RelaxedCare –
Connecting people in care situations: User involvement to collect informal caregivers needs.

Marcel B.F. UHR[1], Bianca REDEL[2], Martin BIALLAS[3], Aliaksei ANDRUSHEVICH[4], Martin MORANDELL[5], Sandra DITTENBERGER[6], Andrea KOSCHER[7]

Abstract. "How is my mom doing right now?" Answering this question in a quick, clear way without the need of calling or stopping by could take away a lot of stress from informal caregivers. The RelaxedCare system aims to develop a solution built upon an existing AAL platform, using a multi-level pattern recognition approach to detect the current state of an assisted person, and then to communicate the state in a pervasive and unobtrusive way (i.e. lava lamp, smartphone widget, picture frame) to the caregiver. For the development of the RelaxedCare system a user centred design approach has been chosen applying especially the ISO 9241-210 [3] and the user-inspired innovation process [2]. A first technical prototype was evaluated with representative end users in lab trials via usability testing to find out, how the generated ideas match with the end user needs. The results show that the project is on the correct path. The majority of participants approved, that the RelaxedCare system supports the informal caregiver in a worry-free way to care for the assisted person (thus allowing the older generation to live longer in their own homes). 19 of 25 participants felt an advantage by using the system in their care situation in general. Overall 18 of them rate the advantage of the usage at home positively and 20 of them rate the usage positively, if they use it on the way. Also interesting is that in total 19 participants could imagine, that there would be an improvement of the care situation for their own family through the RelaxedCare system.

Keywords. Ambient Assisted Living, Informal Caregivers, Assisted Persons, Behavior Pattern Recognition, User Interface, User Centred Design Process, ISO 9241 part 210, User Inspired Innovation Process, Sensors.

---

[1] soultank AG, Bahnhofplatz, 6300 Zug, Switzerland, e-mail: marcel.uhr@soultank.ch

[2] soultank AG, Bahnhofplatz, 6300 Zug, Switzerland, e-mail: bianca.redel@soultank.ch

[3] Lucerne University of Applied Sciences and Arts, iHomeLab, Technikumstrasse 21, 6048 Horw, Switzerland, e-mail: martin.biallas@hslu.ch

[4] Lucerne University of Applied Sciences and Arts, iHomeLab, Technikumstrasse 21, 6048 Horw, Switzerland, e-mail: aliaksei.andrushevich@hslu.ch

[5] AIT Austrian Institute of Technology GmbH, Donau-City-Straße 1, 1220 Vienna, Austria, e-mail: martin.morandell@ait.ac.at

[6] New Design University, Mariazeller Straße 97a, 3100 St. Pölten, Austria, e-mail: sandra.dittenberger@ndu.ac.at

[7] New Design University, Mariazeller Straße 97a, 3100 St. Pölten, Austria, e-mail: andrea.koscher@ndu.ac.at

1. Introduction

As highlighted in the catalogue of projects 2014 from Ambient Assisted Living Joint Programme [1] the majority of existing AAL solutions focus on supporting persons in need of care. A representative study [6] conducted in Austria in 2005 showed that 80% of the people in need of care receive their care by informal caregivers (ICs) at home. Moreover, more than 66% of these informal caregivers feel overburdened by that task sooner or later, which results in a loss of quality of the interaction between the two parties. To reduce the necessity of regularly checking the current status of a person at home by driving by or calling, RelaxedCare aims to provide a system to keep informal caregivers updated on the overall wellbeing of their relatives in a passive and pervasive way. This information is delivered to the informal caregiver via everyday objects like, for example, a colour changing lamp, a picture frame or a smartphone. Additionally, the RelaxedCare system can provide more detailed information for the caregiver if this is desired, keeping in mind the security and privacy aspects of the assisted person's (AP) data. Furthermore, the RelaxedCare system may help to increase emotional bonding of the involved parties by offering the possibility to actively interact with the other partner.

Figure 1. The image shows the basic concept of RelaxedCare. The upper part of the figure shows the Assisted Person at home with various sensors placed throughout the apartment (indicated by the green curved line symbols). The lower part shows the Informal Caregiver with various UI (user interface) devices, either at home (left, color changing lamp), at work (middle, picture frame) or outdoors (right, smartphone app).

