



AMBIENT ASSISTED LIVING, AAL

JOINT PROGRAMME

ICT-BASED SOLUTIONS FOR ADVANCEMENT OF OLDER PERSONS'
INDEPENDENCE AND PARTICIPATION IN THE "SELF-SERVE SOCIETY"

D2.2

User Requirements Investigation Report

Project acronym: **GeTVivid**
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TERMINOLOGY & ABBREVIATIONS

ADLs Activities of daily living

e.g..... Example given

IADL..... Instrumental activities of daily living

i.e. Id est

EUOs..... End user organisations

IM Instant Messaging

QoL..... Quality of live

SNS Social network site

WHO..... World Health Organisation

1. EXECUTIVE SUMMARY

1.1 Link with the objectives of the project

The aim of the GeTVivid project is to develop an application, which meets the users' needs at best. The project follows a user-centred design approach. Therefore, different methods were applied to investigate the user needs, as defined in Task 2.1 and presented in D2.1. This deliverable presents the findings of the user requirements analyses of Task 2.2 (i.e., the different performed studies, personas, social roles, and user requirements). At the beginning, a literature review built the basis for the observation, interview and workshop study, the survey, and the first design workshops. The target group was specified to be 60+, should have physical limitations and receive help regarding activities of daily living. Through the three different end user organisations addressing older adults in different living situations, we were able to assess requirements from a diverse group of users.

The concepts, guides and materials for the studies were provided by PLUS, and adapted according to the project partners' feedback. The studies were then conducted by EURAG in Austria, VMKN in Germany, and CURAVIVA in Switzerland. Afterwards, PLUS analyzed the results and provided the analysis reports to all partners to form the basis for the development of the GeTVivid platform in WP3 and 4. The results of the requirements analysis will be the basis for the development of the GeTVivid platform. In the evaluation phase we will later on assess whether the users' requirements have been met in Task 2.3 and 2.4.

1.2 State of the art

The user-centred design [Norman and Draper, 1986] is a multidisciplinary design approach and philosophy, which describes a prototype-driven software development process, where the user is integrated during the design and development process. User-centered design is based on the active involvement of users and refers mainly to the usefulness and usability of a product [Mao et al., 2001]. It enables emergent interaction between designers & developers and users, and finally enhances users' acceptance.

The approach consists of several stages, which are iteratively executed: Requirements analysis, design/implementation, and evaluation. It is a multi-stage problem solving process that not only requires designers to analyse and foresee how users are likely to use a product, but also to test the validity of their assumptions with regard to user behaviour in real world tests with actual users.

2. STUDIES & RESULTS

In the following the respective studies are presented, including the research questions addressed the study setup, and the summarized results. Separate detailed study concepts and reports are also available for all studies, which include also the sub-research questions for the studies, as well as more detailed results. This deliverable thus provides an overview of the main findings of each study.

2.1 Literature Research

The first step within our requirement analysis was to gain a basic understanding of older adults' activities of daily living and their TV and mobile device usage. This document provides definitions about activities of daily living (ADLs), examples how necessities of daily living can be addressed by "existing service providers" (e.g., meals on wheels) and illustrates functions that could be provided to support older adults with respect to everyday life activities. We address what influence different social roles might have on the organization of activities of daily living (consumer/provider). Moreover, as one of the major goals is supporting social integration and connecting generations for informal care, we describe what is needed to feel part of a community (social connectedness). The following sections will provide the main insights from literature for each research question defined in D2.1.

2.1.1 RQ1 How does the target group organize their activities of daily living?

Growing older often goes along with cognitive and physical limitations and an increased need for care and assistance to fulfil the necessities of daily living. "Activities of daily living" (ADLs) is a term used in healthcare, which refers to the things we normally do, for example bathing, dressing, or grooming. In the following paragraphs we will give a brief overview on the definition of activities of daily living and possibilities to assess it. Moreover, we will describe the current caring situation in Austria, Switzerland and Germany to gain a basic understanding of how formal and informal care is organized to support ADLs.

Definitions for Activities of daily living

The term "activities of daily living" (ADLs) is mainly used in the context of health care and occupational therapy. It stems from the idea of a holistic organization of care. Virginia Henderson, who is one of the pioneers in this field, for example, points out that care is not only about helping with daily activities such as eating, moving, etc. but "... making life more than a vegetative process by communicating with others, maintaining human relationships, learning, working and playing, or recreating." [Henderson, 2006, p. 26]. Activities of daily living are divided in two different parts, basic activities of daily living and instrumental activities of daily living. Basic activities of daily living can be defined as basic activities or daily self-care activities. Roley et al. [2008] define them (adapted from Rogers and Holm [1994]) as "Activities that are oriented toward taking care of one's own body". The activities influence each other and levels of competence complement or affect each other [Zeitschrift Lebensqualität 2009]. They encompass the following activities: Bathing and showering, bowel and

bladder management, dressing, eating, feeding, functional mobility, personal device care, personal hygiene and grooming, sexual activity and toilet hygiene.

Instrumental ADL's are not necessary for fundamental functioning but are important for older adults to live independently at home. These activities often require more complex interactions than basic ADL's and encompass the following activities: Care of others (including selecting and supervising caregivers), care of pets, child rearing, communication management, community mobility, financial management, health management and maintenance, home establishment and management, meal preparation and clean-up, religious observance, safety and emergency maintenance, and shopping.

While basic ADLs are considered universally valid (being independent from culture, time and gender), instrumental ADLs are less frequently referred to as they differ according to gender and temporal changes [Hoeplinger, 2003]. The older people are, the more they need their environment to cope with ADLs. Furthermore, conducting leisure activities is assumed to support social integration and the development of abilities [Hörl et al., 2009]. Social factors, such as support within one's family (e.g., by spouses or children) influence the caring necessity, even if there is need for care in order to perform the ADLs [Hoepflinger, 2003]. Several instruments are available, to assess ADLs (in German Fragebogen zu Aktivitäten des täglichen Lebens¹, Fragebogen zu Beeinträchtigungen², Aktivitäten des täglichen Lebens (ADL), Barthel-Index³) and IADLs (Instrumentelle Aktivitäten des täglichen Lebens (IADL) nach Lawton M.P., Brody E.M.⁴)

If people need support in managing their everyday life, maintaining their autonomy or facilitating well-being and health, they are considered care-dependent. Regarding perception of care-dependency, there are individual differences, which are based on negotiation processes [Sechste Altenberichtscommission, 2010]. However, this understanding of care-dependency differs to the one that is used for legal claims (e.g., insurances), as in the care-dependencies therein express the care needs and thus the claim for reimbursements.

Needs for care and assistance

There is an increasing demand for healthcare (both formal and informal) and social care for older adults, which can be explained by an increase of the aging population. According to the Eurostat [Eurostat 2012] the proportion of individuals aged 65+ in the 27-member countries of the EU is expected to rise from about today's 17% up to 30% in the year 2050. This aging of population is also brought on by the decline in mortality and fertility rates [Bolin et al. 2008].

The idea of "aging in place" has grown in popularity in recent years and refers to the idea of allowing older adults to choose their care and living arrangements. This might have a positive impact on older adults' health and well-being [Hammarström and Torres, 2012]. Thus, supporting them to carry basic ADLs such as eating or

¹ <http://www.uniklinikum-regensburg.de/imperia/md/content/kliniken-institute/haematologie-onkologie/gvhd/deutsch/gvhdkompetenzzentrum/fragebogenweitmeinung-patient.pdf>

² http://www.zpid.de/pub/tests/5870_IMET_Fragebogen.pdf

³ http://www.rs.uni-greifswald.de/fileadmin/mediapool/lehrstuehle/flessa/GM2_ADL.pdf

⁴ <http://www.dgho-onkopedia.de/de/wissensdatenbank/wissensdatenbank/wissensdatenbank/geriatriische-onkologie/InstrumentelleAktivittendestglichenLebensIADLnachLawtonundBrody.pdf> The Barthel Index is sometimes used as part of multi-dimensional geriatric assessments, being complemented with, for instance, cognitive and mobility assessments [Münzer 2008].

bathing, as well as instrumental ADLs, for example, managing medication intake or maintaining household have become of great importance, considering that there is evidence that community-dwelling older adults often face unmet needs. This includes, for example, medical needs, mobility and transportation needs, needs related to home care, nutrition and exercise [Cohen-Mansfield and Frank, 2008].

The idea of aging in place is close related to the concept of 'active aging', which is according to the WHO defined as "[...] *the process of optimizing opportunities for physical, social and mental well-being throughout life, in order to extend healthy life expectancy, productivity and good quality of life into older age*" [UN DPI, 2002]. The idea of active aging aims at keeping people active as long as possible by providing health and social service systems that promote self-determination and encourage people to take control over their own health. Moreover, the support of age-friendly and safe physical environments that encourage social support, opportunities for education, and lifelong learning are required.

Regarding care and assistance family members and neighbours are playing an important role (informal care). A study of the GIB⁵ (on behalf of the German Bundesministerium für Wirtschaft und Gesellschaft) has shown that family members provide the majority of support regarding basic and instrumental ADLs. Only a minority of older adults calls on external support (care givers, etc.) [Becker, 2005]. Through actively integrating the residents of care homes into the community activities, they are given choices and spaces, which are needed for participation and identity. There are forms of civic engagement and voluntary work that act as communities for care (e.g., care accompaniment). However, those communities only cover a small proportion of care needs [Sechste Altenberichtskommission 2010]. A detailed description of the caring situation in Austria, Switzerland, and Germany is given in the following paragraphs.

Caring Situation: Austria

According to Rischaneck [2008] in Austria, only small parts of older people live in caring and nursing homes (about 40.000 women and 11.000 men). About 96% of the older population in Austria live in private households. Half of the Austrian population lives in one- and two family houses, either alone (about 45 % of older adults being 60 years and older) or together with children (26 %). The number of people above 75 years, who stay in a nursing home, is increasing. Only 1 % of the older people between 60 and 74 years live in nursing homes, while within the group of 75 year olds and more, 4 % of men and 9 % of women live in nursing homes. Nearly 20% of the Austrian senior population lives in Vienna in private apartments. A huge number of older adults has to change the apartment because of the costs (the older the person, the less the square meters). Older and handicapped persons, who would be in the need of care, often live in inappropriate facilities in order to save costs.

The most important resource in caring for older people is the family, 76 % of older adults being 60 years and older receive care within their own family mainly by women. Besides informal care within the family, further 3 % is done by neighbours and friends. Around 15 % of care is done by social institutions and mobile caring services, being responsible for the formal care, be it nursing homes (residential care), or mobile social services, which are well-organized in Austria. Furthermore, there are efforts to establish a system, which acts in between the formal and informal care, i.e. part-residential care.

⁵ „Gesellschaft für Innovationsforschung und Beratung mbH“

The following enumeration provides some basic figures about the caring situation in Austria:

- Caring and nursing homes provide around 67.600 places in Austria, whose residents account for 56 % of the total costs for caring in Austria (which is in total around 1,32 billion Euros). About 82 % of the care home residents depend on social benefits to afford the rather expensive care homes, as they cost between 1.000 and 6.000 Euros per month (on average around 2.000 Euros).
- Mobile social services have about 80.000 clients in Austria, causing costs of 375 to 400 Mio. Euros per year, whereof 30 % are paid by the clients. One hour of „mobile care“ costs between 14,20 and 42,60 Euros. Reasons for not using the mobile care services would be either a decline of professional services, or unavailability of mobile social services in certain parts of Austria.
- Dark figures: between 10.000 and 60.000 care givers (mostly from the Eastern European countries) work in Austria as day long carers.

Caring Situation: Switzerland

Similar to the caring situation in Austria, also older adults in Switzerland are either cared for informally or formally. An essential part of care is done within families, as they are an integral part in the constitution of caring structures in Switzerland. However, there are concerns that informal care will decrease due to single households and changing relations between generations, such as the willingness of younger people to care for the older generations. Even in situations of having a partner to mutually care for, it is likely to be in the need for further assistance with ongoing age, be it formal care or informal care done by children [Hoepflinger, 2003].

Within a questionnaire study, Perrig-Chiello et al. [2010] identified partners being the main source of care, who invest on average 60 hours per week for care for on average six years. If children take responsibility for caring their parents, they invest on average 25 hours per week for five years, all of them twice as much as they actually wanted to invest. This burden affects the health of the informal carers, whose health situation is worse than that of the average population. The reasons for informal care are love and affection, feelings of moral obligation, the necessity due to lacking alternatives, or financial issues [Perrig-Chiello et al., 2010].

8,5 % of all older adults (65 years and above) were in 2000 either in residential care homes or other “collective households” (i.e., the Swiss naming for care homes, hospitals, prisons, etc.), a number that has doubled within the past 40 years. This number increases with increasing age (from 2,2 % of people aged 65 to 59 years living in collective households to 58,3 % of older adults being 95 years and older) [Hoepflinger, 2003]. Older adults live longer in their homes compared to former times, influenced by the further development of mobile care services. In general, moving into a care home is affected by several factors, such as the availability of social networks (especially older adults who are single, divorced or widowed live in care homes), or the educational-professional status (richer people or men having worked in academia stay longer in their private homes) [Hoepflinger, 2003].

Caring Situation: Germany

The “Deutsche Alterssurvey”, a German survey focusing on aging, stated regarding informal care that problems arise due to increasing durations in employment. In 2008, around 13 % of (full or half time) employed people between 40 and 65 years support or care another person. Besides bodily care also household tasks and daily routine support is given. Within the group of all 40 to 65 year olds (employed or not), 14 % are carers; 33 % care for a close, and according to the insurance classifications, care-dependent person; 46 % for a close, but only support-needing (and not care-dependent) person, and 21 % care or support others, who do not belong to the core family, such as aunts, uncles, cousins, or friends. 60 % of caring activities are done by women, 40 % by men. The authors of the survey conclude that the question regarding how to combine occupation/employment with informal care needs to be worked on in order to find solutions for future care [Bundesministerium für Familie, Senioren, Frauen und Jugend, 2012].

In 2007, the average age when moving into a care home was 82,5 years in Germany [Sechste Altenberichtskommission, 2010]. 55,9 % of older adults even did not make use of care services at all [Rothgang et al. 2008; as in Sechste Altenberichtskommission, 2010]. Regarding informal care, there are several factors that determine how the caring situation is constituted; living in rural areas with family members in the same household ensures continuous support and best care (with on average 84 hours of care per week), whereas care-dependent people living alone in a city are suffering from a so-called precarious network situation, receiving on average 9 hours of care per week [Blinkert and Klie 1999; as in Sechste Altenberichtskommission, 2010].

Around 70 % of care-dependent people in Germany receive care at home, whereof 70 % do not make use of any formal care. Those carers, who are occupied with care activities more than 14 hours a week are mainly female (90 %), less intense care activities are approximately equally done by men and women. However, there are also concerns that in-family care is decreasing, due to women being more often employed, geographical distances between the families or else. Consequently, it is likely that the number of residents in care homes will increase. Although many people reject living in a care home, moving into one seems to be inevitable. Furthermore, the development of new forms of residential or assisted homes changes the perception of residential care both within the public as well as politics [Sechste Altenberichtskommission, 2010].

Summary

ADLs encompass a variety of different activities ranging from basic activities of daily living such as bathing or showering to instrumental ADLs, which are not necessary for fundamental functioning but are important for older adults to live independently at home. The care situation with respect to activities of daily living is quite similar in Austria, Switzerland and Germany. Most of older adults are living at home and receive support regarding activities of daily living from family members or neighbours (informal care).

2.1.2 RQ2 How do social roles affect the way people organize their activities of daily living?

In the following paragraphs the concept of social roles and older adult's social roles are described for a better understanding in the project.

Conceptualizing Social Roles

The term social organization refers to the patterns of human relationships and interactions that characterize our daily life. The world, into which an individual is born, has families, schools, hospitals, and other organizations. These organizations have been developed in response to the human needs. For example, hospitals exist to respond to health crisis and return the body to normal functioning. Sociologists believe that social organizations actually provide the context, which determines what we do in our lives and how our life is organized. Social organizations can be characterized using the following four basic sociological terms [Zusman, 2009]:

- **Position**, as the position of an individual, refers to the social location in a social organization (e.g., in a family, there are the positions of wife, husband and child, but in a society you have, for example, the positions of the president). The social position an individual holds has an effect on how other individuals will interact with that person.
- Every position is directly associated with a particular **status**. However, the social status refers to the ranking of a position in a social organization from low to high along different sets of criteria (e.g., power).
- The **social role** refers to the way an individual in a particular position within a social organization is expected to act. Social roles are important as they make social interaction predictable but they also contribute to psychological well-being.
- **Norms** are expectations of behaviour directly associated with the different positions, statuses and roles within a society (e.g., an individual in the position of a child with only little status who is assigned to be the “youngest” in the family may be expected to do only little work around the house).

Based on this conceptualization, social roles may be defined as: “A social role is a set of expectations oriented toward people who occupy a certain ‘position’ in a social system or group.” [Gouldner, 1957, p. 282] or “A role [...] is not fixed or prescribed but something that is constantly negotiated between individuals in a tentative, creative way” [Mead, 1936]. In order to better understand and explain potential interrelations between the social role an individual holds and the subjective quality of life (QoL), some theoretical considerations and thoughts on this phenomenon may be needed.

For example, in the area of identity theory, the concept of social roles do play a crucial role, as identity researchers have focused “on the categorization of the self as an occupant of different roles in the social structure [...]” [Burke and Stets, 2009, p. 112]. Within the identity research field, researchers mostly studied the meanings individuals attribute to themselves while in various roles, whereby these meanings are distinct from the behaviours individuals enact while in particular roles [Burke and Stets, 2009]. Identity theorists have thought apart from the classical, symbolic interactionist driven conceptualization of identity, to the

perspective, that there are more bases of identity than just social roles. They claim that besides role identities, there exist also social- and personal identities. Besides, this contemporary research stream in identity theory, the concept of social roles is of high importance for an individuals' subjective well-being as outlined in more detail in the following.

Due to the fact, that identities define "who I am", they should be sources of existential purpose and meaning in life, as Thoits [1992] claims. Each individual's roles are ranked internally within a kind of 'hierarchy' of salience. The term, 'salience' means "*the subjective importance that a person attaches to each identity*" [Thoits, 1992, p.237]. Relating the concepts of social roles and subjective well-being, it can be stated that different social roles of an individual have a different guidance to their well-being. In particular this means, that people base their own well-being in relation to their environment and the lives of others surrounding them [Diener and Eunkook, 2002]. Especially, individual social roles play a crucial role in cognitive well-being. Not only having social ties improve an individuals' well-being, it also improves psychological health. Having multiple roles supports individuals to relate to their society and provide the opportunity for them to contribute more as they increase in their roles [Thoits, 1992].

