and special conditions. A marketplace overview (similar to the Facebook wall), different filter functions, and a list of past personal activities provide an overview of all activities on the platform. Neighbors or acquaintances, registered on BDe, can respond to a request with an offer (figure 1), a comment or a question. Offers contain information on temporal validity, the expected duration to provide the service and the expected price (figure 1). The originator of the wish as well as other participants that have responded to it are notified of all related activities (e.g., by email or SMS). Only the

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[2] Grails is an open source web application framework which uses the Groovy programming language.

originator of a specific wish is able to accept an offer. The owner of that offer is made aware of it (e.g., by email) and gets additional information required for the provision of the service. The wish is then removed from the marketplace and no longer listed as an open request. All other participants who have responded are informed by the platform that the wish-originator has accepted a different offer, thus rejecting their respective bid. The closing and reopening of a request is also possible, as well as the withdrawal of a bid.

Bid on "Bring Dich ein!"

figure 1. Request on "Bring Dich ein!"

Results of the qualitative evaluation

The focus groups conducted during the pilot phase showed that the participants understood the concept of BDe and endorsed the idea of trading peer-to-peer services on a local collaborative consumption platform. All participants attested to the importance of real-world social networks at an advanced age, especially for

everyday support in rural regions. The majority of participants embraced the concept of supporting existing real-world social networks through a virtual neighborhood to prevent loneliness and enable a mobile and independent life. The participants were encouraged to not only request services but also offer aid to other platform members if possible, which was done extensively. In fact most participants were keener on helping themselves than on requesting aid, which hindered service trading somewhat.
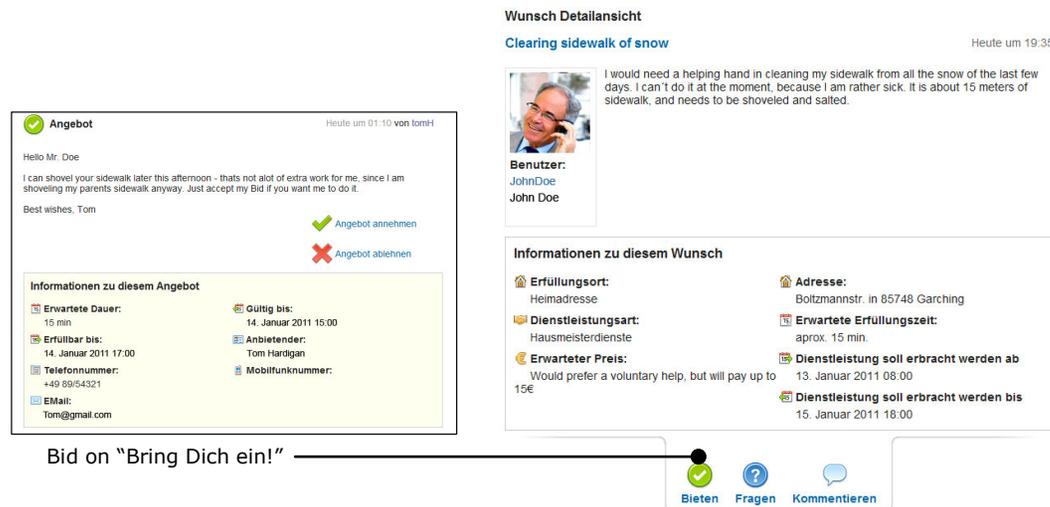
All design rationales that served as basis for BDe were confirmed in the focus group evaluation. The two most discussed design rationales were (1) security and (2) community. (1) There were reservations about the privacy and data protection policies currently enforced in established social networks. Grounds for these concerns are, for the most part, negatively charged reports on SNS in the press or by acquaintances. No active member of an established SNS was among the pilot phase participants. They understood and supported the initially restrictive privacy settings to BDe, noting however, that keeping them restrictive considerably hindered the trading of services. The majority of focus group participants initially feared becoming victims of a crime through the use of a service traded on BDe, despite the fact that participation required a mandatory identity check. Strong, confidence-building measures in SNS through novel technologies (e.g., biometric ID), especially for the mediation of services, seem a necessary prerequisite for the focus groups' acceptance of this new service trading concept. (2) The qualitative evaluation of the community components of BDe pertained particularly to the phases of establishment and growth. BDe implements a detailed role-concept

with four distinct roles to enable an effective and efficient trading and provision of services. However, participants called for a revision of this concept in order to, e.g., combine different roles in one person, thus being able to contribute more substantially to BDe. In the case of BDe, a community identity was established by regulating access to the platform through the area restriction and identity checks. Participants reported a positive impact of this on the confidence in services, traded on BDe. However, such regulations have a severe negative effect on the number of active users and thus on the activity within the platform. A high activity level proved to be the most important prerequisite for the service trading on BDe.

Conclusion

As the Internet permeates and enhances different aspects of human life, there is an increasing realization that the elderly user group risks being left-behind in this development due to several factors such as lower computer literacy, ergonomic difficulties in use and lack of trust. The inclusion of an elderly target group in the conceptual and design decisions of BDe counteracts these factors. The evaluation of BDe shows that the cross-generational collaborative consumption of services along with a concrete benefit for elderly people in the form of tailored personal services can motivate the participation on similar platforms. The current implementation of BDe is limited to a web-platform. However, a Facebook application as well as a mobile version, enabling real-time usage, has been developed in the course of the project, but was not introduced to prospective users during our pilot phase. As reflected by the qualitative evaluation, the design rationales that served as basis for BDe ensured a good usability and usefulness of BDe for an elderly target group. The developed concept shows the potential to fulfill the goal of connecting generations and improving quality of life for elderly people through the peer-to-peer provision of services.

Acknowledgements

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