2. Iterative User Involvement

The end-users – assisted persons and their corresponding informal caregivers – have been involved in the RelaxedCare project right from the beginning. This approach was chosen in order to keep the focus, the development process and the overall goal of the project as closely related to end-users' desires as possible. Additionally, such an approach assures a higher acceptance rate of the resulting system as well as higher benefits for the stakeholders since they are invited to actively contribute to the design and functional aspects of RelaxedCare. Therefore, the RelaxedCare project is committed to a user-centred design (UCD) process methodology and applies the ISO 9241-210 (Ergonomics of human-system interaction Part 210: Human-centred design for interactive systems) [3] during the project. The international standard provides requirements and recommendations for human-centred design principles and activities throughout the life cycle of computer-based interactive systems. Furthermore the "user inspired Innovation Process" [2, 5] is applied consisting of the steps: ignite, perceive, collect, decode, assemble, experiment and merge, as this process enables the active involvement of knowledge and methods from different areas of academic research, design and industrial practice. User involvement happened in this project via an iterative approach. The analysis and specification of end-user requirements for both user groups was followed by the development of first design ideas which got afterwards evaluated in an informal usability test with a representative sample of end-users. Taking the user feedback into account the design proposals were refined and in October 2014 the first technical prototype of the RelaxedCare system was developed. This first technical prototype was evaluated again with end users of both target groups in lab trials.

3. User Study

With the goal in mind to find out, if representative users could imagine using the RelaxedCare system in daily life in their homes and whether they understand the way (information and functions) the prototype works, we decided to recruit participants which matched our defined personas (potential users' group representations) best. These are Gundula and Josef as informal caregiver (ICs) as well Johanna and Isolde as assisted persons (APs). See this personas in figure 2 and 3. Additionally we recruited young family members (Youths), the "grandchildren" of the APs.
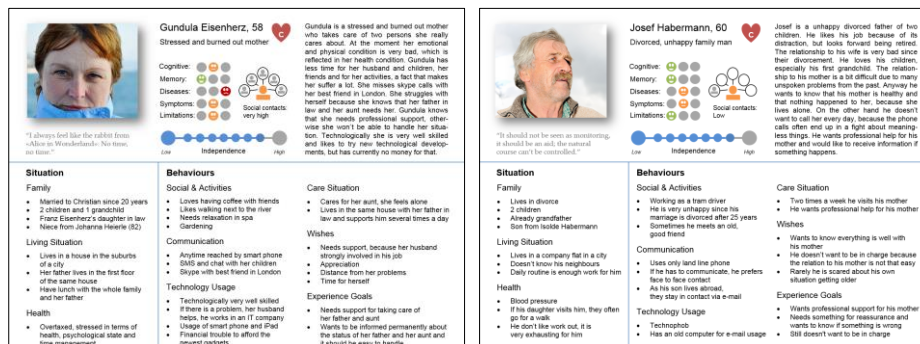

Figure 2. RelaxedCare personas of informal caregiver (ICs)

Johanna Heierle, 82
Nosy, lonely old woman

Cognitive:
Memory:
Diseases:
Symptoms:
Limitations:

Social contacts: medium

"Unfortunately, getting old means to be more and more alone. That's not that good. But that's life!"

Low — Independence — High

Johanna is Gundula's aunt and lives in a nursing home. She suffers about her situation because she never wanted to live in such an institution. Anyway she knows and accepts the fact that she needs help. Her social contacts are not so many, but this is due to her. Johanna knows that her niece tries to visit her as often as she can, but Johanna feels alone. Her daily hobby is to observe the neighbours and chat with them, but she doesn't have friends anymore, because they either passed away or moved to other nursing homes. She tries to stay independent and is also open to try new technological things. She already has an emergency system, but she still uses the landline-phone for phone calls.

Situation

Family
- Widowed
- No children
- Being supported by niece Gundula

Living Situation
- Lives in the suburbs in a apartment for elderly people
- Half an hour away from her niece

Health
- Not fit
- First serious problems
- Feeling dizzy
- Has diabetes
- Recent hip-surgery

Behaviours

Social & Activities
- Feels often alone
- Prefers staying at home
- Short journeys, accompanied
- Likes to read books, but it's sometimes exhausting
- Likes to watch TV (afternoon)

Communication
- Loves visits from Gundula
- Likes observing her neighbours
- Chatting with neighbours few times a day

Technology Usage
- Landline-phone
- Emergency-system

Care Situation
- Never wanted to live in a nursing home
- 2 times a week visits from professional care person
- Gets daily lunch

Wishes
- Hopes that hip heals in a good way
- Staying independent
- Much more contact to niece Gundula and her family, but they are too far away for her
- Wants a more fulfilling life as in previous times

Experience Goals
- Needs support in daily life
- Overcome her loneliness

Isolde Habermann, 85
Optimistic city person

Cognitive:
Memory:
Diseases:
Symptoms:
Limitations:

Social contacts: medium to high

"I feel comfortable in my age. I can do many things independently and don't need lot of help."

