Alternatives and Redundancy: Interaction Design of the TOPIC *CarePortfolio* Landing Page

Hilda Tellioğlu, Aparecido Fabiano Pinatti de Carvalho, Michael Habiger

Vienna University of Technology, Institute of Design and Assessment of Technology, Multidisciplinary Design Group, Favoritenstraße 9-11/187, A-1040, Vienna, Austria

{Hilda.Tellioglu, Fabiano.Pinatti, Michael.Habiger}@tuwien.ac.at

Abstract. This paper introduces the participatory design of the landing page of the *CarePortfolio,* an online platform developed within TOPIC, a European Project under the Active and Assisted Living (AAL) Programme that aims to design and develop innovative technologies for elderly informal carers. The project employs a user-centred and participatory design (UCD/PD) approach combined with an evolutionary development process (ED), which entails the involvement of end-users during all phases of the project and affords changes in the system as new requirements are elicited. The paper recounts the challenging process that resulted in the design of the landing page of the platform, highlighting the relevance of constant interaction and communication with the users and iteratively with the design and development teams for the generation of useful and usable technological solutions for the elderly.

1   Introduction

The body of literature addressing technological developments for the elderly makes notorious the fact that the members from this target group have peculiar needs, such as those stemming from assorted types of motor or sensory impairments developed with the age, which require extra attention and close work with them (Kobayashi et al. 2011; Lindsay et al. 2012).

This paper reports on findings from the TOPIC project, which sets out to design and develop a set of services and integrated tools to support elderly carers (Breskovic et al. 2013). In particular, we present and discuss findings regarding the design of the interaction mechanisms of our platform. We recount with details the design process of the platform landing page, drawing attention to the relevance of being in constant contact with the users, so to design a solution that makes sense to them and provides a pleasant and satisfactory user experience.

The paper mainly elaborates on our design decision about inserting alternative starting points in the landing page of the platform to accommodate different mental models of our users, despite the fact that they would create redundancy in the system, which has been rejected both by HCI specialists and past HCI studies (Nielsen and Thair 2001; Federici et al. 2005). Findings from our user studies challenge such viewpoint. We show empirical evidence that, for this particular group of users, moderate redundancy is rather useful.

2   Related Work

The concept of redundancy in HCI is multifaceted. Some studies on the design of user interfaces touched upon the concept of redundancy not only in terms of exact duplicates of certain interface elements in the same location (e.g., hyperlinks in an specific page of a website (Nielsen and Thair 2001; Becker 2005; De Cock and Hautekiet 2012)), but also in terms of different modalities (e.g. Vetere and Howard 2000; Terken 2005). Most of these studies argue that redundancy increases the complexity of the interaction: "[...] redundancy can increase cognitive load [...]" (Terken 2005); "[r]edundant links add clutter to a Web page, reducing readability and navigational intuitiveness" (Becker 2005). These concerns seem mostly to arise from discourses from information theory and the predictions of cognitive load theory (see Vetere and Howard 2000).

In this particular paper we elaborate on the concept of redundancy and define the concept of interaction redundancy. Here interaction redundancy is understood as the result of multiple navigation options providing alternative paths leading to the same target, e.g., a particular feature of the system, which has been acknowledged by Nielsen (Nielsen 2002) as 'good redundancy'. This concept is different from what Reddy et al. (Reddy et al. 2009) and the likes investigated, as

for them redundancy is to do with the simple repetition of content in diverse physical formats (e.g., text, image, sound, etc.) in the same location. From our search in the literature, a thorough discussion on the matter is still missing. This paper contributes towards reducing this gap.

3 Learning from the users: From Corners to Selective Redundant Interaction Paths

The next sections briefly present what has been done so far within the TOPIC project and how our design decisions have been shaped by the information provided by representatives of our target group and how we came to the conclusion that interaction redundancy is a relevant design element for interfaces targeting elderly informal carers.

3.1 Identification users' needs – Understanding and drawing requirements

In order to understand our users' context, we carried out an ethnographically informed study. As the study data was analysed, we engaged in elaborating design ideas to support our informal carers in there daily lives, i.e., we started drawing requirements for the platform. We decided for a scenario-based design, which consists in using scenarios as generators of ideas about how the system-to-be should look like and behave in the end-users hands (Carroll 2000).