Older Adults' Roles

There are ongoing changes regarding the roles of older adults, such as the development of a 'new' generation, i.e., younger seniors from 55 to 75 years. While older adults have beforehand often been considered inactive, the younger older adults are rather characterized by (leisure) activity, be it media consumption, hiking, gardening, cultural activities, church visits, or gaming. However, those activities are calmer and are given more time to conduct compared to those of younger people. Furthermore, social contacts are likely to decrease, e.g., due to less contacts to working colleagues [Zellmann and Mayrhofer, 2012]. Independent from whether the public picture of older adults' roles is rather negative or positive, it will be internalized by older adults, i.e. it is likely that the public perception is going to override the self-perception. The current trends of targeting youth as the ideal also change the perception of older adults' roles, which leads to adaptations and levelling of generational specifics [Sechste Altenberichtskommission, 2010].

Social roles change throughout lifetime, for instance, during retirement not being a working colleague to others any more. However, other social roles might emerge, such as voluntary work fellow. In order to avoid a notion of uselessness when referring to non-profit work, Zellmann and Mayrhofer [2012] suggest talking about "social profit", emphasizing that voluntary work might benefit the society. Furthermore, new social roles are emerging within the society, such as older adults' participation in learning processes. While older adults have rarely been offered educational activities, this situation is changing, bringing along the necessity of new social roles, meaning that older adults are competent, responsible and active citizens. Additionally, the role within communication as well as the communication partners may change when people are in need of care. Communication within institutionalized contexts may reduce to contacts with (older) adults, like nurses and doctors, and the contacts to younger people are decreasing with increasing age. Free communication with young generations, which are not family related, are rare or not taking place at all, and often replaced by media consumption. Older adults can overtake a plethora of further roles, which are addressed for different purposes. One example would be their role of consumers, which is increasing as many companies identified the group of older adults as a potential market [Sechste Altenberichtskommission, 2010].

Observations in caring situations showed that the interaction between a person to be cared for and the carer follows a so-called “dependency-support script”. This means that carers experience that older adults need care from others. They then generalize these experiences to all older adults and take responsibilities over even for activities, which could have been carried out by the older person her-/himself. Thereby, dependencies are strengthened, while independencies are getting lost [Bales and Wahl, 1992; as in Sechste Altenberichtskommission, 2010].

Summary

Social roles are related to certain expectations about how an individual within a social organization will act. Social roles are dynamic and change within particular contexts. For example, older adults’ roles might change with retirement as the role of being a working colleague dissolves, whereas new roles might evolve (e.g., by working voluntarily, supporting others or being a recipient of care and support). Thus, we address the question to what extent different social roles have an influence on subjective autonomy and quality of life.

2.1.3 RQ3 How does the target group “use” their social capital to organize activities of daily living?

‘Social capital’ a term that originates from Sociology relates to resources that are embedded in social structures. Bourdieu [1986, p. 243] defines it as “[...] *the aggregate of the actual or potential resources which are linked to possession of a durable network of more or less institutionalized relationships of mutual acquaintance and recognition*”. According to Putnam [2000] it can be distinguished between bridging and bonding forms of Social Capital. Bridging forms facilitate the access to external resources and identity of big social groups. Connections to key persons of a company can for example be “capital” to get access to a certain job position. Bonding forms instead increase cohesion and identity of small groups, sharing a strong sense of belongingness. The two major dimensions of bonding forms of social capital are trust and reciprocity. In this sense, relationships, older adults have might serve as “capital” to organize their activities of daily living. In the following we will consider the idea of social capital by describing, in what way older adults are willing to offer support with respect to activities of daily living. Moreover, we will outline what the target group needs to feel part of a community.

Being active and keeping busy have been identified as being related to psychological wellbeing and QoL [Gabriel and Bowling, 2004 and Morrow-Howell, 2003]. Especially, voluntary work, helping other people by offering support, are important as they allow older adults to remain involved in society and to feel needed and valued [Gabriel, 2004]. For a community-dwelling sample of older adults, Brown et al. [2005] could support their prediction that giving social support, independently from ethnicity and demographic factors, relates to lower morbidity. Warner et al. [2010] demonstrated when it comes to support, providing and anticipating emotional support both positively relate to self-esteem and control beliefs and subsequently to higher physical and mental QoL. In contrast, receiving emotional support was associated with negative QoL. This effect might be eluded by making the support “invisible” to the recipient, e.g., “by highlighting recipients’ positive attributes” (suggested by Bolger et al. [2000], cited in Warner et al. [2010]).

Existing technologies designed for supporting older adults (e.g., Seniorpad⁶, Seniortouchpad⁷, or CaringTV⁸) primarily emphasize the value for the senior end user as a service *recipient*, not as a *provider*. In contrast, we want to promote the users' conscience of being both, provider *and* recipient of services. So, the question arises what motivates participation in physical and social activities with regards to care and support. How can we foster this willingness to act as a provider of services through the design of our platform? What kind of barriers and needs do we have to address?

Perkins et al. [2008] found that self-efficacy predicts participation in physical as well as social activities across cultures (i.e., US and Spain), whereas there is no effect for outcome expectations on participation. They suggest that "*care providers should increase and enhance the development of self-efficacy-based interventions for both physical and social activity*" (e.g., programs that help to improve confidence, mechanisms that help to elude barriers to participation).

Summary

There is a body of literature indicating that active participation is related to psychological and physiological well-being of older adults. Technological products designed for supporting older adults mainly highlight the value of the technology for the user as a recipient of support. Therefore, GetVivid aims at emphasizing the role of the user as a provider and a recipient of support, conveying the benefit ones participation might have for others instead of implying one's need for help. Fostering and motivating active participation are the demands we want to meet through the design of the platform. We want to support older adults in establishing new networks and communities, where they are willing to offer active support for others and receive services in return, when help is needed.

2.1.4 RQ4: What does the target group need to feel part of a community?

As the acceptance of our platform and active participation might also depend on how much someone feels part of a community, it is crucial to understand the target group's needs to feel as a part of a community. Thus, we will briefly outline the concept of community and Social Connectedness.

The concept of community

A community can be defined as social organization, characterized by a contiguous geographic area, wherein people have organized to meet their concerns and needs that are carried out within their daily lives [Zusman, 2009]. Under the perspective of modern transportation and the development of new forms of telecommunication and ICTs in general, communities do not necessarily need to be geographically collocated but can also exist over distance [Obrist et al., 2009]. The cohesion of this so-called "online communities" is based on sharing similar interests, attitudes and relationships [Obrist et al., 2009 and Preece, 2007]. According to Tönnies and Loomis [1957], a community can be defined as a group of individuals that share common

⁶ <https://www.conda.at/project/seniorpad>

⁷ <http://www.seniortouchpad.com/>

⁸ <http://www.caringtv.fi/>

interests and are characterized by feelings of togetherness and mutual bonds. Thus, communication is essential to foster close, intimate relationships between people [Rotman et al., 2009] and thus is seen as important prerequisite to enable social and emotional connectedness [Putnam, 1995]. Besides active participation, the experience of being connected to others is crucial to feel part of a community [Cummings et al., 2002].

The concept of Social Connectedness

In order to describe what is needed in order to feel part of a community, the concept of social connectedness provides valuable information. According to Van Bel et al. [2008, p. 3133] social connectedness can be defined as *"[...] the sense of belonging based on the appraisal of having sufficient close social contacts. We furthermore conceptualized interpersonal connectedness as referring to one's satisfaction with the quality of one's entire social network, and as a phenomenon that is fairly stable, but can fluctuate from moment to moment."*

The central aspect of social connectedness is "experiencing belongingness". Visser et al. [2010, p. 4437] consider social connectedness as *"the momentary experience of belongingness and relatedness with others"*. Belongingness is the positive counterpart of loneliness, which can be described as an emotional response to a discrepancy between desired and achieved levels of social contact. The appraisal processes regarding the experience of belongingness involve the satisfaction of both quantitative and qualitative aspects. The quantitative aspect is constituted by the size of one's social network as well as the amount of interactions with the members of the network. The qualitative aspect comprises the degree of closeness in one's relationship. The absence of an intimate attachment relationship leads to emotional loneliness [Van Bel et al., 2008].

Public Perception of Older Adults

Today a split image of the older generation exists in Austria. On one hand, there is a "model of deficits" (being handicapped or sick), and on the other hand there is an image of getting older in a competent way (being healthy and active). The arising dichotomies are retirement versus activity, deficits versus expertise, senselessness versus perspectives, uselessness versus efficiency, and withdrawal versus engagement. Having a community or society that refers to the competence model of aging, would refer to age meaning autonomy, wisdom and dignity. Getting older in a competent way means one has the skills to live autonomous, on one's own responsibility and in a meaningful way (e.g., working as volunteers, travelling, or doing the babysitting for the grandchildren). Nevertheless, for instance in Austria, media mainly show older adults as non-active citizens, like older people are described as the ones sitting the whole day in a park on a bench and feeding doves. Furthermore, being old in a community faces the danger of discrimination. This situation, however, is changing, as older adults are more and more recognized as vital parts of the community, and also represented as such in media. The older adults' self-perception also changes. For instance, while only 5 % of Austrian older adults feel older than they actually are, 36 % feel younger, which also indicates that the chronological age does rarely reflect the psychological or felt age [BMASK, 1999].

Social Isolation

Being not part of a community can be measured, for instance, with the scale of integration (from 0-32). Applying the scale to older adults the results are worrying, as 90 % of older adults above 60 years indicated to feel isolated, and 14 % even reported to feel extremely isolated. Isolation furthermore increases with increasing age. While only 7 % of people between 60 and 64 years feel very isolated, 30 % of older adults being 85 years and older feel very isolated. The high level of isolation starts at the age of 75 years, at this point the very isolated people are the majority compared to the very well-integrated ones. Isolation is furthermore associated with the level of education: the higher educated people are, the less isolated they are in their old age [Hörl, 2000]. Being autonomous, self-responsible and taking over responsibilities is furthermore considered to contribute to avoid social isolation. If the competencies of care-dependent older adults are strengthened, they are likely to maintain or regain an independent, self-responsible and meaningful life [Kruse 1996; in Sechste Altenberichtskommission, 2010].

Acevedo and Kozarzewska [2013] cite David McCullough, chief executive of one of UK's biggest charity organizations, saying that *"loneliness affects older people more than ill-health, and can in turn lead to depression and earlier onset of dementia"*. They state that *"social networks and social engagement are positive features of a healthy society"* and provide a kind of checklist for technology as a solution to counteract social isolation (listed items are direct citations from the original source):

- Better use of technology that already exists (which is constantly evolving);
- Technology by itself is not the answer, it cannot replace human contact, but it may be a means of better facilitating it;
- Older people need training and support to start using and keep using technology;
- Design and ease of use issues need to be addressed;
- The benefits of technology need to be marketed to older people in a way that reflects their needs and aspirations;
- We need to develop and support intermediaries to empower, educate and enable older people to be part of the solution, for example, by volunteering in peer-to-peer support schemes;
- We need to develop service options which support/create opportunities for older people to connect and participate;
- Improve quality of life of older people.

QoL is a multi-dimensional concept, affected by a person's physical health, psychological state, level of independence, social relationships, personal beliefs and their relationships to salient features of their environment. According to the WHO it is defined as *"[...] individuals' perception on their position in life in the context of the culture and value systems in which they live and in relation to their goals, expectations, standards and concerns"* [WHO, 1997, p.1]. Gabriel and Bowling [2004], who investigated QoL themes among 999 older adults (65 years and more) living in private households in Britain, identified a variety of main QoL themes. Retaining a role in society and having good social relationships, help and support as well as having a positive psychological outlook were identified among others.

Vaux [1988] point out that social support (for example Information, emotional support, recognition, affiliation) is a kind of buffer, especially in dealing with negative events [Vaux 1988] and especially social support and social integration have been positively associated with well-being [Umberson et al. 1996, Torche, Valenzuela 2011] constituting an important factor of QoL.

Sundar et al. [2011] emphasize that social connectedness has a positive effect on mental as well as physical health, indicated by mortality rates and psychological factors (e.g., depression or satisfaction) in relation to social networks. They point out how important strong social networks might be especially for the health of older adults. However, they could not find any relationship between QoL and Facebook use (whether older adults use Facebook at all (yes/no), how often Facebook is used (1=never – 5=daily), Facebook Intensity (5-point scale), how much time is spent on the site, and number of Facebook friends), though they conclude this might have been due to the relatively high QoL of the user sample which did not allow for positive effects of the social network site (SNS).

Summary

Being part of a community is essential as it influences one's subjective well-being and QoL. In order to feel part of a community, opportunities for active participation and to share common interests is important. Hence, we want to motivate older adults to use existing communities (with family and friends/acquaintances) and establish or join new communities (with neighbours or strangers living close by), wherein the exchange of support can take place based on a give-and-take principle. QoL is a combination of different aspects concerning physical as well as mental well-being. The question is how can we support a high QoL and which aspects do we have to address in the design of our platform.

2.1.5 RQ5 What information (content) needs to be provided to support ADLs and active participation?

As already outlined, there is a variety of different ADLs for which older adults might need or provide support. Accordingly, there are a lot of different approaches that aim at supporting older adults with respect to ADLs. Approaches range from assistive technologies like robots and software agents to Ambient Information Systems such as the Ubifit Garden⁹, which is an Ambient Information Systems for mobile phones that makes people aware of their physical activities they do. García-Vázquez and Rodríguez [2009] identified three ways how to make use of assistive technologies, i.e., Ambient Information Systems, to support older adults with respect to ADLs: *Motivating* people to do something, *warning* them when they face risks or *remind* them when they forgot about certain tasks or activities.

The platform we are aiming for does not only support older adults in organizing their daily life, it is also intended to offer social network functionalities and features in order to promote the senior users' active participation. We tend to facilitate the creation of network communities in order to foster the exchange of support within them. Thus, different aspects of design could be relevant for reaching our goals. In the

⁹ for more information see: <http://dub.washington.edu/projects/ubifit>

following, we will outline some design implications from existing literature, like e.g., SNS especially for older adults, ADL-related references, design aspects with regards to the feeling of connectedness and active participation.

Inclusive design for older adults

Keeping in mind mental and physical predispositions of particular end user groups is crucial for the successful implementation of a system. Obviously, our needs and capabilities change with advancing age. So the design of our platform should be adapted to the requirements of older adults with mild impairments. Existing literature provides a pool of knowledge concerning technology design with respect to elderly users. Acevedo and Kozarzewska [2013] provide a list of design implications for an elder user population addressing the 5 human senses (vision, hearing, taste, smell, touch) as well as cognitive aspects. The authors especially address the design of web information and provide another list of guidelines that should be considered when designing for an older population:

- It should be clear how the online information is structured and organized
- The hierarchical structure should be simple and straightforward
- Small informational bites should be used (i.e., just providing small amounts of information at one time)
- Related topics should also be grouped visually
- Use clear and comprehensive headings
- The essential information should be prominent
- The sections should follow a logical order (i.e., reflect the way of information seeking → minimize scrolling and avoid double-clicks)
- Important issues concerning written text:
 - Messages should be short (1 to 5 messages for each section)
 - The main message should come first
 - Use short sentences and paragraphs
 - Make the text readable (e.g., provide enough space between text-elements, choose a proper typeface (sans serif, not condensed), choose a proper font size (12- or 14-point), align the text to the left side, use dark colours and light background without patterns, provide information summaries).

Furthermore in the thesis of Acevedo & Kozarzewska [2013] some barriers for technology adoption for older adults are listed, e.g.:

- Lack of home access to the Internet and lack of awareness of technology usefulness
- Inappropriate marketing concepts (i.e., addressing a wrong elderly user profile which many do not identify with)
- Inappropriate design (e.g., see above-listed design implications, fragile hardware-controls (e.g., buttons), too complicated interfaces)
- Financial concerns concerning the purchase and maintenance of technological items
- Security & privacy concerns

Staying in touch with family & friends

A mail-survey questionnaire on SNS usage among older adults (55 years and older) revealed that for those who were already using Facebook staying in touch with friends/family was the most common activity on the site [Sundar et al., 2011]. For non-users of Facebook, the main reasons for not joining were lack of interest (64,4 %), lack of access, lack of skills, and privacy concerns, as already mentioned above. A key aspect that might influence the adoption of a SNS (indicated by 13,2 %) was communication with family members or friends, whereas only 4,4% said better technology-related knowledge could be a motivation. Also Alaoui & Lewkowicz [2012] found communication with family members and friends as the most important need with regards to a social network for older adults provided via the TV.

Projects like iYomu [Gibson et al., 2010] – a social networking site designed specifically for older users, which was re-launched in 2007 and was taken off the market again only 1 year later – illustrate the importance of designing attentively in line with older users' needs. Richard MacManus [2008]¹⁰ tried to figure out what exactly caused the economic failure of the product and listed some potential issues (e.g., the needs of older adults were not met any more specific than by other SNSs (e.g., Facebook or Myspace), a preliminary personality test might have exceeded the attention span, lack of incentive to return regularly.

Instant Messaging

Investigating the Instant Messaging (IM) (i.e., real-time text-based communication, like a chat room) behaviour of older adults, Prior et al. [2008] compared two different kinds of interfaces (a traditional and a metaphorical one). They questioned with regards to computer-based communication whether the lack of adoption of IM in contrast to email services could be overcome by an alternative interface design. The traditional interface corresponded to a typical IM design (see Figure 1), whereas the alternative metaphorical one visualized a more "natural scene" (i.e., a café surrounding, a text field like a speech bubble, the file browser displayed by a handbag, the exit function visualized by a door, the current emotional state representable by choosing an avatar with specific facial expression, hair style, and skin tone) (see Figure 1). Both interfaces implied the same functionalities, i.e., sending messages or files to other users, utilizing emoticons, selecting an avatar and exiting the system. Older novice IM users were observed with respect to the functionalities they were using.



Figure 1: The traditional and the alternative metaphorical IM interface design IM interface design

¹⁰ http://readwrite.com/2008/06/26/iyomu_old_people_expired#awesm=~opwcrbPMdhXbW8

Prior et al. [2008] found that the time span from logging on to sending the first message was shorter in the alternative UI (1.58 minutes versus 45 seconds), the error rate was lower, though rating the ease of sending a message was lower for the alternative metaphor UI (34 % versus 15 % found strongly agreed it was easy to work out how to send a message). Sending a file was not used at all in the traditional UI, but 11 % successfully conducted this task in the alternative UI. In the alternative UI changing the emoticon was executed faster (3 minutes 10 seconds earlier) and experienced as significantly easier. The UI also had an effect on the nature of the conversation – in the traditional UI communication was “more formal and stilted”, whereas on the alternative one, where more spontaneous (i.e., not guided by the facilitator) conversations took place, communication content was more personal and intimate. Overall, there was a preference of the alternative UI, especially, by those who wanted to use IM in the future. The main barrier for those who indicated no future use of IM was lack of typing skills for synchronous communication, wanting to review their text without sensing a pressure to answer immediately. Furthermore, Prior et al. [2008] indicate that graphical representations of users should be more like “real persons” and not just images, as they might be confusing.