Low — Independence — High

Isolde is a lively elderly woman, who looks at her next years with confidence. She realises, of course, that she is not as healthy as before, but she remains optimistic. She loves her beautiful garden, her grandchild Tim and her dog Tristan, who stimulate her taking longer walks several times a week. She has good relationships with her neighbours and is happy, that her son Josef doesn't live far away with his family. Sometimes she is sad, because unfortunately many friends have passed away already. Recently she worries that something might happen to her and there won't be anybody available helping her. Josef always tells her to carry the mobile phone for elderly with her, but she forgets it all the time.

Situation

Family
- Widowed
- One son, Josef Habermann
- Grandmother and great-grandmother (has an ill grandchild)

Living Situation
- Community housing, lives alone
- Friendly relationship with neighbours
- Loves her garden
- Adores her dog

Health
- Don't need drugs
- A little oblivious
- Is afraid to fall down

Behaviours

Social & Activities
- Reading
- Going on excursion and walks in nature, with dog Tristan
- Likes time with grandchild and driving by tram with him

Communication
- Likes face-to-face contact
- Sometimes telephone calls
- 2 times a week visit from son

Technology Usage
- Technophob
- Has landline phone
- Has mobile phone for elderly, but doesn't use it

Care Situation
- Is afraid to impose on son
- Neighbours take a look of her
- Realises more and more, that everything is exhausting

Wishes
- Wants to live independently for a long time
- Hopes, that eyes will be healthy for long
- Drinks everyday a glass of liqueur and wants to live as long like Queen Mum

Experience Goals
- Wants to inform son, if something happens with her – at home or outside
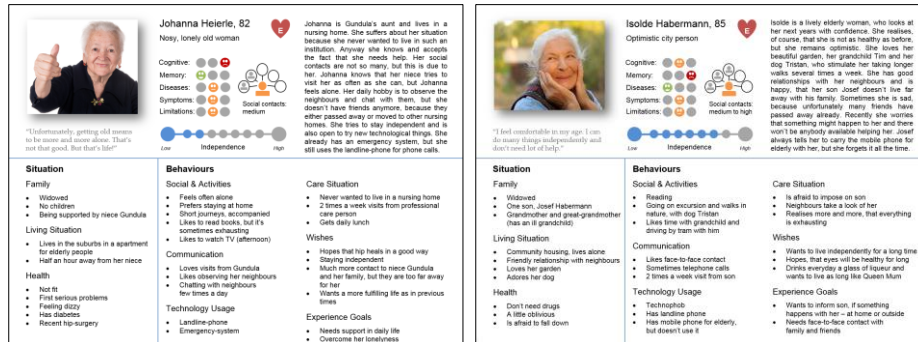- Needs face-to-face contact with family and friends

Figure 3. RelaxedCare personas of assisted person (APs)

3.1. Participants – Experience with technology

The sample for the lab trials consisted of 25 participants. Eleven of them represented the user group of informal carers (average age 61 years), ten of them the youths (average age 26 years) and four of them belonged to the group of assisted persons (average age 77 years).

The ICs are well-experienced with the usage of a computer, a mobile phone and the internet. The majority of them uses computers several times a day, daily or several times a week. Mobile phones get used much more. Six ICs use it several times a day and three ICs every day. The usage of the internet is also well-known. Four ICs are in the internet several times a day and three of them daily. Only one IC declared, that the computer is very rarely or never used. One IC gave the feedback that the mobile phone is very rarely used and two participants use the internet very rarely and one other IC never. Most of the ICs have a good competence and control about using technical devices. Two of eleven ICs feel totally overwhelmed while handling with technical devices meanwhile one IC is not very much interested as well as one other is totally uninterested in technical devices.

As anticipated the Youths are also well-experienced with the usage of a computer, mobile phones and the internet. Only one of them uses a computer daily or the internet several times a week. All others use computers, mobile phones and internet several times a day. The Youths do not have any problems to accept technology. They are competent with and in control of technical devices. The knowledge of using the internet is very high for the Youths. All of ten Youths think their knowledge about the internet is very well. Also four ICs rated their experience with it very well. Three ICs said, that their knowledge is not so good.