3.2 Initial design and discussions – Sketching

After the elaboration of the scenarios representing possible situations in which the platform would be used and how its use would be, we discussed our findings and ideas for solutions with our participants in a series of focus groups. Use cases and mock-ups were created to translate insights of the field studies we carried out.

In the first design iteration, we created "corners" with specific functionalities to cluster and focus certain content and related actions in our system. For instance, Learning Corner would be a space where informal carers can ask questions to

Fig. 1. Initial proposal for TOPIC

professionals and follow online landing page.training for particular tasks.

Fig. 1. shows our initial proposal for the TOPIC landing page discussed with our participants in a series of the focus groups, whose results showed that the users actually did not resonate with the corners idea. In fact, the data analysis suggests that the users did not understand the idea of corners as online spaces where they could go to and engage in specific types of activities.

As our analysis deepened, it became clearer that one possible reason for rejecting the corners idea is the fact that our informal carers are so consumed with the care work that they cannot actually dissociate it from places. The data showed that, even in their homes, informal carers have no space safe from the care situation they handle: the care work actually dominates everything in their life – their time, their spaces, their activities. Hence, in their minds there are no corners: they would do everything everywhere, although not at certain places. Our data analysis made it noticeable that the care work makes very difficult for them to have certain separated places: everything is connected to the care receiver and the care setting. Therefore the corners felt irrelevant for them.

3.3   High-fidelity prototypes – Refining

Drawing on results of our first focus groups, we revisited our initial design ideas and reworked them to meet the new requirements collected from the users. We drew on the results of the analysis carried out in our data and used the suggestions provided by our users as guidelines for the redesign. Furthermore, we subjected the redesigned artefacts to new user tests, as reported in Section 3.4. This approach ensured that the user requirements collected throughout the design process have been properly addressed.

For instance, the analysis of our data showed that our informal carers mainly react to situations caused by the care receiver or act before something has really happened, again in relation with their care situation. Visiting a place is different from doing things directly. Acting beforehand means in general organising and coordinating care activities with others. No matter who or what triggers an activity, our users continuously do something, like checking the wellbeing of the care receiver, searching for care information, contacting others to get help, arranging professional help or other types of care related activities. So we tried to bring their terminology to our system, i.e., to use terms like checking, connecting, sharing, exchanging, organising, etc. This requirement has been clearly noticed by the members of the design team responsible for the landing page of the platform, who set out to elaborate a list of the main actions the users suggested they would expect to be able to perform in the platform.

Since our attempt to use the metaphor of corners was not really accepted by our users, we continued with our studies to understand their motivation of using technology to support their daily life. We particularly focused on investigating how we could design something that would be more inviting, i.e., that would

make them feel encouraged to use the system. The new version of the landing page used the tree as a metaphor. We used it to represent our reaching out to informal carers, connecting them to each other, and providing a strong link between them. The action items previously mentioned led us into the WHAT side of our tree, illustrated in Fig. 2.

Further analysis of our data made evident that our users also need to (re)act very fast when caring for someone. Sometimes they need to focus exclusively on the care situation and its actors. For instance, we had informants who said that in a shopping situation the only item they would like to see on their device is the "care receiver" and everything connected to him/her. We took up this thought and created an alternative view to already available functions in the system by introducing the actor-related items (WHO). Fig. 2 illustrates the two sides of our new landing page, organised according to the WHAT and WHO approach.
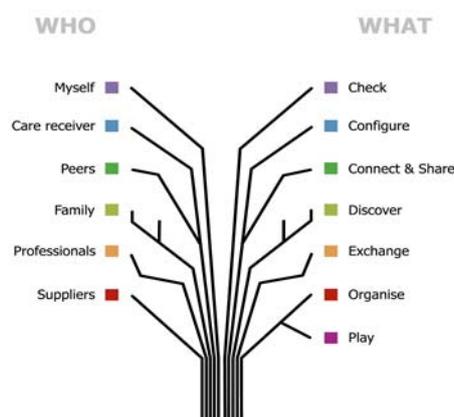

Fig. 2. Landing page with two alternative entry points: WHO and WHAT

3.4   Early stage usability studies – Assessing

Past HCI research has taught us that, when it comes to system development, engaging in usability evaluation since the very early stages of the project is very important. This enhances the likelihood of achieving a system with a good level of usability at the end of the process. Not investing in a formative approach to usability assessment might result in identification of usability problems when it is too late to solve them (Nielsen 1993). Therefore, we started with our usability tests as soon as the first high fidelity prototypes were ready.