Purpose of a SNS

Dhillon et al. [2013] observed that within their tele-health system, seniors welcome social networking functionalities, but only with a clear purpose. Gibson et al. [2010] also identified the purpose of a SNS as being an important factor. Older adults participating in their research perceived SNSs as being just platforms for people who seek for “attention and publicity”. However, they conclude putting heavy emphasis on a particular purpose might end up in too frivolous behaviour by the older users.

Information Content with regard to ADLs

- **Medication & Health:** Reported by Cornejo et al. [2010], seeking for medical and health information is amongst the most frequent Internet activities of US American older adults (besides using email, seeking for hobby information and news). Dhillon et al. [2013] investigated a tele-health system with different functionalities (e.g., social networking, memory games, health monitoring applications etc.). Usage frequencies revealed that the health monitoring apps were the most popular ones (35%; e.g., *Vital Tracker* (29%), *Exercise Tracker* (28%), *Weight Tracker* (22%), *Calorie Calculator* (8%)), followed by the social networking app (22%) and a “friends” page (17%). Regarding medication intake, García-Vázquez et al. [2010] identified three design issues that need to be considered to assist older adults with their ADLs, i.e., medicating: *remind* them to medicate, *guide* the medication and *encourage* older adults to medicate.
- **Spare time activities:** By means of semi-structured interviews Alaoui and Lewkowicz [2012] filtered out some features older adults suggested for a smart TV application (i.e., a widget implemented on a browser but running on the TV screen), e.g., “*virtual guided tours on TV for cities and museums, attending courses (computers, cooking, gardening, foreign languages, etc.), sports sessions, playing remotely games (crosswords, Sudoku, bridge, etc.), online book club exchange, online round table, sharing a TV program, having a photo album on TV and being able to annotate the photos to remember the context in which they were taken*”.

Privacy issues

Sundar et al. [2011] investigated the effects of SNS usage (i.e., Facebook) on older adults' QoL. Besides a lack of access and skills, they identified privacy concerns as barriers for using a SNS. Gibson et al. [2010] also highlight privacy issues as older adults' concerns about SNSs. They report that older adults would prefer "*a more tentative and incremental approach to revealing their identity*" (p.192) instead of revealing personal data when joining new online groups. It is important to have the possibility to share information selectively, with regards to the intensity of social bonds, so Gibson et al. [2010] suggest "quantifying the strength of network ties" to adapt the degree of information sharing to the particular groups. They mention that certain groupings (e.g., family, close friends, work friends etc.) are important as older adults make a clear distinction between friends and acquaintances, so one group named "friends" to cover up all differently intense relationships is not appropriate. Privacy settings classified as "friend / friend of a friend / everyone" was not satisfying for older adults as well. Also Casalegno [2000] (cit. in Lee et al., 2012) reports that older adults perceived an online platform (intended to serve local communities) as being public (which goes along with the above-mentioned privacy concerns). He concludes that this might have been the reason why the sense of social ties could not be increased via the online platform.

Designing for older adults' active participation

Being dependent on support can create negative emotions, whereas giving support is a predictor of lower morbidity [Brown et al., 2005]. An active lifestyle is beneficial for elders' health, wellness and QoL (e.g., [Lee et al., 2012], [Gabriel & Bowling, 2004]). Existing products designed for supporting an autonomous lifestyle of older adults, like e.g., the SeniorPad¹¹ explicitly emphasize the role of the end users as receivers of services. In contrast, the aim of our project is to highlight the role of the system's end users as providers of support rather than being only recipients. Thus, active participation should be fostered by the design of the project's platform.

Previous work aims at motivating active participation of older adults through technology have been reported in Lee et al. [2012] and concern with community activities inside or outside of senior centers. They investigated how technology can support active participation of older adults in senior center programs. They experienced the seniors of their study (all members of senior centers in the US) as highly active in providing center services and not only in consuming them. They argue when designing interactive systems for supporting active seniors in participation of center activities, there are at least three aspects that have to be considered:

1. **activity/event discovery support** – detection of the available programs should be facilitated (e.g., an "event aggregation service" collecting information about local events and recommending them via a community event calendar, based on individual preferences and interests, maybe combining it with some notification and reminder service);
2. **"personality" sharing support** – as their results showed, seniors first evaluate a program before deciding to participate, it is suggested to indicate a program's or group's personality, which technologically could be achieved by, e.g., using real-life videos and images in order to mirror the

¹¹ <http://www.seniorpad.at/>

particular atmosphere; furthermore sharing experiences, like “showing the learning process via multimedia” they see as a mean to increase self-efficacy and motivate participation of others;

3. **activity circles support** – they suggest to provide certain features in order to foster group dynamics (e.g., exchanging information (inform friends/peers “in a simple manner”, discuss events) and taking part in events together (organization of group activities)), which could be achieved by offering typical SNS functionalities like e.g., the sharing of information on local events and means to measure group interest via social plug-ins (“like” button);

Lee et al. [2012] in their paper also report the work of others that provides relevant insights regarding the promotion of active participation in group activities, e.g.:

- Casalegno [2000] (cit. in Lee et al., 2012): the Blacksburg Electronic Village (BEV) is an online platform that was designed in order to serve local communities¹². It was assumed that active participation in online communities “expands seniors’ social networks and increases the ties”. Casalegno [2000] found that “exchanges on the listserv, in combination with face-to-face meetings of BEV seniors, makes it possible for members to know each other better” and the listserv supported finding other members with similar interests (although the sense of social ties was not increased because the site was perceived as public).
- Keyani et al. [2005] (cit. in [Lee et al., 2012]): *DanceAlong* – an augmented dancing environment for older adults tending to facilitate social connections within a senior center as well as motivating exercise and entertainment for individuals; in order to foster social engagement they suggest to design in a way that encourages older adults “to explore and venture out beyond their closed social circles” (cit. in [Lee et al., 2012]), because elderlies primarily interact with others they already know.

Designing for social interaction

An interesting study investigating the effect of an interactive social interface using abstraction and motion cues was conducted by Mutlu et al. [2006], which might serve as a design inspiration for our platform. They installed a projection in a public area (university entrance hall) visualizing abstract, dynamic, motion patterns representing different emotional states (i.e., curiosity and happiness) as a response to social activity. The visualization was built up of a static circular shape in the middle with 12 concentrically arranged axes, each with a small mobile circular shape that could move back and forth on the particular axis (see Figure 2). Happiness was represented by harmonic motion patterns and was displayed as a reaction to high social activity, curiosity was displayed by random, individual, and self-directed movements of the small circles when there was low social activity, no motion patterns occurred when there was no social activity. The installation was evaluated by means of interviews with “long-term users” (i.e., people passing by regularly, interacting repeatedly). Mutlu et al. [2006] could show that the interface increased face-to-face encounters with other people (e.g., conversations about the assumed purpose of the installation). People tried to make sense of the visualizations, trying to attribute social meaning to the interface and its interactive properties. The authors conclude that “simple motion displays can evoke high-level social and emotional content” and state that certain social

¹² <http://www.bev.net/>

qualities of a sense-making process (i.e., seeking to consider interpretations of others if one's own mental models are insufficient to understand a phenomenon) could be used by designers in order to shape the user experience and foster social interaction.

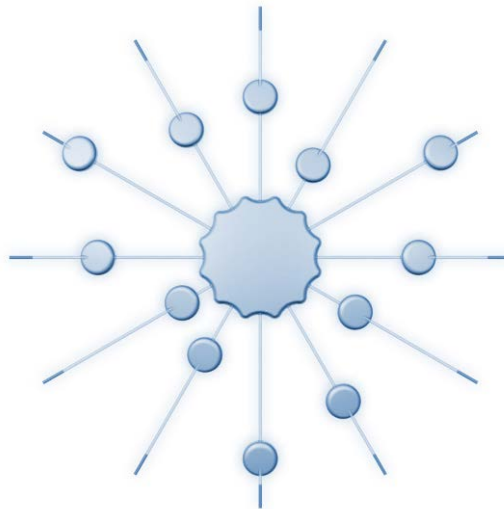


Figure 2: Interactive interface displaying motion cues

Designing for connectedness

Acevedo & Kozarzewska [2013] conclude that *“there are relatively few projects that use technology to help older people renew or develop social contacts and actively engage in their communities”* and thus recommend to *“apply technology creatively to enable older people to make connections, build new networks and actively engage in their communities”*. As already stated above, social connectedness relates to a feeling of belonging. Literature provides insights how to address this topic by the design of interactive systems. We consider the feeling of connectedness as a potential trigger for the willingness to actively participate in group-activities. Though not restricted to older adults, the presented work might serve as an inspiration for the design of our platform in order to explore means to support cooperativeness, in terms of acting as providers or recipients of support.

Kuwabara et al. [2002] introduce *connectedness (instead of contents) oriented communication* as a novel concept for network communication media. Instead of focusing on explicit content, they rather emphasize the implicit aspects of communication aimed at *“maintaining and enhancing human social relationships”*, like communicating, e.g., presence, mood, or social context. A small amount of data is sufficient to transport the information that shall foster the feeling of connectedness. Exchanging symbolized presence or status instead of verbal information is enough for this purpose, as the *“tele-presence”* provokes the feeling of someone apart being nearby. They highlight certain considerations affecting the design, like passive vs. active, synchronous vs. asynchronous, one-to-one vs. group communication. They describe different exemplary implementations/ prototypes, each with different design aspects and qualities:

- The *Family Planter*, which is a system that is designed to support communication between family members living apart. An artificial plant detects human motion via ultrasound and infrared sensors and the remote plant corresponds by rotating and illuminating optical fibres (implicit messaging). Touching the plant results in sound output of the receiver plant (explicit messaging).
- The *Digital Chatty Window*, is an artefact designed for tele-workers which has two communication modes – all-members or individual mode. The infrared sensor captures the presence of a person, which then can choose whom to inform about his/her status. Then, the presence is displayed in different ways – in all-members mode a static image of the user is shown, in individual mode a video with a fish tank is displayed (empty when absent, with a fish when present). In presence status, a video-chat can be easily started.
- The *Gleams of People*, is designed for one-to-one communication, focusing on just “keeping in touch” rather than sending information. Connectedness shall be fostered simply by the act of communicating, rather than exchanging explicit information (i.e., a gleam appears on the receiver’s screen when the sender clicks his/her interface, the colour of the gleam transports information on the sender’s mood, as an automatic response a message is sent back by an agent).
- *FaintPop* [Ohguro et al., 2001] (cit. in [Kuwabara et al., 2002]) is a photo frame-shaped device for group communication with a similar aim as *Gleams of People*, i.e., communicating “things that are not so important to talk about, but that are worth expressing” (p.5). Input happens via touch – clicking the icon of a user allows communicating with him/her, clicking one’s own picture allows communicating to the group. A *tap* (i.e., a click) indicates neutral feelings, a *pet* (i.e., a long click) represents positive and a *hit* (i.e., a double click) negative feelings. The particular message is visible to all group members, i.e. an animated ball cruising from the sender to the chosen recipient. The colour and the speed of the ball reflect the entered feeling, additionally the receiver’s icon starts blinking. Visualizations remain for certain period, fading gradually within one day (which allows synchronous as well as asynchronous communication).

Hassenzahl et al. [2012] in an extensive literature review identified six approaches to design technological artefacts (i.e., concepts, objects, technologies) for mediating the feeling of relatedness within close romantic and familiar relationships (the review considered work published until the end of 2009). The six concepts they categorized are listed below (in descending order of frequency, combination of concepts within one system were possible):

- **Awareness** – creating mutual awareness is understood as knowing about the environment in which another one exists. “*Awareness devices enable the exchange of continuous implicit information*” (p.4), e.g. ambient designs, implicit instead of direct/explicit communication (also see below, Cornejo et al., 2010);
- **Expressivity** – expressivity means explicitly communicating emotional and affective information in an encoded or enriched way, e.g. by turning certain affective signals on and off, by sending symbols and thus creating an own language (also compare Cornejo et al. [2010] – eBowl or Ohguro et al. [2001] cit. in [Kuwabara et al., 2002]);

- **Physicalness** – this concept is related to romantic couples rather than other familiar relations; the idea is to technologically substitute the lack of physical contact, e.g. by transmitting the partner's pulse via technological artefacts;
- **Gift giving** – i.e., the “voluntary transfer of a good without expecting compensation” (p.10);
- **Joint action** – shared activities and experiences foster relatedness, the idea is to “create behavioural interdependence”, which means that one actor's activities influences the other one and simultaneously shows the mutual influence; one sub-strategy is creating new routines (e.g., *Mutsugoto/Pillow Talk*: both partners wear a ring, when moving in bed the system captures the movement and projects pen strokes onto the body of the other one, when partner moves too and both movements cross, the lines react and illuminate); *Distributed Hide and Seek*: a game for grandchildren and grandparents), another sub-strategy is based on existing routines (e.g. *Lovers' Cup*: partner's cup glows when other partner holds or drinks from his/her cup, if both drink simultaneously they glow with maximum power);
- **Memories** – allowing to “re-experience past joint moments without the necessary participation of the partner”, (p.11) e.g., by recording intimate sounds; the authors emphasize that tangibility might be of great importance as it incorporates potential to convey relatedness;

Related work in the area of designing for connectedness with a special relevance for older adults includes the already-mentioned investigations of Casalegno [2000] (cit. in Lee et al., 2012). He was engaged with an online social platform for local communities and reported that face-to-face meetings together with a certain “listserv” function, i.e., an option to post and discuss diverse topics, allowed the senior network members to find other members with similar interests and to get to know each other better. Though the sense of social ties (which corresponds to the feeling of connectedness) could not be increased, the author attributes this to privacy issues (i.e., older adults perceived the site as being public). Nevertheless, the concept of offering online face-to-face-meetings within a social platform for older adults could help bridging the barrier of interacting with strangers. By fostering the feeling of knowing each other better, the willingness to offer or receive help could be supported.

Cornejo et al. [2010] evaluated ambient displays for older adults (i.e., ePortrait & eBowl) and aimed at connecting seniors “in a natural way” with the SNSs of their family members. The *ePortrait* is an ambient display showing the latest photographs uploaded in Facebook by family members and friends, the *eBowl* is a tangible feedback device made of a bowl and three vine balls, each with a feedback function (e.g., sharing a joke - the “laughs” of the relatives indicated on Facebook are then collected and displayed to the older adult by LEDs on the bowl), additionally by putting the keys into the eBowl it informs the relatives that the older adult is at home at the moment.

Summary

A Literature review revealed some aspects that should be considered when designing a social network for older adults. Privacy concerns are an important issue, which could be addressed by enabling selective information sharing in dependence of the strength of certain social ties. Furthermore the naming of such groups might also be of importance (e.g., “friends” indicates real friendship and does not include loose acquaintance). Another aspect that needs to be highlighted is the purpose of such an application. To older adults a SNS should not

implicate that it is just a platform for “attention and publicity”. Thus, the purpose of exchanging support via our platform should be emphasized. Furthermore, older adults’ adoption and use of a SNS can be motivated by functionalities that enable to stay in touch with family and friends. The communication with loved ones should therefore also be facilitated. The failure of previous SNSs designed especially for older adults also provide implications of what is important in order to create systems in accordance with the end users special needs.

With regards to Instant Messaging (IM) features an alternative metaphor user interface triggered more exploratory behaviour (e.g., sending files, changing emoticon) in comparison to a traditional IM interface. Furthermore the metaphorical interface design influenced the type of conversation (e.g., the spontaneity to communicate, more private content, in contrast to a “more formal and stilted” nature of conversation). Their results also indicate that the pictures representing users should not be just images as they might be confusing, but rather “real persons”. Interactive systems designed for the purpose of fostering social interaction might also make use of abstract visual motion cues, as they carry potential to influence the user experience as well as social encounters and communications, which could provide inspiration for our platform.

According to daily activities of older adults, the literature review revealed aspects concerning health and medication as well as spare time activities (e.g., offering cooking, gardening or computer courses, online book clubs, sports sessions, or sharing information (e.g., photos, TV programs)). Facilitated detection of local activities or events should be supported by the platform in order to foster participation. Furthermore, the assessment of what one has to expect (in terms of purpose or content) from such activities has to be enabled in order to allow appraisal of whether older adults want to participate or not. This aspect is similar to the phenomenon mentioned, that the purpose of a SNS is important for older adults’ adoption. So, older adults first assess the value and expectation (of SNSs and offered activities) before they decide whether to take part / join or not. Lee et al. [2012] suggest “personality sharing” by multimedia technology (e.g., via pictures and videos) and thus representing a group’s “collective image” or “real life action rather than a few descriptive sentences”. Finally, it can be useful to support group dynamics in order to foster active social participation. Other aspects that should be addressed by the design of the platform are, e.g., enabling (real or virtual) face-to-face meetings in order to foster the feeling of knowing each other, allowing the detection of others with similar interests, supporting social explorations in order to expand older adults’ networks beyond the borders of already known people.

As one focus of the project is to investigate how social connectedness increases QoL, it should also be considered how social connectedness can be fostered through system design. Previous work, though not exclusively focusing on older adults, provides implications on how to address this topic. For example, the concept of connectedness oriented communication might serve as an inspiration for design considerations, where not the explicit information content as such, but the more implicit aspects (e.g., presence, mood) are communicated. Furthermore, there are recurring concepts for technological artefacts that are meant to mediate the feeling of relatedness among beloved ones living apart (e.g., enabling mutual awareness, expression of affective and emotional states, and organization of joint action).

2.1.6 MISC

TV usage

According to the TdW 2009 Burda Community Network (cited by Pelz and Schnait 2009). TV usage is the most preferred leisure activity for people being 60 years and older in Germany. Hörl et al. [2009] indicate that according to the Teletest study in 2006, 50 to 59 year old people watch television approximately 3 ½ hours per day, 60 to 74 year olds watch around 4 hours, and 80 year olds and older ones 4 ½ hours. However, it has not been studied whether this is rather passive TV consumption or an active watching, or whether there are activities in parallel when watching TV. In terms of content, information programs and news are preferred. The TV thereby provides access to societal and political events, or it is used for relaxation [Hörl et al., 2009].

Alaoui and Lewkowicz [2012] explored the design space for a smart-TV application aiming at enhancing older adults' QoL. Their sample did not have any apparent health problems and all participants (8 women, 2 men) were still living in their private homes, but some connection to a senior service institution already existed which organized some group activities. Amongst others, Alaoui and Lewkowicz [2012] investigated the seniors' needs in relation to the TV as a medium for communication and common activities. They found that still the phone is the main medium for communicating with family and friends. The TV for all of the participants belonged to their daily activities, though the time span in front of it varied (some watch TV at certain hours or broadcasts (e.g., news at noon), others just keep it on in order "to have a presence in the background"). Some problems with remote controls were reported (e.g., when having multiple remotes for the TV itself and the receiver box for digital services some functions become redundant, like volume control). Furthermore, advanced remote functions were generally not used, only basic ones (like e.g., turning on and off, volume up and down, switching channels). Furthermore, they identified the need for "more accessible and less complicated interfaces than computers". Their participants stated to prefer tablets and voice control over keyboards.