The experience with technology seems to be different from APs point of view. The frequency of usage differs between the four interviewed APs. Computers are not really of interest for the participants. Only one AP uses it several times a week. Mobile phones are much more interesting. In each case one AP uses the mobile phone several times a day, daily or several times a week. One AP never uses it. The frequency of using the internet differs. In each case one AP uses the internet several times a day, several times a week, once a week or very rarely. Again as anticipated the APs have more difficulties with an overall technology acceptance, competence and control. All four APs know that the success of usage depends on their own will, but they feel

overwhelmed while handling with technical devices. One AP is nevertheless generally interested in technical devices, the others are not interested in it at all. The experience and knowledge of using computers and mobile phones differ between the APs. Two APs rated their experience and knowledge of using mobile phones as very good or almost good. The other two APs as rather bad or bad. It is nearly the same with their experience and knowledge of using computers. Two APs estimate their experience as medium, the two others as rather bad or very bad.

3.2. Methodology

The lab trials were methodically carried out in the form of lab based usability walkthroughs combined with structured interview techniques. Each participant used the technical prototype while being observed with the help of a mobile usability lab. The usability walkthrough is a qualitative research technique used in user-centred design processes (ISO 9241-210) to evaluate a product with users with a little bit more support of the test lead than in classical usability tests. This can be seen as an important usability practice, because it gives direct input on how real users use the system. As Kuniavsky [4] explains, the development team can immediately see whether people understand their designs as they are supposed to understand them.

The technical prototype comprises of a tangible user interface and a mobile app (see figure 4) as well as a RelaxedCare system visualization (see figure 1). Based on defined scenarios the participants performed in one hour seven tasks while interacting with the prototype.
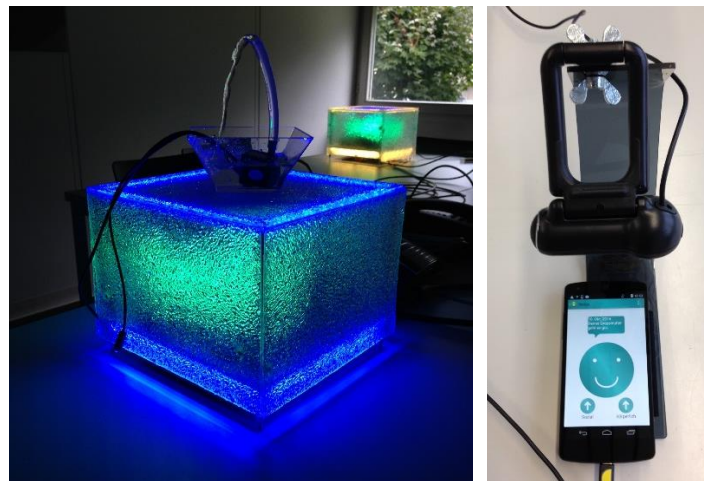
Figure 4. Technical prototype represented by a tangible user interface (1) and a mobile app (2).

3.3. Tasks of the participants

To become a deeper impression, which tasks participants worked on, the single tasks explain following in detail.

Task 1 identified, if the participant perceives the whole RelaxedCare object in surrounding. In this connection task 1 also clarified which status and sound will be perceived or not.

Task 2A dealt with the understanding of the importance of the RelaxedCare idea. For further tasks it was of high importance that participants empathize with the care situation in general and understand the level of stress this causes for Informal Caregivers. Corresponding to this challenge task 2 showed two examples of possible situations: first a pleasant day of a care situation without RelaxedCare and followed by a day with an incident in the care situation without RelaxedCare. This approach was chosen to stimulate the participants of the study to talk freely about their own situation. The information gathered might support the understanding of the participants' individual care situation.

Task 2B showed examples of two different care situations with RelaxedCare: first a pleasant day of a care situation with RelaxedCare and followed by a day with an incident in the care situation with RelaxedCare. At the same time three possible well-being status of RelaxedCare object were shown for the clarification of the RelaxedCare idea. The approach helped to discuss the understanding of the overarching benefits, the usefulness of RelaxedCare and the representation (display of status, colour, sound) of well-being state.

Task 3 dealt with the two messages, which the RelaxedCare object offers: Ambi-Message and Poetic-Ping. Therefore both messages have been presented to the participants. The main question was to clarify, if this kind of communication could support participants in care situations. Other questions were about the individual meaning of these messages and the representation of these messages.

Task 4 evaluated the general appearance of the visual nature of the RelaxedCare object. How should the RelaxedCare object looks like? The imagination of participants was supported with object examples and spontaneous feedback about design proposals from RelaxedCare project.

