A Digital Health Coach for Younger Seniors – User Centred Requirements Collection

Marten SCHMIED[a,1], Irina IGERC[a] and Cornelia SCHNEIDER[b]
[a] *General Health & Care, FH Wiener Neustadt, Austria*
[b] *Institute of Computer Science, FH Wiener Neustadt, Austria*

Abstract. Background: Based on socio-economic and medical improvements as well as healthier lifestyles, a majority of baby boomer pensioners still feel fit and active and thus may struggle with transitioning into retirement. They could benefit from an ICT system to ease their transition into retirement and support general well-being. Objectives: The aim of this paper was to gain insights into the requirements for a digital coach to support their transition into retirement. Methods: Two rounds of focus groups with older employees close to retirement, people just retired and relatives of retired were conducted. Outcomes were then identified through a framework analysis and integrated into the design of a digital coach. Results: Four functional groups (i) physical activity, (ii) cognitive support, (iii) emotional support and (iv) social support were identified.

Keywords. ambient assisted living, retirement, digital coach, health, baby boomer

1. Introduction

At present, first baby boomers, people born after the Second World War (in Austria between 1956 and 1969 [1]), enter retirement [2]. Based on socio-economic and medical improvements as well as healthier lifestyle choices the majority of baby boomer pensioners can expect to spend a quarter to a third of their life in retirement in good health [3,4]. The transition to retirement itself is a major life event that might be accompanied with joyful anticipation or fear [5]. According to a study regarding the needs of baby boomers, many would like to receive more support as they make their transition into retirement [6].

Compared to previous generations most of baby boomer retirees are used to information and communication technology (ICT), as many of them have used it as part of their working life [3]. This paper describes the Austrian part of a human centred requirements collection process for a digital health coach within the European AAL project *AgeWell*. In the project we define a digital health coach according to Kari & Rinne [7] as information and communication technology mediated coaching activities which are generated by a software whereby coaching activities are activities that guide, train or instruct a person being coached.

[1] Corresponding Author: Marten Schmied, University of Applied Sciences Wiener Neustadt, Johannes Gutenberg-Str. 3, 2700 Wiener Neustadt, E-Mail: marten.schmied@fhwn.ac.at

In some areas digital health coaches for older people have already been proven to efficiently support real life coaches [8] or function as a virtual coach on their own [9, 10]. Existing applications range from providing a digital pet avatar to reduce the effects of social isolation [11] to programs that are adjustable to the users' needs for physical activity, such as "ILSE" [12] or "Vadiya" [13]. In contrast to other implementations of digital health coaches for younger seniors, the *AgeWell* coach will use different ways of interaction – robot and avatar. In this combination these means of communication have not been used to coach younger seniors. In addition to existing coaching solutions for seniors, *AgeWell* does not only focus on physical but also psychological and social wellbeing and therefore follows a more holistic approach towards health coaching. Thus, the main aim of the requirements collection process was to identify a variety of possible functions for a digital coach and subsequently get feedback on first implementation ideas – *Sanbot Elf* robot (figure 1) and *Sola* avatar (figure 2).

Figure 1. Sanbot Elf (source: sanbot.co.uk)

Figure 2. Avatar Sola (source: AIT)

2. Methods

To meet the users' needs, the digital coach is developed following the human-centred design approach, in which potential users (people between 54 and 74 years near retirement or just retired) and their relatives are involved in all necessary project phases [14]. Thus, in the requirements phase of the development process two sets of focus groups were conducted. Focus groups are an appropriate method for gathering requirements, opinions and impressions about a new product/innovation [15].

2.1 Ethics

The focus groups (including the informed consent) were reviewed and approved by the independent ethics board of the University of Applied Sciences Wiener Neustadt (14/03/2019; chairman: Nimmerichter Alfred).

2.2 Data collection

As the project focuses on the *transition into retirement*, three different target groups were invited to each focus group: (a.) those workers currently employed but nearing retirement

age, (b.) those just retired and (c.) relatives of people retired. Participants were assigned to these groups according to their age and with regards to the Austrian retirement age, which is 60 years for women and 65 years for men. Thus, the median age for (a.) was 60, for (b.) 65,5 years and for (c.) 40 years. For the recruitment a call for participation in form of a flyer with project information and contact details was prepared and circulated through different company networks.