We conducted 14 usability tests for the first iteration of the evaluating phase of our UCD approach. The preliminary results of the data analysis have informed the planning of the next focus group that has been carried out two weeks after the conduction of the last usability test. In the focus group our informants have been

organised in two groups to discuss alternatives for the terms to be used for the TOPIC landing page. A set of clear and straightforward concepts has been identified as the main issue to be solved with the tested interface. In a second moment of the focus group, one of the tasks has been revisited. Difficulties observed during the tests have been collectively discussed in order to better understand the reasons for them and how they could be minimised.

4   Discussion

First of all we have to accept the fact that it is a real challenge to provide a real support for elderly (carers). We have to think on means of easy-to-use, on-demand, useful and informative systems, both with regard to content and interaction. Use simplification in this sense can only be achieved by simple navigation and interaction mechanisms of the system.

A relevant finding from our usability tests and focus groups is that our users form a very special group. When it comes to being part of a community, they mainly want to be passively present, because they want to avoid additional workload to the care work they provide. Our findings show that they prefer to have "on-demand" access to the platform and the community behind it. At the same time, they are aware of the positive impact of such a community to their lives and to their physical and mental beings. Our challenge as designers was to create a system that is useful and informative, which can support our users from different perspectives, but only when and in ways they want to. From our results, if this requirement is not fulfilled by the system, they will simply not use it at all.

In this research work, achievement of the balance between alternatives and redundancy in user interaction turned out to be key. Alternative views to central data enable us to reach out towards a broader group of users. We know that we cannot offer a system that suits all types of requirements and situations of informal carers because the user group is very heterogeneous. Therefore, configurability of the system is crucial to make personalization possible.

In our context, with our multiple alternative access points in our system, we refer to interaction redundancy, against to some guidelines found in the HCI literature. For instance, one of the guidelines for homepage usability is about avoiding redundant content, like categories or links in the page (Nielsen and Thair 2001). In our design we did not repeat content. We only created different paths to reach the same functionality of the system. Coming from different starting points (WHO or WHAT) we provided the same interfaces on the second level of interaction with our system. This way they were not confused, but positively surprised when they could reach the interfaces they needed. They were even happy to have shortcuts to certain functions, especially when the system intelligently selected relevant data for their purposes, like the filter mechanism integrated in case of actor-related (WHO) items in our system. Due to reasons like

faster data access with minimum user interaction, clear entry points considering the user context, easy orientation in the system depending on the concrete situation, and finally the familiar interface to deal with regardless the path of access so far are some reasons what our users like the alternatives we designed.

However, we have been reminded in our usability tests that it is very important which action terms are used on the system's landing page to correctly communicate the functionality available for this term. They found some of them very useful and refused to use some others, e.g., "Discover" (Entdecken) was not understood as something where users can browse new content provided by someone else, or search for new content, peers, or events. It was more understood as a safe place where they go to search for whatever they could not find the system, suggesting that we must reconsider the term for the next version of the landing page. We can try to explain this phenomenon by referring to the concept of mental model differences of our users. They had another meaning and use of the term "Discover" than we had.

Indeed, we need to rename some of WHAT items available in the landing page. This will solve some of the usability problems identified during the tests. As pointed out in many HCI and IxD books (e.g., (Nielsen 1993; Sharp et al. 2006)), our study confirmed that we, the designers, use a different terminology of actions than our users, something difficult to overcome even when working close to them. One challenge we faced in the redesign process was to communicate our design decisions to other members of our consortium. Since we were proposing an innovative way to give users access to the platform features, some partners were resistant to it. The main argument against it was that users would feel disoriented and have difficulties to find their way around the system. The suggestion was to use the traditional left menu bar approach widespread across the web. However, since we set ourselves to design something that would work across different devices – e.g., laptop, smart phones and tablets – we argued that the left menu bar would have some limitations. After a few discussions and brainstorming sessions, the consortium decided to subject the redesigned landing page to testing in a
series of usability evaluation sessions.