Mobile device usage

In terms of mobile devices, the older adults mainly used mobile phones. However, the younger older adults use or possess mobile phones more frequently than older ones [Hörl et al., 2009]. In 2001 about 50 % of people aged 50+ stated that they have a mobile phone mainly for security reasons than for the purpose of communicating over distance. Today, almost 80 % have a mobile phone and little more than half of them use it to send text messages [Empirica, 2008].

2.2 Observations, Interviews and Group Discussions

We wanted to gain a deeper basic understanding of how our target group organizes their ADLs. Therefore, observations, interviews and workshops were conducted during a period of three weeks in October 2013. One observer from PLUS spent one week at each of the three end user organizations (EUOs) in Austria, Germany and Switzerland in order to interview and observe people that were either still living in their homes or in residential homes. The goal was, to gain a deeper understanding for what kinds of activities the participants need support and who supports them in those activities, as well as for what kind of activities they could offer support. At the end of each week, a workshop was carried out to discuss the major findings gathered throughout the interviews and observations with all people involved during the preceding week.

2.2.1 Research Goals

We focus on older adults, aged 60+ who have got physical limitations, and receive help regarding activities of daily living. Virginia Henderson, who is one of the pioneers in this field, for example, points out that care is not only about helping with daily activities such as eating, moving, etc. but “... *making life more than a vegetative process by communicating with others, maintaining human relationships, learning, working and playing, or recreating*” [Henderson 2006, p. 26].

The main research goal addressed throughout these activities was the target groups’ needs in terms of necessities of daily living. In particular we focused on the investigation of the organisation of ADLs (e.g., Who is involved? How does the communication look like? What kinds of activities could the target group do/offer for others?), effects of social roles on the organisation of ADLs, and the use of “social capital” to organize ADLs. According to Franzen and Pointner [2007] we define social capital as resources that are embedded in social structures, meaning that people we know or to whom we have a relationship have got value for us in a sense that they might provide, e.g., support.

2.2.2 Research Questions

Accordingly to the definitions mentioned above, the following three research questions were defined:

RQ1 How does the target group organize their activities of daily living?

This research question generally targets to gather and develop a deeper understanding of older adults’ daily lives. In particular, we are interested to gather insights that focus on aspects that characterize the organization of older adults ADLs. Therefore, we want to investigate what kind of ADLs exist, which persons are involved in the organization of ADLs, which means of communication they use to organize them, what kind of support is demanded and provided by the participants, and what kind of barriers regarding the organization of ADLs can be identified.

RQ2 How do social roles affect the way people organize their activities of daily living?

This research question aims at investigating how the different identified key-persons (which have been elicited throughout the analysis for RQ1) interplay and interrelate with the organization of certain activities of daily living. In particular, we are interested in finding out more about what individuals play a key-role within social

activities or are actively involved within those but also which individuals play a key-role when it comes to the provision of support to our target group.

RQ3 How does the target group “use” their social capital to organize activities of daily living? & RQ4 What does the target group need to feel part of a community?

This research question focuses on the investigation of how the participants use their “social capital” (i.e., their relationships to others) to organize their ADLs. Furthermore, this research question also addresses the target groups’ requirements in order to feel part of a community (e.g., what do they need to feel part of a community?), with whom they feel connected but also what constitutes this feeling of being connected to others.

2.2.3 Approaches

One researcher from the PLUS was on-site at the target groups’ homes or residential homes. Thereby, the researcher spent one week at each of the EUOs places and had the opportunity to observe processes, interactions, etc., carried out interviews and performed group discussions at the end of each week. More details regarding the methodological approaches applied within each stage are outlined in the following sections.

2.2.3.1 Participatory Observations

Observations are one of the central methods within the social sciences. Scientific observations focus on *systematically collecting* and interpreting perceptible behaviour [Atteslander, 2003]. It allows the researcher to get insights into processes within an organization, to assess and understand social behaviour and interactions by means of taking notes, or using technical means (e.g., camera or voice recorder). The quality of the data that is collected is closely related to the observer. Usually, observation schemes are developed beforehand and a category scheme serves as a kind of template to organize the gathered data. Following a more qualitative approach, usually no category schemes are used. It is more explorative and instead of proving hypotheses by means of observations, hypotheses are developed based on the observations [Lamnek, 2010].

Our approach was more explorative as we did not want to prove any hypotheses, but wanted to explore how ADLs are organized, how people communicate with each other, what kind of technologies are used or can be found within the participants’ (residential) homes and how the participants living situations actually look like. Regarding the observations at participants’ (residential) homes the observer approximately spent 1-3 hours on-site. The observations were organized as a kind of “informal getting together”, avoiding that the participants experience a kind of “interviewer situation”, but more narrative, talking about his/her experiences regarding ADLs and allowing the observer to get insights into everyday activities. In general, those participants, who let the observer visit them within their homes, were very hospitable and even kind of happy that someone is interested in their lives and the way they live. Most of the participants have shown the observer around their (residential) homes in order to provide an overview about their current living situation. Focusing on residential homes, the observer was also shown around the organization in order to gather insights concerning more organizational related processes (e.g., what kind of services is provided within the institutions).

2.2.3.2 Semi-Structured Interviews

Whereas observations focus on the assessment of behaviour and social processes, e.g., within an organization, interviews are more actor-centred and focus on assessing a person's opinion about certain topics. Depending on, if it is more a quantitative or qualitative approach, either predefined interview questions or more open defined guidelines are used for data assessment. Focusing on a more explorative approach, the observer, who was at the residential home, used guidelines for data assessment, which supported him/her to keep focused during the interviews, but also allowed flexibility in order to gain new insights into the topic. It was intended to interview the personnel in the residential homes (e.g., caregivers) as well as inhabitants, who might have a key role with respect to the central research questions, we wanted to address. However, when being at the EUOs places it was not possible to interview any personnel. Nevertheless, within the group discussions some experts (e.g., caregivers, health management) took part and, we were able to gather insights from this perspective as well.

As mentioned in the beginning, the role of the observer was also to talk with people on-site to gain deeper insights and background information about how activities of daily living are organized and to explore what the target group needs in order to feel part of a community. The questions should trigger the participants to narrate about a typical day in their life and thus a more "natural" conversation was intended than making participants experiencing a kind of interviewer situation.

2.2.3.3 Group Discussions

A group discussion is a data collection method of the social sciences. Thereby, a group of participants discusses issues, based on a semi-structured guideline, developed by the researcher. This qualitative approach aims at gathering perceptions, needs, problems, beliefs, etc. from a target audience and enables in contrast to a survey to gain deeper insights into a topic. The group discussions were conducted as a kind of "coffee party", thus they had more the character of an informal "getting together" than of a formal discussion. Based on the insights that were gained through the observations and interviews a rough guideline for the discussions was prepared to help the researcher on-site to keep focused on the central topic and to gain deeper insights into the addressed topics.

The group discussions were carried out at the end of the week. Based on the insights the observer could gain through the observations and interviews, he/she created a kind of guideline that aimed at gathering more detailed information. It was intended to have 4-6 participants taking part in the group discussions of every EUO. All sessions were recorded with video camera and voice recorder and lasted around 2 hours including a short break.

2.2.4 Results

In the following, the participants and the summarized results for the research questions are presented.

2.2.4.1 Participants

Regarding the recruiting of the participants PLUS stood in close contact with the EUOs, who were responsible for the recruitment. The recruiting profile was defined, in terms of older adults (representing the generation 60+), who have got mild physical limitations and receive help regarding activities of daily living.

14 interviews with 16 participants were conducted (whereof we had to exclude 1 interview from further analysis due to serious impairments of the participant that do not fit our target group), 7 participants were observed (altogether 10 participants have been visited at their homes, but 3 participants refused to show their homes to the researchers due to several reasons, e.g., privacy), and 13 participants took part in the discussion sessions. Not every participant took part in each stage of the research process. **Fehler! Verweisquelle konnte nicht gefunden werden.** below shows how many participants joined the different research methods.

Participants	Interview	Observation	Discussion
1	X		X
2	X	X	X
3	X	X	X
4	X	X	X
5	X	X	X
6	X		X
7*	X		X
8	X		X
9	X		
10	X		
11	X	X	X
12	X	X	
13	X	X	
14	X		
15	X		
16	X		
17			X
18			X
19			X
20			X

* The participant was excluded from further analysis because of serious impairments that do not fit our target group.

Table 1: Mapping of participants and their participation within the different research stages

Altogether 19 participants with mild impairments (one participant with more serious impairments was excluded from further analysis), 16 females and 3 males, took part within all three activities (observations, interviews and group discussions) and were aged between 63 and 91 years (average of 71 years). From the 19 older adults that participated, 18 were retired and 1 participant was keeping the house. Five older adults were divorced, 5 participants were widowed, 7 participants were married and another 2 participants were single.

2.2.4.2 General insights from an institutional perspective

The first place visited by the researcher (from the 14th of October till the 18th of October, 2013) was in Biel, a medium sized town in Switzerland. The visited institution is one out of 2.500 institutions throughout Switzerland, which are members of CURAVIVA¹³. The visited institution was conceptualized as a facility with 1) assisted community living for older adults that are in frequent need of professional care, and 2) residential homes with the possibility to acquire for professional care services. The assisted community living provides 49 single rooms for those older adults that need frequent care, and 67 residential homes. Besides, there are also two restaurants on-site; one restaurant for the residents and another one also for all others (such as visitors, guests, or family members). There was also a physiotherapist, a hairdresser, a fitness studio, seminar rooms, a kindergarten and a podiatry. The institution follows the main idea and philosophy of providing a place for older adults that generates a feeling of “being home” wherein supporting and sustaining a high quality of life for older adults is the key-concept from a more entrepreneurial perspective. The researcher from the PLUS was shown around in both, the community living- and the residential home care concepts. Additionally, interviews and observations were carried out with older adults, that are integrated and part of both care concepts, which has led to a manifold perspective and deeper understanding of both concepts and the inherent needs and issues of the residents that derive from these concepts.

In the following week (21st of October till the 25th of October, 2013) the researcher went to Nürnberg, a city in Germany. In general, the ‘Verein für Menschen mit Körperbehinderung Nürnberg e.V. (VMKN)’ has been dedicated to advancing and supporting individuals having physical and/or multiple disabilities of all ages¹⁴. The researcher from the ICT&S Center was shown around to the branch office and especially to the advice center called ‘InBestform’ as part of the association. The ‘InBestform’ information- and advice center provides comprehensive (socio-pedagogical) advice, support and help for individuals having physical and/or multiple disabilities, but it is also a platform for older adults with and without particular disabilities. With regard to older adults, the center aims at providing a place where older adults have the possibility to network and be actively involved in the voluntary work of VMKN. All participants that took part in the study were actively involved in various activities (e.g., computer courses, cooking classes, or events concerned with health-related topics for older adults) that are organized by the team of the center. All interviews conducted in Nürnberg were carried out at the center, and all participants have originally met each other there. The group discussion at the end of the week was carried out at the branch office of the association.

¹³ see www.curaviva.ch

¹⁴ see <http://www.behinderte-nuernberg.de/>

In the next week (28th of October till 31st of October, 2013) the researchers' last stop was in Vienna, the main capital city of Austria at the EURAG Austria¹⁵, which is an organization focusing on: obtaining the life quality and the self determination of seniors, maintaining a bridge between the generations, empowering the older generation and preventing discrimination of older adults. In contrast to the other EUOs places, all interviews and observations in Vienna were carried out at the actual homes of the older adults (neither directly at the association nor in a retirement home), directly in Vienna or in villages in Lower Austria, not far away from Vienna. Due to the rather long geographic distances of the interviewed and observed participants in Vienna and Lower Austria, it was not possible to bring all older adults together at the end of the week for the group discussion. Instead, other older adults and members of EURAG Austria participated in the group discussion in Vienna, which was conducted in a typical Viennese café.

2.2.4.3 Insights from an individual perspective

The daily routines of the participants were very different. Either the daily routine was chronologically structured or different courses of action were made every day. Lunch was a main fix point for most of the participants. Further the participants highlighted that self-determination was of great importance in this context. However, in most cases the routines of the participants were oriented on the daily routines of other persons like their own caretakers or family members in need of care (e.g., husband or wife). The daily routine was often oriented on health aspects (e.g., going for a walk to avoid stiffness of hinges), mobility and activity outdoors were from significant importance. In general, the majority of the participants stated that they were busy in their everyday life and were, therefore, bored very rarely. All of the participants could imagine either supporting someone else in some ways, being supported by someone else in some ways, or both.

The living situations of the participants were different in terms of their housing space. 1 participant lived in a flat with about 40 m², 1 participant did not mention the size of the flat, 2 participants lived in flats with about 50 m², 2 participants lived in flats with about 65 m², 1 participant lived in a flat with about 100 m², and one participant lived in a serial house with 3 floors. When talking about technologies 4 participants had a TV, 1 participant had 2 TVs, 1 participant had 3 TVs, 6 participants had a landline, 1 participant had 2 landlines, 1 participant had a record player, 4 participants had a radio, 1 participant had 2 radios, 1 participant had a CD-DVD-Player, 3 participants had personal computers, 1 participant had a printer/fax machine, and 3 participants had mobile phones at home.

The patterns of use of the possessed technologies vary strongly throughout the group of participants. One participant had a mobile phone that was especially designed for elderly people but stopped using it after making one "mistake" (e.g., calling someone while being in a foreign country). Another participant is very enthusiastic in using a smartphone (not only for telephoning but for taking/receiving pictures, sending/receiving SMS/MMS, and writing/receiving E-Mails) and stopped nearly all activities on the personal computer since owning it. One participants uses the personal computer very frequently because of being used to it from the former work position, but feels somehow alone with that because many other retirees avoid using the personal computer (e.g., another participant uses the personal computer only for playing cards). One participant hides the TV in a cupboard and uses it only to watch the news two or three times a week while

¹⁵ see <http://www.eurag.at/>

another participant that has the TV on a prominent place in the living room wishes to buy a second TV for the bedroom. Another participant has three TVs, one in the dining room, one in the living room, and one in the bedroom, and another participant changed from having cable television to having a satellite dish in order to receive more programs. One participant removed the TV from the flat because “only bad things are shown on TV”. One participant stopped using the record player despite having a high amount of records because the buttons are “so hard to rotate”. See Figure 3 till 5 for TV-Set up examples.

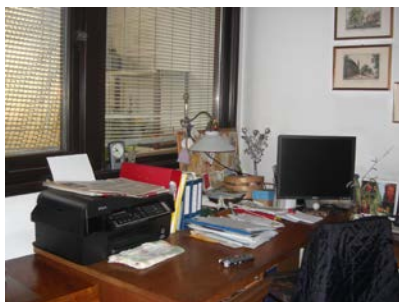


Figure 3: Printer and PC of a participant



Figure 4: TV-Set up in the living room of a participant



Figure 5: TV-Set up and living room of a participant

2.2.4.4 RQ1 How does the target group organize their activities of daily living?

In general, this research question targets to gather and develop a deeper understanding of older adults’ daily lives.

Key-Persons in the organization of ADLs

During the interviews we identified nine main groups of key-persons, which are involved in the organization of the activities of daily living. The list of the identified key-persons below does not represent any relatedness to their actual part or role in the older adults’ organization of daily activities (e.g., in which activities do these people play a key-role?). This means, that those persons have been actively named by the participants and are thereof in any way valuable for the participants’ organization of daily activities. Accordingly, the following key-persons could have been identified during the data analysis (ranked according to the quantity of their naming’s):

- Family
- Friends & acquaintances (including neighbours, former working colleagues)
- Professionals & Service providers (including caretaker, hairdresser, consultants/advisors for older adults, domestic aide)
- Institutional representatives (information centres, associations)
- Other people’s children
- Formal caregivers
- Doctors
- Religious & spiritual representatives
- Strangers

The group „formal caregivers“ includes mainly persons like family doctors, caretakers, physical therapists, and orthopaedics. When talking about family our participants mostly referred to their marriage partners, children, grandchildren, sons-in-law, daughters-in-law, siblings, and godchildren. In the group “Friends & Acquaintances” besides friends primarily neighbours and (former) work colleagues as well as members of different clubs were mentioned. With regard to “spiritual succour” the participants obtained mainly to priests and god. The group “household help” includes mostly persons that help the participants doing more challenging activities in the household like cleaning the windows, ironing, and gardening.

Means of communication to organize ADLs

According to the interviews the participants use six different means of communication to organize their activities of daily living (ranked according to the quantity of their naming’s):

- Telephone (landline as well as mobile phones)
- Personal conversation
- Emergency button / Emergency bell
- Via post office / written
- Social media & E-Mail / Computer

When talking about personal conversation the participants referred to their visitors (e.g., their children) as well as people they visit (e.g., neighbours) and thereby ask for help. The participants that live in institutions mentioned that they have an emergency button / an emergency bell with which they can call for assistance 24 hours a day. Further the participants use written notes, which they let deliver via post office in some cases to organize their activities of daily living. Some of the participants prefer to use, besides E-Mails and their Personal Computer, also social media like “Skype” or “Facebook” instead of written notices.

Identified ADLs

Regarding the target groups’ ADLs, we came to understand that a high diversity of different activities could have been identified. The participants’ daily routines strongly differ according to different identified interrelating aspects (such as nursing activities) and the way how people want/tend to structure their day (strong temporary structured vs. not temporary structured). Regarding temporally unstructured days one participant for example outlines *“sometimes I get up at 6 o’clock in the morning and sometimes I got to bed at this time”*. In line with existing literature (see Henderson [2006]) we based our overall categorization of activities of daily living on the following three criteria: 1) basic activities “that are oriented toward taking care of one’s own body” [Roley et al. 2008], 2) instrumental activities which are not necessary for fundamental functioning (in contrast to basic ADLs) but are important for older adults to live independently at home and, 3) offering and demanding support from others. In order to provide a better overview about the identified target groups’ ADLs, the following graph (Figure 6) visualizes the categorization structure of our identified ADLs.