2.2.1 First round of focus groups

An overall of 17 people attended the first focus group in May 2019 (women: 10; men: 7) and were divided into the three aforementioned groups (a, b & c). The aim of the first round was to identify possible functions of a digital coach. Therefore, fears and expectations regarding retirement (or the retirement of relatives) and regarding a digital coach with respect to assistive activities and possible designs were collected. We used a semi-structured interview guideline covering questions dealing with (i) personal expectations towards retirement, (ii) general thoughts about a digital health coach and (iii) definition of individual needs. According to the target group, the questions varied a bit. For stimulating the discussion, we showed the participants pictures of the Sanbot Elf robot and the avatar Sola.

2.2.2 Second round of focus groups

The second focus group took place in November 2019 with an overall of eleven participants (women: 4, men: 7). Again, a semi-structured interview guideline was used, the questions now focussed on feedback for the basic functions derived from round one. Use cases on physical activity, cognitive, emotional and social support were illustrated with storyboards and presented to the participants. Interviewers remained the same throughout the groups. To gain more insight into preferences on the visual design, the participants were now asked to give feedback on printouts of different avatar mock-ups and the real *Sanbot Elf* robot, which was showcased before the interviews started.

2.3 Data analysis

The interviews were transcribed with MAXQDA [16]. The analysis was conducted via the “framework approach” [17]. At first, the text was analysed, allowing themes to be identified. Each theme was then filled with different categories (“codes”). Direct quotations of these categories were also gathered. Finally, the results of each focus group were integrated to one main result.

3. Results

Overall, 436 minutes of data were recorded, with the individual focus groups lasting between 65 and 82 minutes. Within the interviews and subsequent data analysis, four basic groups of functions were identified: physical activity, cognitive support, emotional support and social support. These four dimensions shall be positively influenced by the digital health coach. Although different aims were defined for each focus group, some useful information was gained from both rounds of focus group and has been combined to the following results.

3.1 Sentiments, expectations and plans for retirement

In general, older employees reported that they hope to have more time for their family members. They want to stay healthy as long as possible and hope to have more time for meaningful activities. They plan to have more time for their hobbies and hope to transition into retirement step by step, gradually passing on their knowledge and duties to their successors.

Retirees mentioned that they were surprised by suddenly having so much time. Some were of the opinion that they did not know how to structure the day, others saw having so much time as a sort of luxury, because now they finally had time to be spontaneous. The pensioners explained they still felt young and could not imagine staying at home, doing nothing.

In both the groups of those nearing retirement and retirees the danger of social isolation was an issue. Those about to retire expressed a certain fear of losing their social network at work and missing their duties and responsibilities of their jobs. For all participants, communication was a focal point, as the fear of being isolated was often mentioned in the interviews. They want to stay connected to different networks, they want to stay in touch with both those of a similar age and younger people. The next of kin generally had a realistic view on their relative's expectations and were consistent with their requirements and fears.

3.2 Sentiments, expectations and fears regarding a "digital coach"

The sentiments and expectations with respect to a digital coach were ambivalent in all three target groups. While some totally refused to use a digital coach, others were open to use it, particularly as a management system for their personal health. Some could imagine to use a digital coach if they were lonely and had no relatives at all. An issue was the communication; a digital coach could talk to them or help them stay in touch with friends and relatives.

A common concern was the loss of autonomy: *"I don't want to be dominated by it."* In all focus groups, it could be perceived that autonomy is highly valued, which should be a major consideration when designing the coach.

3.3 Basic functional groups

Many of those interviewed could imagine using a digital coach who accompanies and supports them. They could imagine that it might combine different types of apps already being used: fitness apps, reminder functions, health databases and communication tools. While wider ideas about what tasks the coach might offer became apparent within the interviews, four essential functions could be defined as a result of the data analysis. Thus, the coach should influence the user's wellbeing within these four dimensions:

- *Physical activity:* As physical wellbeing and the fear of illness were two of the focal points in the interviews, the coach has to offer appropriate exercises, motivate to and eventually track physical activity.
- *Cognitive support: "You have to be challenged and cognitive training is as important as physical."* Participants mentioned crosswords and quizzes as a useful and entertaining component regarding cognition.

- *Emotional support:* Often regarded as a rather delicate function, the coach would be expected to recognise the user's emotional state and approach this matter through offering some kind of advice.
- *Social support:* The fear of being isolated was mentioned often throughout the course of the interviews. The coach has to enable users to stay connected to different networks and stay in touch with other people.