After discussion about the RelaxedCare object the RelaxedCare mobile app showed in **task 5**. Main question was to clarify how participants cope with the mobile app. It was also interesting to find out, which information takes priority for the participants and if something is missing.

Task 6 investigated the understanding of the current well-being status of the Assisted Person presented in the mobile app. Focus was on how participants use the mobile app and which kind of information participants would like to see or do not want to see there.

Task 7 highlighted the mobile app in depth. This task dealt with the history display of the well-being status shown on the mobile app. Main question was to clarify, how participants use the mobile app as well as what problems arise and get received positively.

Additionally different questionnaires were used to collect structured feedback.

4. Results

The majority of participants approved, that the RelaxedCare system supports the ICs in a worry-free way to care for the AP (thus allowing the older generation to live longer in their own homes). 19 of 25 participants felt an advantage by using the system in their care situation in general. Overall 18 of them rate the advantage of the usage at home positive and 20 of them rate the usage positive, if they use it on the way. Also interesting is that in total 19 participants could imagine, that there would be an improvement of the care situation for their own family through RelaxedCare.

Thus the conclusion could be drawn that the RelaxedCare system could effectively disburden the IC from fears and the uncertainty of not knowing whether the AP is fine now or not. Apart from that it is currently not possible to answer, if the RelaxedCare system has the potential to disburden the IC from additional tasks within the process of caring for the AP.

In general the whole concept and idea of the RelaxedCare system represented through the first prototype is rated as a good approach by the participants of the lab trials. Participants reflect the implementation of the system in the homes of the assisted persons as potentially problematic. The acceptance of the system by the APs is not so much questioned by the Youths. The feedback of the ICs is unbalanced, but the tendency goes in the same direction. Everyone agrees that when explaining the APs the reason (possibly with doctors' support) for installing the RelaxedCare system, they will finally accept it. Three APs agree with it, because they could imagine using the system as AP when knowing that their own family feels safer with it. Eleven participants liked the object, but nine others did not. Five participants abstained from voting. 13 participants on the other hand liked the mobile app, only two ICs did not like it. Please note that ten participants abstained from voting.

The RelaxedCare system needs a few improvements and an update inside the user interface. The RelaxedCare object needs another size, an aesthetical refreshment to be more attractive for the users and the possibility for individualization (e.g. colours, sound and kind of message). There was a lot of input about how the RelaxedCare object should look like which will be discussed in detail.

5. Lessons Learned

Participants have to be familiar with the usage of a smartphone with which they evaluate the mobile app, because the navigation of the mobile app uses navigation patterns of this smartphone. That is one of the reasons why the navigation of the mobile app was not self-explanatory.

6. Outlook

It is important for the development of the second prototype to use existing interaction patterns of mobile phones (e.g. iPhone, Android, Windows) and on the other hand to bring the functions and the navigation in the front of the display (not hidden). Another interesting finding was revealed by the request that RelaxedCare should provide an open gateway in order to integrate other software (biofeedback, Fitbit etc.).

Till autumn 2015 a second technical prototype will develop based on the results of lab trials. As following big step field trials in the households of ICs and APs will bring further results, if the idea of RelaxedCare project works in daily life and ICs feel supported in a worry-free way to take care for the AP. On the other hand if APs feel more comfortable in their own situation. The field trials will perform in the beginning of 2016 during three month with a second technical prototype.

7. Acknowledgments

References

[1] Ambient Assisted Living Joint Programme. The Central Management Unit (CM) (2014) Catalogue of Projects 2014, Belgium.

[2] Dittenberger, S. (2012) User-inspired Innovation Process. [Script] New Design University, Sankt Pölten, Austria.

[3] International Organization for Standardization (2012). ISO 9241-210:2010.

[4] Kuniavsky, M. (2003). Observing the User Experience. A Practitioners's Guide to User Research. San Francisco: Morgan Kaufmann Publishers.

[5] Morandell, M., Steinhart, J. Sander, E., Dittenberger, S., Koscher, A. and Biallas, M. (2014) RelaxedCare: A Quiet Assistant for Informal Caregivers, CCCIC CSCW 2014, Baltimore (USA), 15.-19.02.2014, Proceedings of the ACM CSCW Workshop on Collaboration and Coordination in the Context of Informal Care, p. 11-21.

[6] Pochobradsky, E., Bergmann, F., Brix-Samoylenko, H., Erfkamp, H. and Laub, R. (2005) Situation pflegender Angehöriger. BM für soziale Sicherheit, Generationen und Konsumentenschutz, Wien, Austria.