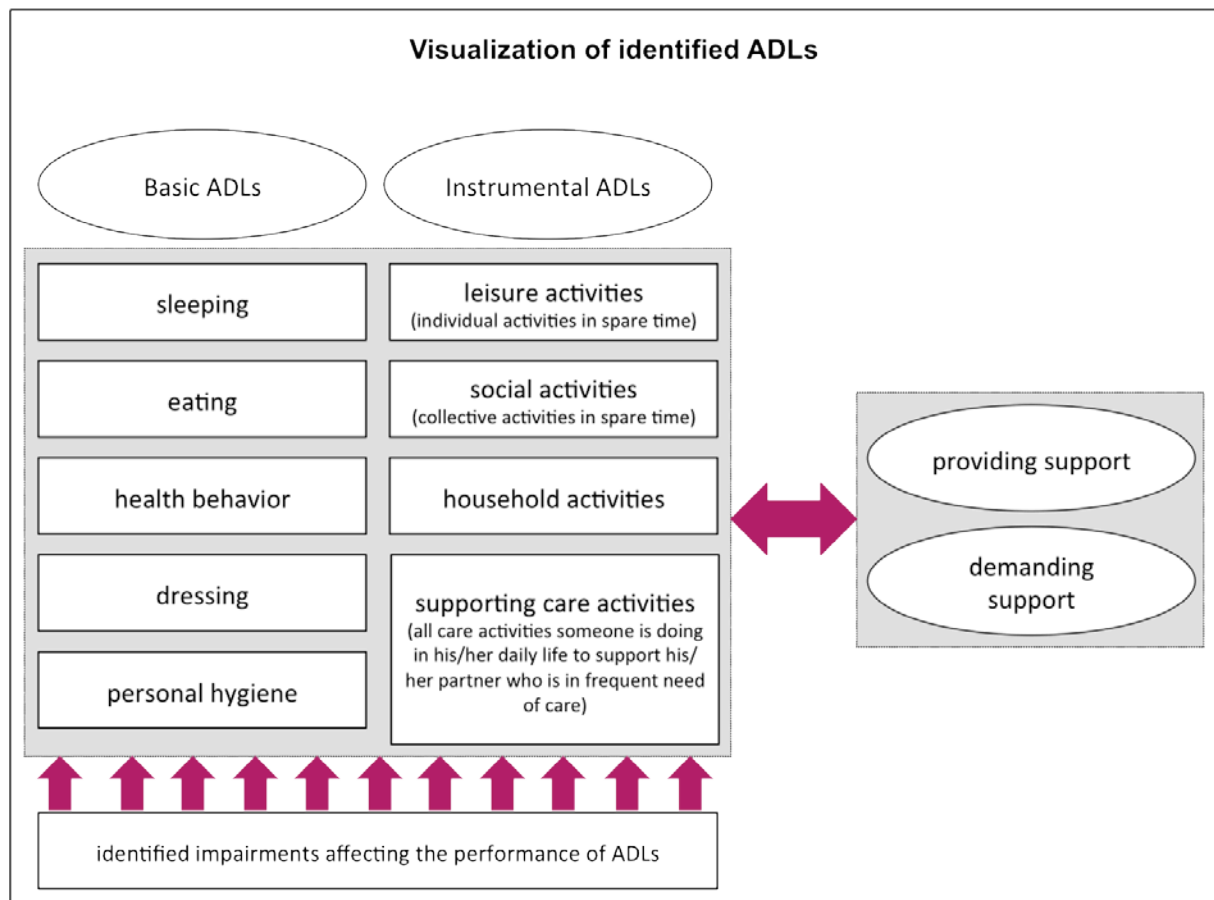


Figure 6: Visualization of identified ADLs and their interrelations

In terms of Basic ADLs we could identify 5 main activities during the interviews. These basic activities all relate to daily self-care activities and go in line with identified basic ADLs from literature (e.g., [Roley et al., 2008]):

- **Sleeping:** during night but also short afternoon naps
- **Eating:** breakfast, lunch, dinner, drinking coffee, snacks
- **Health behaviour:** taking medication, physical therapy, physical activities (e.g., walking, gymnastics), visit to the doctor
- **Personal hygiene:** hairdresser, bathing and showering, grooming, bowel and bladder management
- **Dressing:** getting dressed in the morning and getting ready for sleep, getting changed during day

Besides the before outlined overall categorization we clustered the data related to the instrumental ADLs in the following four categories, also including supporting care ADLs, as these activities appear to be done every day in terms of taking care and supporting care-dependent partners (mostly marriage partners) in daily life:

- **Leisure Activities:**

This category refers to all activities that a participant is independently doing in his/her spare time. The category “Leisure Activities” contains listening to music (e.g., radio), watching television (e.g., news), reading (e.g., newspapers), needlework (e.g., knitting), solving crosswords, sportive leisure activities (e.g., walking, hiking), going on holiday, computer activities (e.g., computer games such as free cell, information seeking on the Internet, editing digital pictures received) and creative activities (e.g., painting).

- **Social Activities:**

This category refers to all activities that a participant is doing in his/her spare time together with other people. When talking about “Social Activities” the participants referred to drinking coffee together, inviting someone or being invited by someone, telephoning, performing activities within a certain club, performing hobbies in the group, and performing voluntary work or community service.

- **Household Activities:**

This category refers to all activities that a participant is independently doing in order to maintain his/her household. In terms of “Household Activities” the participants mainly mentioned vacuuming, wiping the floor, washing the laundry, ironing, cleaning the windows, cooking, cleaning up, dusting, pouring the flowers, shopping, and settling (e.g. within public authorities and administrations).

- **Supporting Care ADLs:**

This category refers to all care activities a participant is doing in his/her daily life to support his/her partner (mostly marriage partners) who is in frequent need of care. Dependent on the health situation and the degree of care-dependency of the partner (mental and/or physical impairments), the quality of provided support varies enormously. In general, four participants do actively support their care-dependent marriage partners in everyday life. Most of these daily supporting activities refer to the provision of basic support, such as dressing, personal hygiene, eating, physical support and supporting the health behaviour of the partner (e.g., through providing medication) mostly due to physical deceases and impaired mobility. Nevertheless, also mental support in daily life, due to mental deceases (e.g., dementia) is provided. This support is characterized through unobtrusive help in everyday situations such as closing doors that have been forgotten to close or assuring that the partner has found his/her way to a certain place. In relation to this aspect, one participant for example outlines, *“when I leave the flat and got to the elevator, I listen if he has closed the door of the flat. This is what he wants to do on his own, closing the door (remark of researcher: because due to his dementia he does not always remember to do that).”*

Identified barriers in the organization of ADLs

In terms of identified barriers regarding the organization of ADLs, this section mainly focuses on the limitations of the participants regarding the participation, activity and organization of ADLs due to impairments of body functions and body structures (WHO, ICF, Version 2.1a, 2001). In health research and especially disability scholars exists a long argued discussion that what is called physical or mental ‘disability’ is not simply an attribute of a person, but a complex collection of conditions, activities and relationships, whereby many of those are created by the social environment (in contrast to the so-called medical model in which disability is defined as an observable deviation from biomedical norms of structure or function). This is often called the ‘social’ or ‘social-political perspective’ wherein disability is seen as a ‘social construct’ [Bickenbach et al., 1999]. Based on this point of view, we analysed our data concerning these aspects, following the CIF (International Classification of Functioning, Disability and Health) as it conceptualizes functioning as a “*dynamic interaction between a person’s health condition, environmental factors and personal factors*” (WHO, ICF, Practical Manual, 2013, p. 5), in order to provide a more comprehensive and manifold perspective on the participants limitations in participating and organizing their daily lives.

The following table outlines the identified impairments regarding body functions (are the physiological functions of body systems, including psychological functions) and the relating body structures (are anatomical parts of the body such as organs, limbs and their components).

Impairments of Body Functions		Impairments of Body Structures	
Mental Functions	Memory	Structure of the nervous System	Brain
Sensory Functions and Pain	Seeing, pain	The Eye, Ear and related Structures	Eyes
Functions of the Cardiovascular and Respiratory Systems	Heart, respiration	Structure of the Cardiovascular and Respiratory Systems	Cardiovascular and respiratory system
Genitourinary and Reproductive Functions	Urination functions	Structure related to Genitourinary and Reproductive Systems	Urinary system
Neuromusculoskeletal and Movement related Functions	Mobility of joint, muscle power	Structure related to Movement	Shoulder region, upper extremity (arm, hand), pelvis, lower extremity (leg, foot), trunk

Table 2: Clustering of identified impairments based on the ICF

From the 16 older adults with whom the interviews have been conducted, 11 have explicitly reported about one or more of the above outlined impairments. These identified impairments lead to various restrictions and limitations in their everyday life mainly resulting in constrained mobility and movement. Two of the participants are wheelchair-bound whereas another participant is using a walked-chair. Most of the above outlined physical activities wherein support is needed, relate to those three mobility restricted participants. However, one participant reports about respiration afflictions (due to a lung function disorder) that immensely limit the free movement in proximity and further surroundings (the participant is not able to go and walk wherever he/she wants to). Nevertheless, this participant is living at home by him-/herself just acquiring for household support from service providers.

Demands and provisions of support

When it comes to demands of support from our participants, we mainly clustered those activities wherein support is needed according to our general framing in basic ADLs and instrumental ADLs in order to provide a comparable framing and mapping of identified activities and the demands of support.

- **Basic ADLs wherein the participants demand for support:**

Within the basic activities of daily living, we identified some categories for which support is needed, i.e., personal hygiene (which is mainly provided through care services such as e.g., home visits of hairdresser, toilet hygiene), physical support due to declining physical capabilities & impaired mobility (e.g., carrying something heavy, driving someone somewhere, or snow removing) health behavior (e.g., when being sick, surgical hose operations) and eating (e.g., cutting bread or delivery services: pizza delivery)

- **Instrumental ADLs wherein the participants demand for support:**

According to the instrumental ADLs support is needed for the following activities: household (e.g., cleaning, window cleaning, ironing, yard work), support in daily health care activities of others (e.g., support through day-care centres that care about the husband), support in authority visits/organizational and administrative issues (e.g., bureaucratic paper work), leisure activities (e.g., help with computer problems), support in organizational issues that support subjective well-being (e.g., informational lectures for older adults regarding juridical problems of older/retired adults)

- **Willingness of target group to acquire for support:**

In general, throughout the interviews, it became obvious, that most of the participants when generally asking, if they need any support regarding the organization of ADLs, denied being in any need of support in first place. Only after being asked about more concrete activities wherein they might need support, they started to think about their daily lives and routines and reflected upon certain activities wherein they however, needed support (resulting in the ones that are outlined above) (e.g., one participant stated that he/she is not in need of any support, but when asking for concrete activities, he/she committed that he/she has already employed a household help and a caretaker for physically demanding activities). From an interpretative perspective, this might be due to a certain degree of unreflectiveness about one's own situation in life and of being in need to receive little help with some activities. This might be caused by a general negative association with the word "support" or more concrete with "being in need to receive support in life" as this is sometimes directly related to certain weaknesses of individuals. During the interviews, it became clear, that one of the most important factors at their age is, that they want to maintain their autonomy, independency and especially their proactivity in life. The negative association of being in need of support stands in a negative conflict (from the perspective of the participants) with being autonomous, independent and proactive in life. However, even though the participants associate needing support negatively, some participants highlighted, that acquiring for support if they pay for it, is considered as "positive" as it fits in the concept of "give and take" (mutual benefits for both parties).

In line with the categorization of demanding for support, we also clustered the provision of support in basic and instrumental ADLs and thereof gained insights into what kind of support is already provided by the participants to other older adults. Additionally, we gathered information on what motivates the provision of support (in terms of how the willingness of providing support is triggered).

- **Basic ADLs wherein participants provide support:**

Three subcategories of basic ADLs could be identified, i.e., physical support (e.g., driving someone somewhere, doing grocery shopping, providing others with edibles/aliments, help with furnishing one's accommodation), health behaviour (e.g., accompanying someone to the doctor, advising/caring for someone if one has the impression that he/she is not doing fine, helping with bandages or functional/medical garment), dressing (e.g., supervising that someone puts on his/her clothes properly).

- **Instrumental ADLs wherein the participants provide support:**

Instrumental ADLs older adults of our sample actively support were grouped into the following subcategories: mental/affective support (e.g., consoling someone, providing moral support, giving helpful advices (e.g., to take notes in order not to forget anything, to drink water in order not to feel dizzy), giving pleasure (e.g., by preparing coffee and having a chat, by drawing a picture for someone), socializing support (e.g., spending time, having a chat, paying visits, going for a walk, read a story to someone, doing handicrafts, playing something), materialistic support (e.g., sharing poems/books), household support (e.g., drying the dishes), care support (e.g., in order to disburden someone else *"my mother is 88 years old, from time to time she comes to my place in order to allow my brother [...] to have a time-out"* (original German statement).

- **Willingness of the target group to provide support:**

In order to enlighten under which conditions older adults are willing to provide support, we identified the following aspects as important to them: there needs to be the (temporally limited) necessity for help/support (e.g., if someone is sick, has problems or needs help, *"I only go there when I really can help in something"*, *"when I see that someone is not doing fine or he/she cannot do this and I can, then I go there and help him/her"*), caring for others' well-being as motivation (e.g., *"once a week I go to town with her, because otherwise she would just sit in front of the TV"*), caring for family/friends/acquaintances (e.g., former colleagues, neighbours, within clubs/associations), organizing the particular strengths (e.g., offering and organizing support with regards to particular competences, organizing mutual exchange), the aspect of mutual benefit "give and take" (e.g., *"you get so much back"*, *"I want to give her [the mother] back a lot, back then she also helped me"*). An interesting finding is, that regarding the necessity for help and support, some participants highlight, that if someone is significantly feeling worse than oneself, the participants tend to act (in terms of support) in an altruistic manner with no expectations from the person that is in need of help. In this case, the "give and take" concept is not valid anymore.

Summary

We mainly focused on the investigation of our participants' organization of daily activities. Thereby, we found out that the daily routines of our participants varied a lot. Some of them have a clear chronological structure of their day whereby others "take each day as it comes". Nevertheless, one thing that is considered as a fix point for most of them is lunchtime. However, in most cases certain actions during the day were oriented towards other persons (e.g., family members), health aspects and activities outdoor. Most of the participants stated, that they are rarely ever bored during the day, which is considered by them as an important factor for their subjective well-being. Before being able to understand how the participants organize their ADLs, we first need to describe which kinds of activities our participants accomplish every day. We mainly identified two different kinds of activities: basic ADLs (sleeping, eating, health behaviour, dressing, or personal hygiene) and instrumental ADLs (leisure activities, social activities, household activities, or supporting care activities) (see Figure 6). Within those activities, we identified eight different groups of key-persons (family, friends & acquaintances, professionals & service providers, institutional representatives, other people's children, formal caregivers, religious & spiritual representatives and strangers) to be of relevance for their organization. Nevertheless, not all of these identified key-persons do play a role within those activities.

In order to organize their activities of daily living together with the key-persons, the participants use six different means of communication (telephone, personal conversation, post office, emergency button, computer and social media). On basis of this general description about the participants' organization of ADLs, we also identified barriers (impairments of body functions and body structures) that interfere the participants' organization of them. Those barriers, lead to being in the need of demanding for support for certain basic (personal hygiene, physical support, health behaviour, eating) but also instrumental ADLs (support in household, health care of others, in authority visits, in leisure activities, organizational issues). We found interrelations between those activities wherein support is needed and the different, above outlined, key-persons. Even though being in need of support within different life situations, the participants express their willingness to also provide support to others that are themselves in the need to demand for support. However, this willingness underlies special conditions (e.g., time frame of the provision is temporally limited) that are considered as criteria to support others. Identified activities of other individuals wherein support is provided are basic ADLs (e.g., physical support, health behaviour, or dressing) and instrumental ADLs (mental & affective support, giving pleasure, socializing support, materialistic support, household support and care support). The following figure aims at describing the relations between the different investigated facets (provision and demand of support exchange, key-persons etc.) that characterize the organization of ADLs.

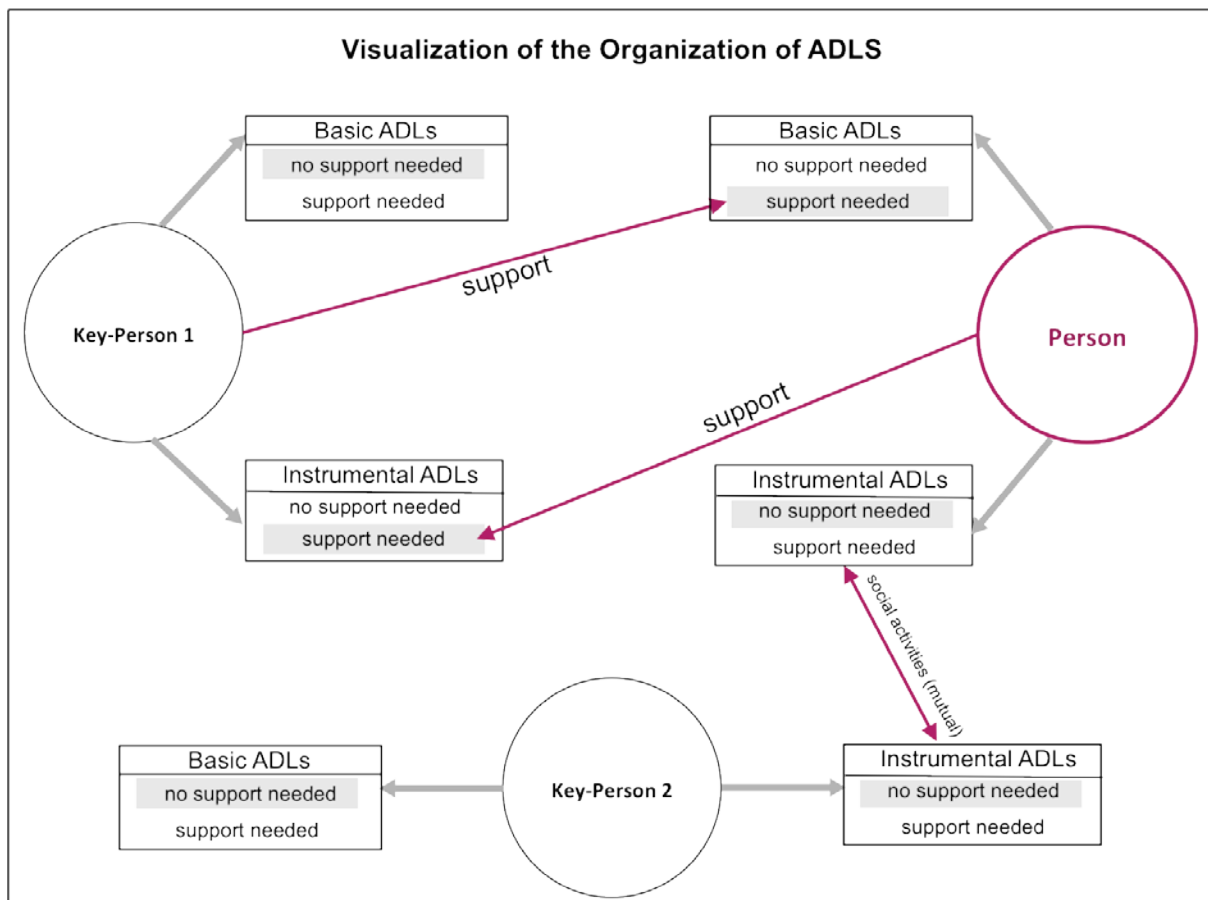


Figure 7: Visualization of the organization of ADLs and support exchange activities

2.2.4.5 RQ2 How do social roles affect the way people organize their activities of daily living?

Before going into detail regarding the gathered findings, we first want to provide some background information regarding the concept of social roles, which has a longstanding tradition within the social sciences and why social roles play a crucial role in the subjective well-being of an individual wherein social connectedness plays an integral part. Due to the importance of social roles in the subjective well-being of an individual, this research question is strongly interrelated to the next research question that deals with the participants' appropriation of social capital (operationalized in our case through social connectedness and subjective well-being).