3.4 General preferences concerning the use of services

While general ideas were collected within the first focus group, more specific feedback was gathered through discussing the storyboards for each basic functional group. Therefore, the second focus group was able to specify further with regard to what is important for the target group, when using the coach. The following priorities emerged from the discussion and were verified through data analysis:

3.4.1 Autonomy

The participants insisted on being able to control the coach, meaning that the user is able to turn off the coach at any given time. Also the interview partners wanted to choose whether the device may start some form of interaction, or simply react. They proposed setting a time slot for the permission to act at first, as this could be a way to remain independent from the coach. *"I don't want a system that is permanently controlling me."*

3.4.2 High level of sophistication, individuality

Thus, the participants were already using apps in their everyday life, in order to be accepted as the digital virtual coach has to be highly sophisticated and offer added value. Thus, a digital coach should be voice-controlled and be set to the personal preferences of the user. In addition, it has to include personalised content regarding the type of activities, quizzes and health related information. *"It has to be individually adjusted"*. The communication itself should be diversified in expression and ideally is psychologically proven, especially regarding the motivational function of the coach.

3.4.3 Data security

On the one hand, sharing scores from particular tasks was seen as a possible motivation, on the other hand, data security was seen as one of the highest priorities in each focus group. *"I have a problem with the possibility that someone is listening in."*

3.4.4 Times and length of service use and the preferred devices

Some participants envisaged using the coach all the time, so that the coach has to be available on different devices, such as smartphones and tablets. Other participants would like to use the coach only for a limited time, when feeling "low". The preferable device depended on the functions the coach was used for, e.g. a tablet was preferred for cognitive exercises while for tracking of sportive activities the participants would rather use a smartphone.

3.5 Feedback concerning the user interface

The reactions after showing the *Sanbot Elf* poster differed greatly from seeing it in real in the second focus group. While some admitted they did not like the appearance of it at all, some were of the opinion that they find it somehow "cute". The general feeling regarding the robot was that it looked too humanoid. Some participants mentioned they perceive the appearance as "fake" because with its eyes and its heart, it pretends to have emotions. However, when seeing the real *Sanbot Elf*, most participants emphasized its cuteness and rather feminine appearance.

The initial response to the avatar was better overall than that of the robot itself. Participants said they could imagine using such an avatar because they can turn it on and off as they wish. Most recognized the avatar as a combination of different apps they already use on their smartphone in a user-friendly way. For the proposed avatar design this was generally conceived as being rather strict and should be friendlier.

4. Discussion

Valuable and rather unsuspected insights were gained during the interviews and integrated into the coach's development. The four desired functional groups identified in focus group one (physical activity, cognitive, emotional and social support) were successfully transferred into four use case scenarios that the participants could easily relate to in focus group two. Focus group one aimed to determine possible functional groups together with the target group. After this first round it became clear that the target group really envisions not only a coach for physical activity but rather a holistic coach that supports psycho-social wellbeing too. Thus, the *AgeWell* should aim to support physical activity, positively influence the cognitive capabilities, as well as the user's emotional and social wellbeing.

Furthermore, some issues considered to be crucial in the design process could be addressed. Potential users do not want to be patronized or monitored in any way. Therefore, the coach needs to have options for individualization, such as setting the appearance and communication style of the avatar as much as the frequency, extent and type of exercises and information offered. Also participants asked if the interventions offered were "psychologically proven" suggesting that the virtual coach needs to be perceived as highly sophisticated and the tasks to be effective in order to be accepted by possible users. Finally, data security was another topic often raised. Overall, it became apparent that when developing a virtual healthcare coach for younger seniors it is inevitable to include them as part of the design process. Baby boomers are already used to using ICT and thus as informed clients add valuable insights into their perceptions and expectations with regard to any virtual healthcare solution. Therefore, future retirees will demand solutions of high interaction and quality content. Furthermore, a digital coach will only be accepted when it adds obvious value to existing applications, as interested users are very likely to already use fitness apps, social networks and such like.

Within the focus groups the participants, particularly the retirees, displayed high levels of awareness with regard to technical topics. While this may be partially due to the rather high educational level within the sample group, it shows that a user-centred approach is reasonable when developing systems targeting older adults. As the possible target group already uses different apps and ICT, virtual solutions can be a feasible way to address healthcare matters in older adults. However, with the increasing use of tablets

and smartphones it will become more important to advertise and educate about the benefit of holistic healthcare coaches. Their usage has to be perceived as something modern and cool rather than being seen as an application for frail older adults.

4.1 Limitations

In the second round of the focus groups the number of participants decreased from 17 to 10. In the second round there were also two new participants. Although it was planned to reach out to all classes of socio-demographic background, only those regarded as highly educated could be recruited in the sample. Due to this rather small sample transferability of the results may be limited.

Acknowledgement

This work was supported by the Active Assisted Living Programme grant number aal-2018-5-92-CP. It received funding from the Active Assisted Living Programme, cofounded by the European Commission, National Funding Authorities of Austria, Italy, the Netherlands and the individual project partners. Collaborating partners in the AgeWell project were WPU (lead partner), Austrian Institute of Technology, ProSelf, University of Applied Sciences Wiener Neustadt, MEDrecord, Golden Days and INRCA.