The results of the usability tests performed by one of our partners pointed out that users would in fact have no difficulties in using the tree design. Users who were more used to web systems have suggested that, initially, it was slightly more difficult for them to get oriented in the system, however, after a few interactions they have mastered the new navigation concept and could easily find what they needed. On the other hand, users who have no prior experience with web systems would find the tree solution easier from the beginning. This illustrates how communication between users and designers and among designers is very important so to put forward a user-centred solution.

A last challenge we experienced concerns conveying the importance of our methodology to our development partners. Since the beginning they confronted

the qualitative research approach, because of reaching out to a rather small number of users, and the thorough work with the users. It took us an intense negotiation and articulation work throughout the project. Finally, the field study results convinced them of its validity and usefulness.

5   Conclusions

In this paper we presented results of design activities and usability studies conducted in TOPIC. We particularly addressed our design decisions for accommodating multiple user models to make initial navigation in the system more straightforward. Applying user centred and participatory design enabled us to find these different user modes. We could shadow, interview, and gather additional data via cultural probes. Focus groups helped to create rationales for our design decisions. For instance, we thought corners would be very useful as metaphors for the landing page of the system. We were wrong. The tree turned out to be more suitable and understandable by our users. Our experience shows that only clear and constant communication with the users and within the design team can help us to better understand their mental models and translate this into interaction mechanisms that can provide easy of use and a better user experience.

6   References

Becker, S. A. (2005) "E-government usability for older adults," Communications of the ACM, 48(2), 102-104.

Breskovic, I., de Carvalho, A. F. P., Schinkinger, S. and Tellioğlu, H. (2013) "Social Awareness Support for Meeting Informal Carers' Needs: Early Development in TOPIC," in Korn, M., Colombino, T. and Lewkowicz, M. eds., Adjunct Proceedings of the 13th European Conference on Computer Supported Cooperative Work (ECSCW 2013), Paphos, Cyprus, Aarhus, Denmark: Department of Computer Science Aarhus University, 3-8.

Carroll, J. M. (2000) "Five Reasons for Scenario-based Design," Interacting with Computers, 13(2000), 43-60.

De Cock, R. and Hautekiet, E. (2012) "Children's News Online: Website Analysis and Usability Study Results (the United Kingdom, Belgium, and the Netherlands)," Journalism and Mass Communication, 2(12), 1095-1105.

Federici, S., Micangeli, A., Ruspantini, I., Borgianni, S., Corradi, E., Pasqualotto, E. and Belardinelli, M. O. (2005) "Checking an integrated model of web accessibility and usability evaluation for disabled people," Disability and Rehabilitation, 27(13), 781 – 790.

Kobayashi, M., Hiyama, A., Miura, T., Asakawa, C., Hirose, M. and Ifukube, T. (2011) "Elderly User Evaluation of Mobile Touchscreen Interactions," in Campos, P., Graham, N., Jorge, J., Nunes, N., Palanque, P. and Winckler, M., eds., Human-Computer Interaction – INTERACT 2011, Springer Berlin Heidelberg, 83-99.

Lindsay, S., Jackson, D., Schofield, G. and Olivier, P. (2012) "Engaging older people using participatory design," in Proceedings of the SIGCHI Conference on Human Factors in Computing Systems, Austin, Texas, USA, ACM, 1199-1208.

Nielsen, J. (1993) Usability Engineering, New York: Morgan-Kaufmann, 340 pp.

Nielsen, J. (2002). Reduce Redundancy: Decrease Duplicated Design Decisions, available: http://www.nngroup.com/articles/reduce-redundancydecrease-duplicated-design-decisions/.

Nielsen, J. and Thair, M. (2001) Homepage Usability: 50 Websites Deconstructed, New Riders Pub, 336 pp.

Reddy, G. R., Blackler, A. L., Popovic, V. and Mahar, D. P. (2009) "Redundancy in interface design and its impact on intuitive use of a product in older users," IASDR 2009 Rigor and Relevance in Design, 209-209.

Sharp, H., Rogers, Y. and Preece, J. (2006) Interaction Design: Beyond Human-Computer Interaction, 2nd ed., West Sussex: John Wiley & Sons.

Terken, J. (2005). Guidelines and Tools for the Design of Multimodal Interfaces. COST278 Final Workshop and ITRW on Applied Spoken Language

Interaction in Distributed Environments. Vetere, F. and Howard, S. (2000). Prior knowledge and redundant multimedia. Multimedia and

   Expo, 2000. ICME 2000. 2000 IEEE International Conference on, IEEE.