"Who am I?" – answers to this question constitute an individual's identity, in terms of the positions or roles that one holds (e.g., "I am a mother, a grandmother, a senior..."). Each individual's role is ranked internally within a kind of 'hierarchy' of salience (i.e., the subjective importance) [Thoits, 1992]. People base their own well-being in relation to their environment and the lives of others surrounding them [Diener and Eunkook, 2002]. Having multiple roles supports individuals to relate to their society and provide the opportunity for them to contribute more as they increase in their roles [Thoits 1992]. This aspect is especially important when it comes to the demanding and provisioning of support, as both the provisioning and demanding of/for support inherently also implies implicit and explicit social roles the individuals have to enact towards their social surrounding.

In our case, we focused on key-persons and their corresponding roles for different activities of older adults. In order to gather a deeper understanding what individuals do play a crucial role in the daily lives of our target group, we categorized all individuals in terms of their roles within different activities. This means, that we matched all individuals that were named by the participants, according to their relation to the older adults organization of ADLs. By doing this, we on the one hand aimed at identifying key-persons in the organization of ADLs but on the other hand, we also wanted to investigate what kind of social roles these individuals play within this process. By means of these research interests, we mainly focused on two different topics that were in our major focus, 1) from whom does the target group acquire support (including basic and instrumental ADLs) and 2) who is involved in social activities of the target group (as part of IADLs).

Key-persons and demands of support

As outlined in Table 3 below, the overall clustering followed the distinction of basic ADLs and instrumental ADLs. In immediate relation to these basic categories, we identified major activities in which the participants have particularly outlined that they are in need of help, assistance and support. Based on this conceptualization of support demanding ADLs, we mapped the identified key-persons to these activities, i.e., we wanted to identify who plays a crucial role in organizing the support for specific ADLs. The table visualizes and provides an overview of the identified key-persons and their involvement to support the participants within certain ADLs. The y-axis represents the identified key-persons that provide support and the x-axis represents the identified ADLs wherein our participants are in need of support; the size of the crosses indicates the extent to which those key-persons support the participants. All coloured crosses are outlined and interpreted in more detail below.

In terms of activities wherein the participants are in need of care and assistance, we mainly identified the family (e.g., marriage partners, children, grand-children, or siblings) as playing a crucial role for the organization of these activities. Especially, in the area of support for basic ADLs, the participants articulated (5 naming's), that they require support from their family members when it comes to physically demanding activities (e.g., carrying heavy bags), but also activities that require a relatively high level of mobility (e.g., driving someone to do groceries) (see Table 3). Besides this facet of support, the family (4 naming's) also plays a crucial role when it comes to support activities in the household (e.g., cleaning the windows, or trimming hedges) (see Table 3). However, besides these more 'physically' driven support activities, the family members represent the only group of key-persons that provide support when it comes to issues related to organizational and administrative issues (2 naming's) (e.g., doing bureaucratic paper work or organizing care services) (see Table 3). In general, the family was identified as playing a key-role in manifold support activities for our interviewed older adults as they have been identified to be active in eight out of ten identified support activities (especially in providing help for all identified instrumental support activities). One participant for example outlines, that his/her daughter is providing him/her a lot of organizational help in terms of "*she organizes and arranges everything for me, all the paper-stuff or everything that is related to administrative and official things [...].*"

From which key-persons are the participants demanding support?	BASIC ADLs				INSTRUMENTAL ADLs					
	physical	dressing	health behavior	personal hygiene	organizational	leisure	administrative	household	healthcare of others	general supporting
Formal caregivers	✗	✗	✗	✗	/	/	/	/	/	/
Family	✗	/	✗	/	✗	✗	✗	✗	✗	✗
Friends/ Acquaintances*	✗	/	/	/	/	✗	/	✗	✗	/
Religious & Spiritual Representatives	/	/	/	/	/	/	/	/	/	/
Institutions **	/	/	/	/	/	/	/	/	/	/
Professionals/serv ice providers ***	✗	/	/	✗	✗	/	/	✗	/	✗
Doctor	/	/	✗	/	/	/	/	/	/	/
Strangers	✗	/	/	/	/	/	/	/	/	/
Other peoples children	/	/	/	/	/	/	/	/	/	/

* = Including neighbours, former work colleagues

** = Represented through information Centers, associations

*** = Represented through caretaker, hairdresser, gardener, consultants/advisors for older adults, domestic aide

Table 3: Identified key-persons for demanding support

This is especially interesting, when taking the actual care situations of the interviewed participants into account, as seven participants do live in professional care organizations and, therefore, do have access to professional caregivers. Nevertheless, even though having easy access to professionals, the most interviewed participants rely on informal care, in terms of their family members. This crucial role of the family regarding care and assistance goes in line with other research in this area. For example, a study conducted by the GIB¹⁶ (on behalf of the German Bundesministerium für Wirtschaft und Gesellschaft) has shown that the majority of support regarding basic ADLs and instrumental ADLs is provided by family members.

¹⁶ „Gesellschaft für Innovationsforschung und Beratung mbH“

Regarding support for basic ADLs, formal caregivers play an important role, as they provide help and assistance when it comes to physical demanding activities (due to restricted mobility), dressing, personal hygiene, but also health behaviour (2 naming's) (see Table 3). Therefore, the formal caregivers provide assistance in all of our identified basic ADLs. In terms of the variety of activities wherein support is provided, mostly other professionals and service providers can be seen as important actors (besides family members), as they also play an important role in the support for instrumental ADLs (in contrast to formal caregivers) such as support in organizational and household related activities (2 naming's) (see Table 3). Friends and acquaintances can be seen as rather similar to family members, not in terms of their quantity of provided support but more wherein/in which activities they provide support. Another interesting aspect could have been found for the basic activity - personal hygiene. Neither family members nor friends provide support to related issues. In general, during the interviews, the participants did not really indicate of being in need for help regarding their personal hygiene or at least did not want to talk about this aspect in more detail. Only one participant explicitly talked about restrictions regarding his/her personal hygiene due to his/her rather strong mobility impairment.

Even though physical support is majorly provided by the family, formal caregivers, friends and acquaintances also the group of strangers was reported as physically providing help to the participants. However, this provided help by strangers is temporally limited and based on providing help in immediate situations, as one participant outlines, *“what I recognized is, especially here in the institution, that people who cannot walk that good anymore, which use a walked-wheel, that they say, that they do not want to go on a bus or tram anymore. On the train from [name of point of departure] to [name of point of arrival] the first step when getting into the train is so high. Even if someone lifts my walked-wheel in, I cannot go inside. Once, I desperately had to go to a funeral and two men helped me to get into the train”*. Religious representatives, other people's children and institutions could have not been identified as being directly related to certain actors when it comes to the provision of support for older adults.

Key-persons involved in social activities

We also wanted to investigate what persons are involved within the different identified social activities of our interviewed older adults (as part of IADLs). The table below visualizes and provides an overview about the identified key-persons and their involvement within social activities with the participants. The y-axis represents the identified key-persons that are involved within the participants' social activities and the x-axis represents the identified social activities wherein the key-persons take part in; the size of the crosses indicate the extent to which those key-persons are involved within the participants' social activities and the coloured items are outlined and explained in more detail below.

In general, as can be seen from **Fehler! Ungültiger Eigenverweis auf Textmarke.**, friends and acquaintances do play a crucial role within these activities. From overall nine identified social activities, friends and acquaintances are anyhow involved within seven of those. Especially, visits in terms of visiting someone else (8 naming's) (our interviewed participants tend to mainly visit their friends and acquaintances) (see **Fehler! Ungültiger Eigenverweis auf Textmarke.**). When it comes to being visited from someone, friends/acquaintances and family members equally visit the participants (each of those has 3 naming's) (see **Fehler! Ungültiger Eigenverweis auf Textmarke.**). Interestingly, family members are not that much involved within the various social activities as, for example, the friends and acquaintances. Some of the participants said,

that their families are not having that much time due to their involvement in the work life and mostly those participants, who have moved to residential homes, report about less face-to-face contact with their family members as a result from living geographically more distant than before. Concerning hobby group activities, a rather high variety of persons are involved, such as friends/acquaintances, religious/spiritual representatives, others people children (e.g., from a kindergarten) but also professionals/service providers. Nevertheless, as can be seen from the size of the crosses, the older adults mostly do or receive visits to/from family members, friends and acquaintances. Formal caregivers, family members, friends and acquaintances mostly accompany the participants' for various outdoor activities (e.g., having a walk together).

Who are key-persons with regard to social activities?	Instrumental ADLs - Social Activities								
	Being visited by someone	Visiting someone	Coffee break	To phone with someone	Club activities	Voluntary work	Hobby group activities	Social media	Outdoor activities
Formal caregivers									✕
Family	✕	✕							✕
Friends/ Acquaintances*	✕	✕	✕		✕		✕	✕	✕
Religious & Spiritual Representatives							✕		
Institutions **									
Professionals/service providers ***	✕						✕		
Doctor			✕						
Strangers									
Other peoples children							✕		

* = Including neighbors, former work colleagues

** = Represented through information Centers, associations

*** = Represented through caretaker, hairdresser, gardener, consultants/advisors for older adults, domestic aide

Table 4: Identified key-persons and their participation in social activities

Summary

We mainly focused on key-persons and their corresponding roles for different activities of older adults. We matched all individuals that were named by the participants, according to their relation to the older adults' organization of ADLs. Thereby, we were mainly interested in two different topics that were in our major focus, 1) from whom does the target group acquire support (including basic and instrumental ADLs) and 2) who is involved in social activities of the target group (as part of IADLs).

Regarding the key-persons from which our target group mainly requires support, we identified family members as playing a crucial role for the organization of Basic ADLs (especially for physically demanding activities), but also Instrumental ADLs (especially, household activities). Family members, represent the only group that provides support when it comes to organizational and administrative issues. Overall, the family members have been identified to be an active support provider in eight out of ten identified support activities. In contrast, formal caregivers are exclusively involved in providing support for basic ADLs that are the basis for fundamental functioning, whereby the family members represent key-persons when it comes to the support of Instrumental ADLs that are essential for older adults to stay in their own home. Therefore, in our case and for our participants, family members could have been identified as those key-persons that ensure the older adults' autonomy and independency in terms of living at home. However, even though family members are considered as key-persons when it comes to support activities regarding IADLs, the participants also outline, that their families are not having that much time (due to e.g., their involvement in the work life) anymore. Mostly those participants who have moved to residential homes report about less face-to-face contact with their family members as a result from living geographically more distant than before.

Concerning the involved key-persons when it comes to social activities (IADLs), we identified mainly friends and acquaintances as key-actors. From overall nine identified social activities, friends and acquaintances do play an active role within seven of those. In contrast to the provision of support, family members do not play such an important role within those activities as friends and acquaintances do. Especially, the participants have outlined, that they visit their friends and acquaintances frequently whereby they themselves are mostly visited by family members. An explanation for this phenomenon might lie in the differing health situation of those groups of persons, as on the one hand, family members are mostly younger and more physically fit to visit them, and on the other hand, one's own friends and acquaintances are in the same age cohort and might be in a worse health condition, which implies that they have to be visited by the participants. Furthermore, as outlined before, family members do play an important role in the organization of support for the older adults; maybe the provision of support goes hand in hand with social activities as the family members are already on-site (e.g., the son brings mineral water to his mother and goes for a walk with her afterwards).

Summing up, not every identified key-person is involved in every activity. Each group of key-persons (mainly distinct for family and friends/acquaintances) has its inherent role within certain activities in the daily lives of our participants. For support activities mainly formal caregivers (basic ADLs) and family members (IADLs) are involved whereby in contrast, friends and acquaintances are much more involved in social activities than family member or other identified groups of persons.

2.2.4.6 RQ3 How does the target group “use” their social capital to organize activities of daily living? & RQ4 What does the target group need to feel part of a community?

This research question focuses on the investigation of how the participants use their “social capital” to organize their ADLs and in particular what makes them feel part of a community, with whom they feel connected, but also what constitutes a feeling of being connected to others. Furthermore, this section also deals with constituting and restricting factors on the older adults’ subjective well-being, wherein our findings suggest that social connectedness plays an integral part. This importance of social connectedness in the subjective well-being of older adults can be also supported through further research in this area. In general, subjective well-being is mostly “based on the idea that how each person thinks and feels about his or her life is important” [Diener and Eunkook 2002, p.4]. In particular this means that people base their own well-being in relation to their environment and the lives of others surrounding them. Furthermore, an individuals’ well-being is also subjective to pleasure and whether or not basic human needs are fulfilled, even though one’s needs and wants are never fully satisfied [Diener and Eunkook 2002]. Based on these basic principles and perspectives, the following section outlines the results of our empirical investigations.

Constituting factors for subjective well being

In terms of the target groups needs concerning their subjective well-being, we have identified the following aspects to be considered for a positive well-being:

- Relaxing, vacation in terms of escaping from everyday life
- Balancing social contacts and privacy (relational aspect)
- Self-motivated activities, being proactive in life
- Being alone (private) vs. being desolate
- Having time together (relational aspect)
- Practical help (relational aspect)
- “To give and receive” joy, thankfulness (relational aspect)
- The feeling of being needed contributes to physical/mental “fitness” (relational aspect)
- Cross-generational contacts (e.g., with kids) (relational aspect)
- Group activities, being connected to others (relational aspect)

The participants have outlined, that it is important for their subjective well-being to have individual time to relax and to have the possibility to “escape from everyday life” whenever they want to. This goes in line, with the statements, that social contacts are definitely considered as crucial for subjective well-being, but that these contacts need to be balanced with time for one’s own (private time). In this manner, the participants also point out that there is a difference between being alone (in terms of being private) and being desolate as for example TP 12 outlines in more detail “my sister always says to me ‘you are alone’ and then I always reply ‘you are right, I am alone but I am not desolate’. My sister again says ‘that’s the same’ and I again reply ‘no, that’s a big, big difference. I can be desolate in a huge crowd of people” (original German statement). Even though, social contacts and shared time together with others (e.g., family, friends, or neighbours) is decisive for our target group, time for being alone and private at home is equally considered as an important aspect. In terms

of being connected to others, the participants consider the “giving and receiving of joy” from others and the fact of being needed by others, as contributing factors to their physical and mental fitness as for example TP 6 outlines “*maybe, this is what keeps me fit, being needed by others*” (original German statement). Also cross-generational contacts (specifically kids) are seen as decisive for the target groups’ subjective well-being.

Hindering factors for subjective well being

Besides the above outlined needs, we also identified the following factors have been identified as negatively affecting the subjective well-being of our interviewed older adults:

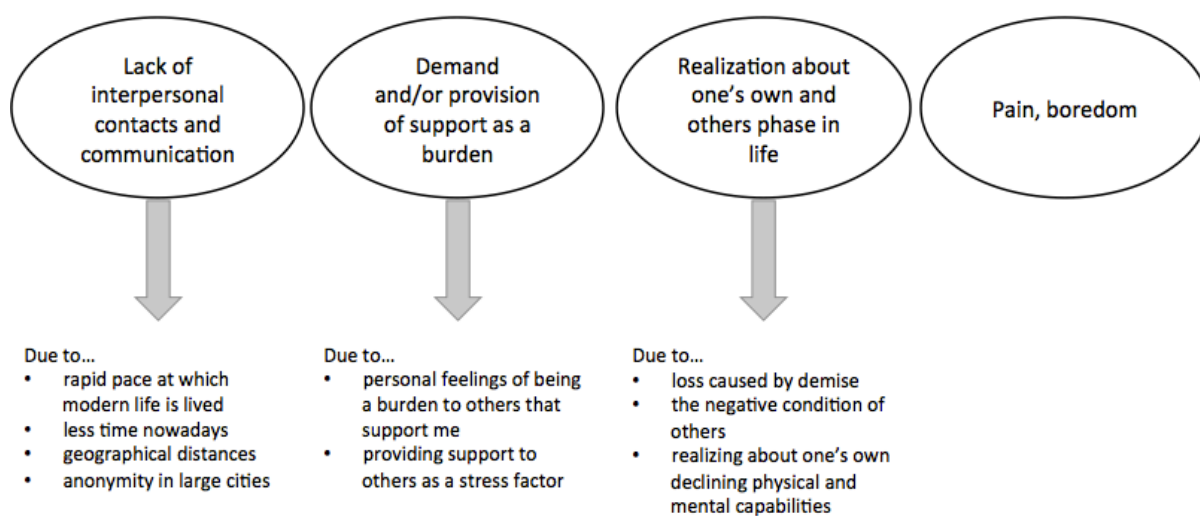


Figure 8: Identified barriers that affect the participant's well-being

Especially, the participants living in residential homes have outlined that living in an institution with other older adults leads to a frequent loss caused by demise of other residents. This loss negatively affects the participants’ well-being, even if the departed individuals do not have a close relation to themselves, as the feeling of being frequently confronted with the end of life leads to a personal reflection about one’s own late phase in life. This impression can be also supported through statements that relate to negative impacts on the subjective well-being caused by the negative condition of fellows (e.g., friends or other inhabitants). Furthermore, some see the rapid pace at which modern life is lived as a stress factor that negatively impacts their well-being as for example TP 9 says “*in Germany the only thing that is left is being quick, quick, quick, yes. Eating quick, working quick, [...] and possibly even dying quick [...]*” (original German statement). In relation to this aspect, they also outline that nowadays people do have less time for interpersonal communication as, for example, own children have to work a lot. This lack of interpersonal communication might not only be due to a lack of time, but also due to higher geographical distances when changing to residential home care concepts. They also outline, that having the feeling of being “forgotten” by others, (especially, when living in residential homes and, therefore, living possibly more distant from family and friends), negatively affects their well-being. When it comes to the provision and demands of support, the participants on the one hand outline, that demanding support

sometimes leads to a feeling of being a burden to others and on the other hand, the ones that provide and actively care about others (e.g., marriage partners), consider these activities sometimes as rather stressful. The participants also report about negative impacts on their well-being when realizing that one's own physical and mental capabilities are declining. Furthermore, also boredom and physical pain are considered as negative, but also financial impacts on their quality of life are considered as negatively influencing their well-being. In general, they sometimes see themselves in life situations where they have the feeling of being helplessness to change negative circumstances of life.

Social Connectedness

We consider social connectedness as a *sense of belongingness*, which is based on the experience of *having sufficient close contacts*, depending on the satisfaction with the size and quality of one's social network [Van Bel et al. 2008, Visser et al. 2010]. Thus, social connectedness is constituted by the quantity and quality of ones' social network.