References

[1] R. Wolf, G. Langley and R. Finke in *Project M. Baby, it's over: The last boomer turns 50*, edited by Allianz SE (Allianz SE, München, 2014).

[2] Statistik Austria, *Statistik des Bevölkerungsstandes*, https://www.statistik.at/web_de/statistiken/menschen_und_gesellschaft/bevoelkerung/bevoelkerungsstruktur/bevoelkerung_nach_alter_geschlecht/index.html, last access: 23 March 2020.

[3] J.E. Morley, Vicissitudes: Retirement with a Long Post-Retirement Future, *Generations-Journal of the American Society on Aging* **41** (2), 101–109 (2017).

[4] Eurostat, *Healthy life years statistics - Statistics Explained*, https://ec.europa.eu/eurostat/statistics-explained/index.php/Healthy_life_years_statistics, last access: 23 March 2020.

[5] I.-M. Hübner, *Subjektive Gesundheit und Wohlbefinden im Übergang in den Ruhestand* (Springer Fachmedien, Wiesbaden, 2016).

[6] S. Honoré, S. Brown and C. Paine Schofield, *The Voice of the Baby Boomers* (Hult International Business School, 2017).

[7] T. Kari and P. Rinne in *Digital transformation. Meeting the challenges: conference proceedings*, edited by A. Pucihar, M. Kljajić Borštnar, A. Baggia, A. Škraba, D. Kofjač, G. Lenart, and M. Marolt (University of Maribor Press; Faculty of Organizational Sciences, Maribor, Kranj, 2018), pp. 127–143.

[8] C.M. Castro Sweet, V. Chiguluri, R. Gumpina, P. Abbott, E.N. Madero, M. Payne, L. Happe, R. Matanich, A. Renda and T. Prewitt, Outcomes of a Digital Health Program With Human Coaching for Diabetes Risk Reduction in a Medicare Population, *Journal of Aging and Health* **30** (5), 692–710 (2018). doi:10.1177/0898264316688791.

[9] H.B. Jimison, S. Hagler, G. Kurillo, R. Bajcsy and M. Pavel, Remote health coaching for interactive exercise with older adults in a home environment, *Conference proceedings : ... Annual International Conference of the IEEE Engineering in Medicine and Biology Society. IEEE Engineering in Medicine and Biology Society. Annual Conference* **2015**, 5485–5488 (2015). doi:10.1109/EMBC.2015.7319633.

[10] F. Mostajeran, N. Katzakis, O. Ariza, J.P. Freiwald and F. Steinicke in *2019 IEEE Conference on Virtual Reality and 3D User Interfaces (VR)* (2019), pp. 1465–1470.

[11] N.-C. Chi, O. Sparks, S.-Y. Lin, A. Lazar, H.J. Thompson and G. Demiris, Pilot testing a digital pet avatar for older adults, *Geriatric nursing (New York, N.Y.)* **38** (6), 542–547 (2017). doi:10.1016/j.gerinurse.2017.04.002.

[12] C. Neuwirth, V. Venek and H. Rieser, *Nutzungsanalyse von ILSE*. Deliverable zum AAL-Projekt „fit4AAL“, https://www.fit-mit-ilse.at/wp-content/uploads/2019/12/fit4AAL-Nutzungsanalyse-ILSE-final-V1.0-Websiteversion.pdf, last access: 23 March 2020.
[13] C. Carlson and P. Walden, *Digital Coaching to Build Sustainable Wellness Routines for Young Elde*. BLED 2017 Proceedings, https://aisel.aisnet.org/bled2017/45/, last access: 23 March 2020.
[14] Austrian Standards Institute, *ÖNORM EN ISO 9241-210:2010 07 01 - Webshop - Austrian Standards*, https://shop.austrian-standards.at/action/de/public/details/365767/OENORM_EN_ISO_9241-210_2010_07_01, last access: 23 March 2020.
[15] N. Döring and J. Bortz, *Forschungsmethoden und Evaluation in den Sozial- und Humanwissenschaften*, 5th ed. (Springer, Berlin, Heidelberg, 2016).
[16] U. Kuckartz, *Realizing Mixed-Methods Approaches with MAXQDA*, https://www.maxqda.com/download/MixMethMAXQDA-Nov01-2010.pdf, last access: 3 January 2019.
[17] C. Pope, S. Ziebland and N. Mays, Qualitative research in health care, *BMJ: British Medical Journal* **320**, 114–116 (2000).