Accordingly to this definition, we will outline if/to what extent the participants of our study experience that they have sufficient close contacts, and what makes them feeling part of a social network. All participants indicated that they have regular contact to other people, e.g., neighbours/other inhabitants from a residential home (7), their family (8) or people they know from interest groups (e.g., sport group, computer course) (8) and all of them consider having contact to other people as being important. Some statements should illustrate this: *"The family is the most important thing."* *"Everybody needs somebody and if it is just that you say 'hello' when standing with another person in the elevator."* (original German statements) Some of our participants indicated that they are also in contact with their friends via social networks like Facebook or via Mail. Some of these persons pointed out that they consider the *personal* contact as being most important, indicating, for example: *"The personal contact is important. You can write an email but if you sit in front of somebody else it is much easier to express yourself. A gaze sometimes says much more than in one line in an email."* (original German statement) Although all of them consider contact to other people as being important, it was also explicitly mentioned that they also enjoy moments of being alone and that it is important to have times to be for oneself.

Within the interviews and observations we also identified some reasons why they considered the contact to other people as being important. Participants mentioned that on the one hand they need the feeling that somebody is there for them (e.g., that others do not forget about them), but that they also want to have a feeling of being needed (e.g., that it is a pleasure to help others). In this context some participants mentioned the importance of reciprocity, meaning that they experience and expect mutual assistance and support, especially, when living in a residential home. The following issues were mentioned:

- To have the feeling that other people do not forget about oneself – to feel needed
- It is a pleasure if you meet other people or to support other people
- Just to have a feeling that somebody is there
- To have a network of other people who support each other
- It provides a feeling of security, if you know that somebody is there
- To feel connected - To have somebody to whom you can talk about your problems
- It is good to feel that you can be there for somebody else

Besides we identified a variety of different issues that are important for the participants to feel part of a group of people, e.g., to *do things together* (taking part in a course together with others or meeting other people in a sports club). Moreover, within the residential homes, the aspect of supporting each other, contributed to their feeling of being part of a group. Some of them mentioned that they felt like being part of a big family. In this context the aspect of supporting each other and knowing that there was somebody there when they needed help contributed to this feeling. In the following a full list of all issues that were mentioned is given:

- Supporting each other
- To be there for somebody else
- To know that somebody is there when you need support
- Friends provide a feeling of connectedness
- Common interests
- The chemistry must be right to feel part of a group of people

Summary

We consider our findings concerned with the subjective well-being of our participants and their connectedness to other individuals (i.e., the social environment) as strongly interrelated concepts that we subsume within the tradition of the epistemologist-constructivist perspective of the life world which was defined by Björn Kraus [2006]. According to Kraus, the concept of the life world is on the one hand an uncircumventable subjective category, which is indeed due to the linkage with structural life circumstances restricted. Aspects that belong to life circumstances are not just of tangible nature (e.g., housing space or financial capital), but especially intangible values such as available social networks. Additionally, the physical health of an individual belongs to the subjective valuation of one's personal life circumstance. The perception of these conditions (tangible, intangible and personal health) is what constitutes to an individual's life world [Kraus 2006].

Based on Diener and Einkook [2002] conceptualization of well-being (i.e., well-being is *"based on the idea that how each person thinks and feels about his or her life is important"*), we first want to summarize the findings regarding the participants subjective well-being. The identified constituting factors for a positive well-being of our participants, mainly relate to aspects that concern the involvement of other individuals (i.e., the older adults social environment). This indicates that certain activities are considered as valuable in terms of well-being, if they are done together. In particular, the participants consider the balancing of social contacts and privacy, shared time with others, cross-generational contacts, and the feeling of being needed by others as contributing to a positive subjective well-being. However, the participants highlight that time for one's own (private time) is important, but they also highly articulate the need to establish and foster social relations to other individuals. In this manner, the participants specifically mentioned friends and acquaintances above family members and formal caregivers, to be the group of people with which they feel socially connected. One participant explicitly outlines, *"friendships are the most important things in life"*. This goes in line with the findings gathered throughout the analysis of hindering factors for subjective well-being, as the participants consider a lack of interpersonal contacts and communication (due to e.g., the rapid pace at which modern life is lived) as restricting for their subjective well-being. Demanding support is seen as burden for most of the participants; this might explain the fact that the participants feel more socially connected to their friends and acquaintances than to their family members, which are the ones that mostly provide this support. The loss of

social relations (e.g., due to death) is also negatively contributing to their subjective well-being. These findings indicate and can be supported through the previously outlined statement of Diener and Einkook [2002], people base their own well-being in relation to their environment and the lives of others surrounding them, and are, therefore, strongly related concepts. Nevertheless, the interrelations between social connectedness, criteria to feel part of a community, social roles and the individuals' subjective well-being will be investigated on a broader basis within the survey in order to strive for more generalizable results.

2.2.4.7 MISC

In the following we present additional outcomes that focus on potential hurdles and barriers regarding more system specific aspects, but also for the GetVivid project in general.

Networking with strangers

The most interesting finding from the group discussions deals with the topic "strangers". When strangers offer support to the participants (e.g., helping to get something out of an upper shelf during the shopping, helping to get inside/outside a bus/train) most of the participants feel very glad about that but when it comes to the opposite situation and they think about asking strangers for support they start feeling uncomfortable. Nevertheless, there exists an exception when getting in touch with strangers: It is not uncomfortable when children or teenagers are involved. The participants enjoy getting in touch with the young generation and they would appreciate more contact, also in terms of supporting each other. For example, one participant heard a woman talking to another woman in the bus about having problems to find a babysitter. Later, at home, she looked up the telephone number of the woman, which she had never met personally in her life, called her and offered her to babysit her children. This phone call was the start of a friendship that lasts for more than 20 years now. As it is a crucial point for most of the participants to get in touch with strangers through the platform the possibility that this strangers might be children or teenagers could help the participants to overcome this barrier. Altogether it can be said that the participants are concerned about getting involved too much in someone else's life through offering support for old people, for example, when talking about having more contact to people being in need of care. The participants think about responsibilities that might result out of contacts to strangers. Therefore, it should be highlighted that the platform is solely for neighbourly help in terms of supporting each other. Getting to know new people seems to be alright for the participants, but nearly no one could imagine to invite a stranger into their home (not even for the drop-off of shopping bags). This attitude towards strangers implies restricted possibilities for face-to-face interaction and communication.

Fears and worries with regard to the provision of support

When talking about giving and receiving support the participants are concerned about the dimension of support that is anticipated from the users of the platform. Although all of the participants would like to support others the "how" of this support has to be defined clearly upfront. It is of great importance that support is not expected on a regular basis; instead the participants require flexibility in all their actions on the platform. According to the statements of the participants it can be assumed that there is a barrier in the use of the system for older people because when getting in touch with other older people one might get the feeling that a

one-time-support might lead to a long-time-duty. Therefore, it is very important to highlight that the system stands solely for neighbourly help. Of course, the emotional duty one might feel when knowing that a person in the neighbourhood is alone and in need of support cannot be avoided. In terms of support it was also very important to the participants that there is a give and take without any hidden agenda. Therefore, it might be necessary to define upfront that the help that is offered on the platform is without any request in return. Every user is free to give and take support; it can be assumed that there will be an overall balance. A person that is not able to do his/her own shopping might not be able to return the support in an equal manner, but another person might not want something in return for a little support.

Relevant features on the platform

- When thinking about the involvement of children and teenagers within the platform the participants mentioned that it would be a nice feature, if the platform could send SMS to smartphones, as they are most likely to be used by this age cohort.
- Further there should be a possibility to add special information to the platform, like e.g., the weekly menu from the institution or relevant (organizational) information for seniors (such as e.g., information from where to acquire professional support).
- Besides those features, the participants would also like to have a feature on the platform wherein they can promote certain group activities (e.g., association or institutional related activities such as movie nights, cooking courses, choir practice, or computer courses) and send reminders to all involved group members.
- Furthermore, the participants would like to organize their daily time schedule regarding certain appointments (e.g., hairdresser or physiotherapist) on the platform. Also for this feature they would like to have immediate reminders before certain appointments. They are also interested to organize their appointments there, in terms of postponing appointments with e.g., the hairdresser whereby automatic messages are sent to the service providers.
- Another interesting feature mentioned, deals with sustaining mental health, in terms of “brain jogging” features, such as e.g., SUDOKU or a feature that is inspired by a diary wherein the participants have to shortly reflect upon and summarize the day.
- The participants would also like to see pictures of their interaction patterns on the platform but would also like to send and receive pictures of, e.g., family members from/to others.
- Other participants also refer to more organizational related aspects that might simplify their daily lives such as a list of relevant phone numbers on the platform (from the caretaker, hairdresser, family members, or friends).

Potential system and project related barriers

- **Design (visualization of pictures, handling, fine motor skills or dexterity)**

In terms of design it was especially mentioned that all the icons used on the platform have to be bigger than like they are usually to address the target groups' needs (e.g., some of the participants have already problems with their fine motor skills). Furthermore, the participants would appreciate to see pictures of their interaction partners or just pictures of family members that were sent to them on the platform, but they are not sure about how to actually visualize those pictures as one participant for example outlines *"but how should that work out? I'm watching TV and suddenly a picture of my grandchild pops up?"*.

- **Time needed for feedback**

The participants were unsure how long it takes to get feedback from other users (e.g., When another user uses the platform rarely wouldn't it be better to simply call instead of waiting in front of the TV until the other user starts the platform again?).

- **Coverage of users**

When talking about the platform itself the participants were concerned about its impact, because it will only start making sense, if there is a high amount of users in one's own surrounding. Although some of the participants doubt that the platform could help them in their everyday life, they can imagine it to be helpful for people being integrated in a community (e.g., like a certain club). One participant even mentioned that it would be good to install the platform area-wide and giving an introductory training to everyone on the day of retirement.

- **Costs**

The costs of the platform are an important issue (e.g., Will there be financial support by the health insurance fund or not?) as one participant explicitly outlines *"but who is paying for that? Do the older adults have to pay that on their own? Or might health insurance funds pay for it? [...]"*.

- **Technological affinity**

Some of the participants explicitly outline, that they do not have the feeling that they can actually learn how to use such a platform as our proposed one. They report about previous experienced hurdles they had for example with their TVs (e.g., issues when configuring the TV channels) or computers. When talking about the GetTVivid platform, some of them seemed to be deterred as they imagine that the usage of the platform will be very complex and due to that they do not feel comfortable enough to use or learn how to use it. One participants underpins this impression through the following statement *"one says 'I don't want to', the other one says 'I cannot do this anymore, that is all too much for me, you have to remember so many things when using it' [...] for me it is already enough, if I remember that I have to go to the doctors tomorrow [...] and now, I should have to learn everything, how to press all the buttons."* (original German statement)

- **Disinterest in technology**

Furthermore, some participants explicitly outline that they are in general not interested in technologies and especially not in emerging ones. Some of them refuse to use the Internet, computers in general but also smartphones. One participant for example says *"Principal disinterest. I do not need technologies, I do not need them. I would say, that I am purposely disinterested in technology."* (original German statement)

- **Range of interconnectedness and interconnectedness via smartphone across the generations**

In terms of interconnectedness the participants were unsure if the range of the platform would be expanded enough (e.g., What if my family members do not want to buy this platform for themselves?) to connect them better to their families than the smartphone already does.

- **Willingness to participate is dependent on adequate introductory trainings**

For the willingness of participation it seemed to be of importance that the participants are getting a solid introductory training, which highlights the additional benefits of the platform for their everyday life and explains all its areas of application. Through solid introductory trainings the general detachment of older adults regarding emerging technologies would be lowered. Especially, two participants explicitly emphasize the need to generally sensitize older adults more for (emerging) technologies and highlight that it might be a good idea to already start with sensitizing activities earlier, in terms of younger generations. One participant says *"I think the most important thing is that seniors get sensitized towards technical issues so that they can better react towards them. This is the most important thing [...]"* and another participant says *"if you are younger it is easier to adjust oneself (remark of interviewer: meant is the adjustment to emerging technologies) to changes, now I know, at my age, that it is important to have this emergency bell around my neck while I am showering. But what if I would already be 80 years old and I would have never known before that this is important, than I would not accept it at this age. This means, that someone has to inform you about the importance of such devices [...]"*(original German statements)

Some participants also outline, that a fundamental condition towards a successful usage of new technologies lies therein that the language that is spoken in introductory trainings, but also instruction booklets is in our target groups` language (speak the users language).

- **Ambiguous additional benefit/cost-benefit calculation**

Some participants are unsure about the platforms additional benefit. They especially consider other technologies (e.g., phones) to be more usable for our proposed purpose. For example, they outline that it would cost them much more effort to learn how to use the platform than doing it the ordinary way of just calling someone as this is considered as the easy and more practical way (they consider it as a cost-benefit calculation). It has to be added, that only people who know whom to call can benefit from using the phone while the platform may be able to provide contact details from contact persons for several situations for people who are (temporarily) alone.

Nevertheless, the participants definitely appreciate that the platform runs on a TV as the usage and interaction is familiar to the participants. However, participants that do have computers at home do not see the need (or additional benefit) of using another "computer"-like device (in terms of a tablet) as their computer at home already fulfils all their needs. Whereas those participants that are not familiar with the usage of computers and do not have computers, also are less willing to buy a tablet and learn how to use it (the participants report about fears in making mistakes that might result in financial consequences). On a more general level, one participant also outlines, that it is not clear for him/her why individuals with mild impairments are our selected target group as he/she does not see any added value for this group of people as nowadays people with mild impairments (e.g., visual impaired) have so many other possibilities to organize their daily lives (e.g., phone, E-Mail, Skype, Facebook) that he/she *"does not need a TV where I have to press buttons"*.

- **Privacy and safety**

Concerning the privacy and security of the platform, and in particular networking activities on the platform, a minority of the participants have clearly outlined concerns, in terms of revealing one's own personality there (especially with regard to strangers), but also potential strangers that hack into the network in order to get information about older adults daily routines such as when they are usually going grocery shopping and are, therefore, not at home.

2.2.5 Overall Summary

In the following, we provide a short summary of the major findings regarding each research question.

RQ1 How does the target group organize their activities of daily living?

- Daily routines of the participants highly differ; either temporally structured or taking "every day as it comes". However, in most cases certain actions during the day were oriented towards other persons, health aspects and activities outdoor.
- Regarding the ADLs, we mainly identified two different kinds of activities: basic ADLs (e.g., sleeping, eating, health behaviour, dressing, or personal hygiene) and IADLs (e.g., leisure activities, social activities, household activities, or supporting care activities).
- Key-persons in the organization of ADLs are: family, friends & acquaintances, professionals & service providers, institutional representatives, other people's children, formal caregivers, religious & spiritual representatives and strangers.
- In order to organize their activities of daily living together with the key-persons, the participants use six different means of communication: telephone, personal conversion, post office, emergency button, computer and social media.
- We also identified barriers that interfere the participants' organization of ADLs. Those barriers, lead to being in the need of demanding for support for certain basic (e.g., personal hygiene, physical support, health behaviour, or eating), but also instrumental ADLs (e.g., support in household, health care of others, in authority visits, in leisure activities, or organizational issues).
- Even though being in need of support within different life situations, the participants express their willingness to also provide support to others that are themselves in the need for support.

RQ2 How do social roles affect the way people organize their activities of daily living?

- Regarding the key-persons from which our target group mainly requires support, we identified formal caregivers as playing a crucial role for the organization of basic ADLs whereby in contrast family members do play a fundamental role in the organization of support regarding IADLs. Therefore, in our case and for our participants, family members are those key-persons that ensure the older adults' autonomy and independency in terms of living at home.
- However, today family members are not having that much time (due to e.g., their involvement in the work life) anymore. Mostly those participants who have moved to residential homes report about less face-to-face contact with their family as a result from living geographically more distant than before.
- Concerning the involved key-persons when it comes to social activities (IADLs), we identified mainly friends and acquaintances as key-actors. Not every identified key-person is involved in every activity.

RQ3 How does the target group “use” their social capital to organize their activities of daily living?

- The identified constituting factors for a positive well-being of our participants, mainly relate to aspects that concern the involvement of other individuals.
- The participants specifically mentioned friends and acquaintances above family members and formal caregivers, to be the group of people with which they feel socially connected as one participant explicitly outlines, *“friendships are the most important things in life”*.
- The participants consider a lack of interpersonal contacts and communication as restricting for their subjective well-being.

2.3 Survey

After having collected all these qualitative insights with observations, interviews, and workshops, we conducted a survey to get more representative data from our end users.

2.3.1 Research Goals

The goal of the survey is to deepen the understanding of how older adults organize their activities of daily living (e.g., how the communication looks like, who are key persons to organize activities of daily living), how they use their social capital to organize these activities and how inherent/ascribed social roles interplay in these communicative and collaborative processes.

2.3.2 Research Questions

Accordingly to the definitions mentioned above, the following three research questions were defined:

RQ1 How does the target group organize their activities of daily living?

RQ3 How does the target group “use” their social capital to organize their activities of daily living?

RQ5 What information (content) needs to be provided to support ADLs and active participation?

2.3.3 Approach

The survey was distributed both offline and online in Austria, Germany, and in Switzerland. It was structured into five thematic areas: Personal Data, Technology usage, Social Environment, Everyday Activities and Health & Well-being.

Target group for our survey were older adults with mild impairments, who do not regularly receive professional care. The questionnaire was distributed offline and online via the three End User Organizations in our project in Austria, Germany and Switzerland. Overall 232 questionnaires were completed (102 offline, 130 online) and could be evaluated.

2.3.4 Results

In the following, the participants and the summarized results for the research questions will be presented. The analysis was performed in SPSS 21, a statistical analysis tool¹⁷.

2.3.4.1 Participants

The participants of the study were between 55 and 98 years old ($M=74,64$, $SD=8,23$), 44,2 % were female, 55,8 % male. The majority (71,4 %) were living at their own home, 21,2 % in an assisted living facility and 7,4 % indicated that they were living in a retirement home. More than one third (38,1 %) were living alone, almost two third (61,9 %) indicated that they were living with somebody else (family, partner). The majority (90,5 %) still had family and only 9,5 % indicated that they did not have any family. Among those participants, who indicated that they had family they had on average 4 children and grandchildren and 2 siblings.

Technology usage

With respect to the target groups' usage of technologies we were interested in their general attitude towards technologies, what kind of technologies they possess and how they appraise their skills with respect to certain technologies. As the central goal is to offer the service via the TV we especially investigated participants' TV watching behaviour. The major results are described in the following.

Most of the respondents (71,8 %) indicated that new technologies enrich their everyday life, 16 % disagreed to the statement and 12,1 % neither thought that new technologies enrich nor do not enrich their everyday life. Although these results indicate that a great amount of participants were technology affine one fourth (26,8 %) was critical in matters of new technologies (54,5 % disagreed to the statement, 18,6 % indicated neither/nor).

Almost half of them (40,7 %) had bought a new technology during the last six months, 59,3 % did not. Most of them (53,8 %) bought a mobile phone, almost one third (28 %) a tablet. Only 8,6 % bought a new computer, 7,5 % other technologies like an E-book Reader and only 2,2 % bought a new TV. More than three quarters (83,5 %) had got a mobile phone, 16,5 % did not have any mobile phone. More than half of the participants (59,1 %) appraised their mobile phone skills as very good or rather good. One third (33,7 %) thought that they have medium skills and a minority of participants (7,3 %) appraised their mobile phone skills as rather or very low.

Almost all participants (98,2 %) indicated that they have Internet access at home, only 1,8 % did not have any access. More than two thirds (70,6 %) had a computer at home, less than one third (29,4 %) did not have any computer. Out of those participants, who had a computer, 62,6 % appraised their computer skills as very or rather good, 32,5 % as medium and only a minority 4,9 % indicated that they judge their skills as rather or very low.

Almost all participants had a TV at home (98,3 %), only a minority did not have a TV (1,7 %). Most of them (69,7 %) watched between 1 and 3 hours per day, 20,8 % 4-6 hours, a minority (4,8 %) watched more than 7 hours per day and also only 4,8 % did not watch TV although they had a TV at home. Most of the participants,

¹⁷ <http://www-01.ibm.com/software/analytics/spss/>

who had a TV (78 %) thought that they can operate their TV very good or rather good. 18,2 % appraised their skills as medium and 3,9 % indicated that their TV skills are rather or very low. Half of the respondents of the survey used additional TV services (50,2 %) half of them did not (49,8 %). Out of those participants, who used additional services, 78,4 % indicated that they use Teletext, 62,9 % Electronic Program Guide, 35,3 % media libraries, 19 % Sky or AON-TV, and 9,5 % Smart TV. Thus, in general, the majority of our respondents was quite technology affine and had at least a mobile phone, a computer and a TV at home. Regarding their skills with respect to the usage of the different technologies at least half of our respondents had very or rather good skills.

Business aspects

Almost half of the participants (45,9 %) would appreciate it if there would be financial support for the purchase of new technologies, which support independent living, 54,1 % would not. Among those participants, who agreed to the given statement, the majority (48,1 %) indicated that it should be supported up to 50 % and 18,9 % indicated that it should be supported to more than 50 % (see Table 5). 67 % indicated that the possibility of financial support for the purchase of new technologies that support independent living would influence their decision to buy those technologies, 33% disagreed to the statement.

To what extent should the purchase of new technologies be financially supported?	Percentage
to 10%	1,9 %
to 20%	22,6 %
to 50%	48,1 %
more than 50%	18,9 %
to 100%	8,5 %

Table 5: Financial support for the purchase of new technologies

2.3.4.2 RQ1 How does the target group organize their activities of daily living?

We were interested to what extent the target group can carry out certain activities of daily living (instrumental activities of daily living) autonomously, for what kind of activities they need help and who supports them to organize support if required. Moreover, we investigated what kind of communication modes the target group uses to organize support (e.g., what kind of technologies) and if they were willing to support other people (e.g., doing grocery shopping for neighbours).

Required support to complete activities of daily living

The majority of the participants (78,4 %) did not need any help with respect to the basic activities of daily living (e.g., dressing, bathing, or eating). Only 12,1 % indicated that they occasionally need help with personal care tasks, 3,9 % indicated that they need help for care tasks they experience as being difficult and only 5,6 % indicated that they need help with most or all personal care tasks. Half of the participants (51,7 %) indicated

that they receive help to complete household tasks (e.g., cooking, cleaning the house or washing), 48,3 % did not receive any help.

In order to find out more about participants autonomy they were asked to indicate to what extent they can complete certain (household) activities such as dusting or cooking autonomously, and to what extent they can complete other activities, like doing administrative paper work or going to the post office (see Figure 9). Regarding more “complex” activities such as cleaning the windows (46,8 %) or ironing (51,9 %) only half of the participants indicated that they can carry out those activities completely autonomous, when talking about other activities such as going to the post office (76,6 %), or doing grocery shopping (73,6 %) three quarters stated that they can complete those activities autonomously.

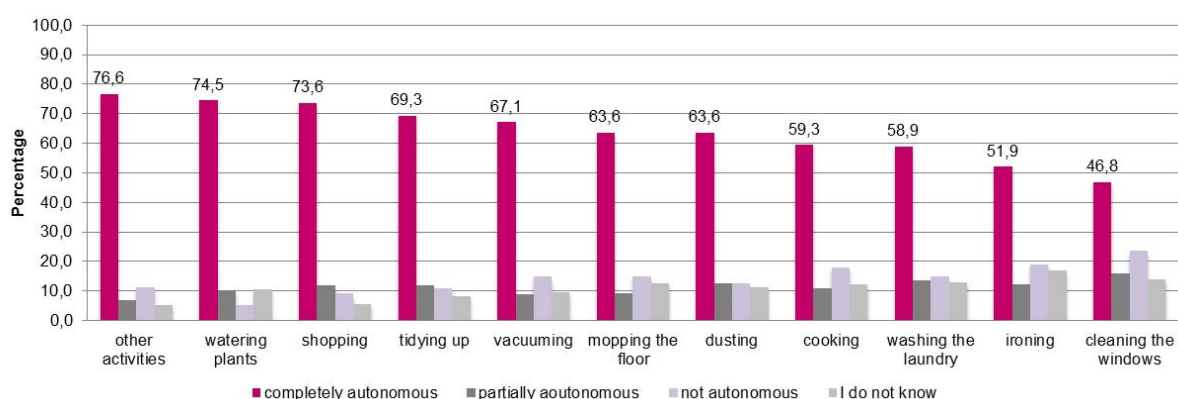


Figure 9: Autonomy with respect to certain household activities

Support provided by to complete activities of daily living

There are a variety of different household activities for which the target group requires help. In general, the majority of participants received help from their family members (informal care givers) (between 13 % and 24,2 %) or a household help (professional). Only a minority (between 0,4 % and 2,2 %) received help from friends or acquaintances. With respect to a variety of different activities we see, that most of the respondents either received help from their family (informal care) or a household help (formal care). Moreover, between 8 % and 17% indicated that other people support them with respect to certain activities of daily living. Only a minority indicated that they receive help from friends with respect to different household activities, but more than three quarters (80,85 %) received help from friends or from acquaintances (more than 50 %) when they go shopping. The majority (95,7 %) also indicated that the family supports them with respect to other activities, e.g., when going to the post office (see Figure 6).

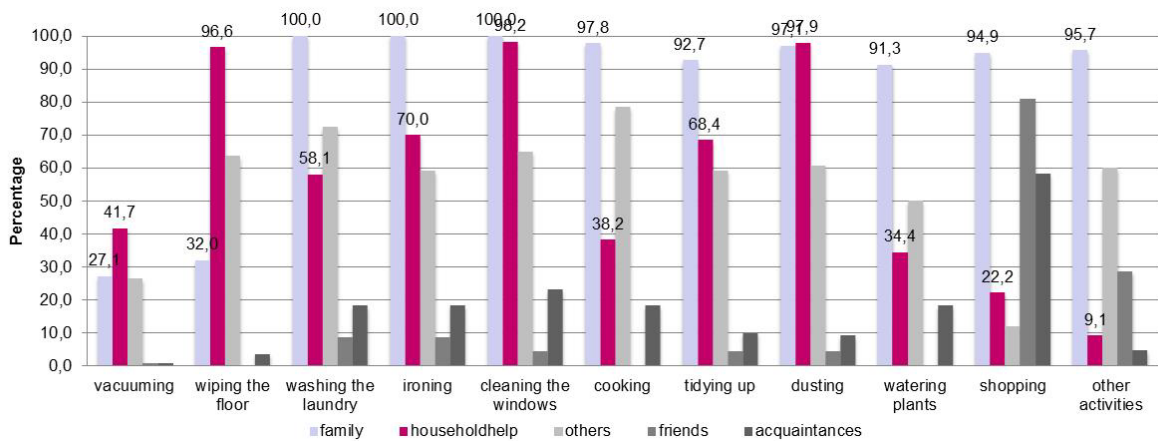


Figure 10: Who supports you?

Accepting support provided by to complete activities of daily living

Besides the support the target group actually receives we were also interested whom they could imagine to receive support regarding different activities of daily living. The results indicate that especially with respect to household activities, such as dusting, vacuuming or watering the floor they could imagine accepting support from a household help. For other activities, e.g., cooking, watering the plants or going shopping the majority indicated that they could imagine receiving help from their family. Only a minority indicated that they could imagine receiving support with respect to household activities from their friends or acquaintances (see Figure 7).

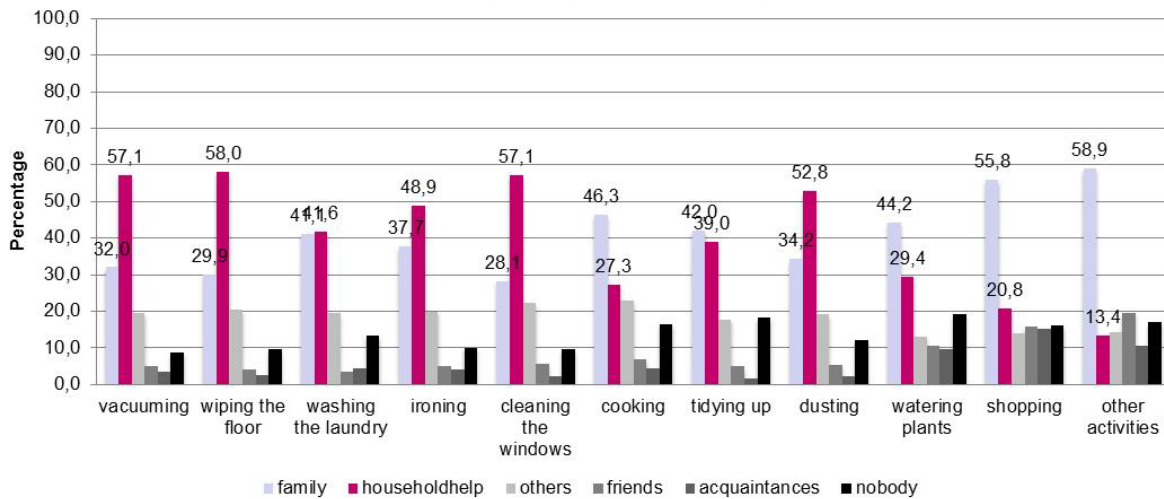


Figure 11: Whom could you imagine to receive support?

Means of communication

To organize support for activities of daily living, the majority of the participants (90,9 %) indicated that they use the telephone/mobile phone, 80,5 % organized support by personally talking with people, 51,9 % used Email, only 11,7 % Video Telephony and 4,3 % used Social Media to organize support regarding activities of daily living (see Figure 12). The usage of “new technologies” (E-Mail, Video Telephony, Social Media) as means of communication to organize support are positive correlated with the age. The younger the participants the more they used E-Mail (moderate correlation) (-0.500, sig. 0.000), Video Telephony (very weak correlation) (-0.213, sig. 0.000) or Social Media (very weak correlation) (-0.196, sig. 0.003) to organize support.

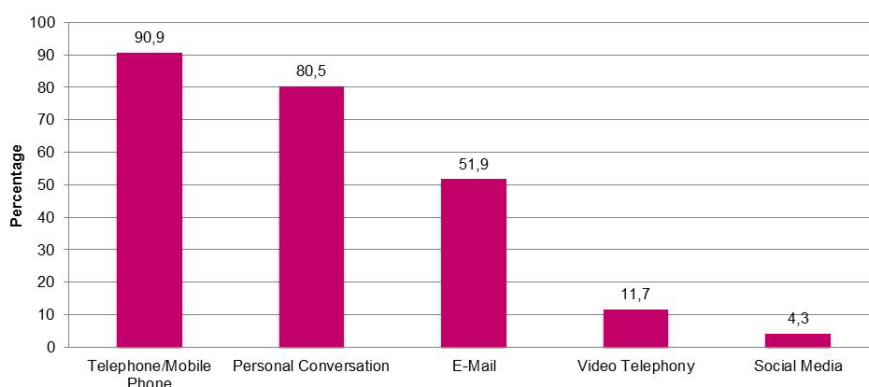


Figure 12: Means of communication

Summary

Although between 46,8 % and 76,6 % of the respondents indicated that they can complete a variety of household tasks (instrumental activities of daily living) autonomously half of them indicated that they receive help. To organize support, the telephone and the mobile phone are those communication tools that are used by most of the respondents (more than 90%). But also personal conversation seems to be important as more as 80% indicated that they would personally talk to people to organize support. The usage of “new technologies” as means of communication to organize support is related to the age of the participants, whereby our results indicate that the younger the participants the more likely they use the aforementioned means of communication.

2.3.4.3 RQ3 How does the target group “use” their social capital to organize their activities of daily living?

According to the theoretical concepts (see [Putnam, 2000], [Coleman, 1990], [Bourdieu, 1986]) we consider social capital as resources that are embedded in social structures. With respect to the GetVivid platform we were interested in what way they make use of their social capital or in other words from whom they acquire/receive support regarding activities of daily living. Additionally, we assessed participants’ attitude towards the importance of being connected to others, investigated if it is important at all to be in regular contact with family, friends or acquaintances, and examined *what* the target group actually needs to feel

connected to others. Additionally, we assessed if the target group is satisfied with the amount of support they receive.

The results indicate that it is important for the target group to be in regular contact with their family (81% indicated “important”, 12,1 % indicated “rather important”). Only 1,3 % indicated that it is rather unimportant for them to be in contact with their family and 5,2 % said “I don’t know”. Also friends were rated as being important. More than half of the participants (56,3 %) said that it is important for them to have regular contact, 34,6 % said that it is rather important. Only 6,2 % indicated either “rather unimportant” or “unimportant” and 2,6 % “I do not know”. Besides, acquaintances are rated as important persons (28,6 % indicated “important”, 46,8 % indicated “rather important”). For 17,7 % of the respondents it was rather unimportant to be in regular contact with their acquaintances and 3,5 % said that it was unimportant. A minority (3,5 %) indicated “I do not know” (see Figure 13).

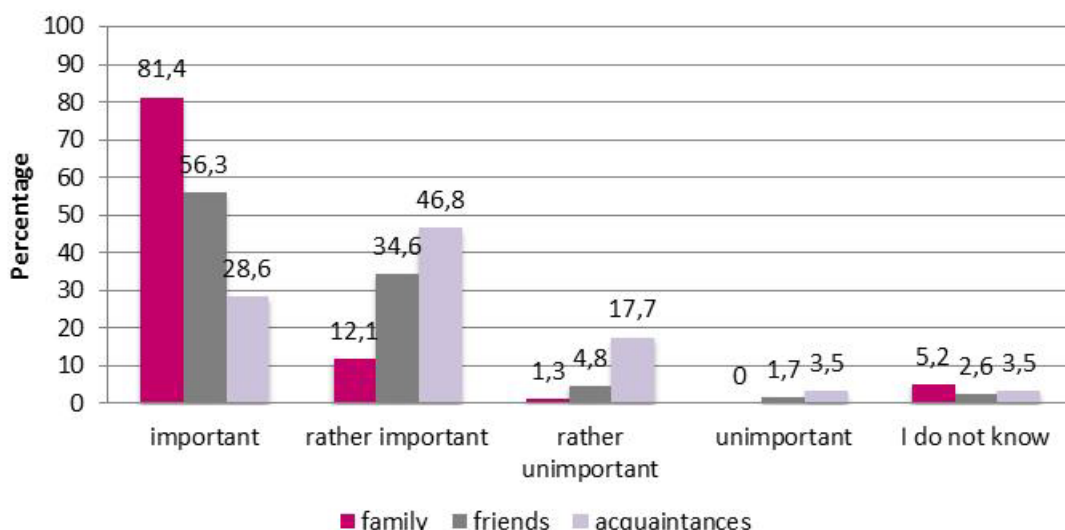


Figure 13: Importance to be in contact with others

Thus, we conclude that for almost all of the respondents it is important to be in contact with family and friends. In contrast, regular contact with acquaintances seems to be less important. To assess aspects that are important for the target group in order to feel connected, participants were asked to indicate (based on a predefined list of items we gained from our observations) what they need to feel connected to others. More than half of the participants said that it is important for them to know to can rely on each other (63,6 %), that someone will help (57,1 %), just to spend time with somebody else (55 %) or knowing that there is always somebody there (54,5 %) (see Figure 14). Interestingly, a feeling of being part of a group was only rated as important by one quarter of the respondents. Thus, we conclude that aspects of trust (e.g., to know that you can rely on somebody else) or spending time with another person are rated as more important than being part of a group to have a feeling of connectedness.

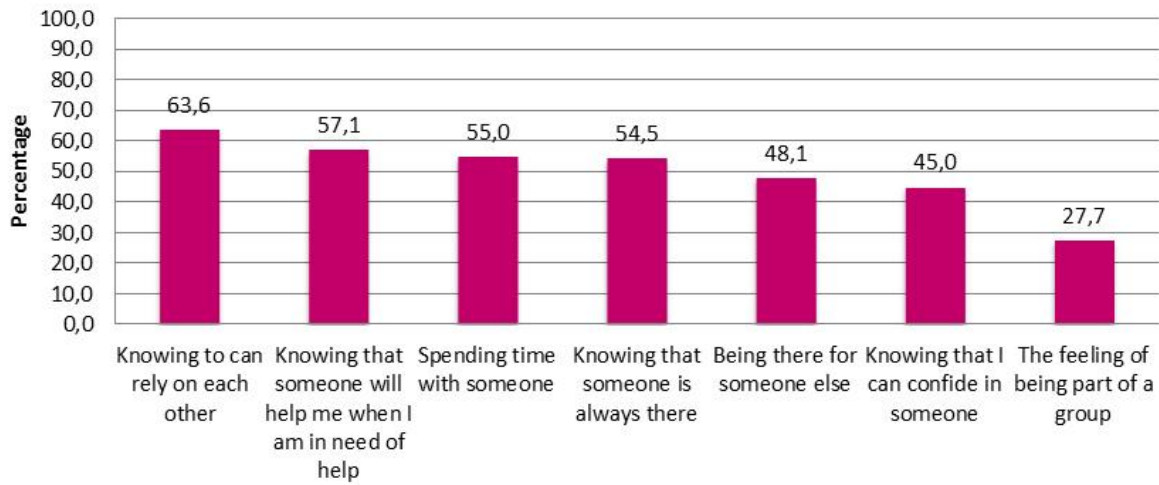


Figure 14: Important to feel connected

Regarding participants’ satisfaction with the support they receive at the moment, we see that more than two thirds (69 %) were satisfied with the amount of support they receive from their family/friends or their partner according to their everyday activities, one fifth (20,7 %) were rather unsatisfied or unsatisfied and 10,3 % were neither satisfied nor unsatisfied (see Figure 15).

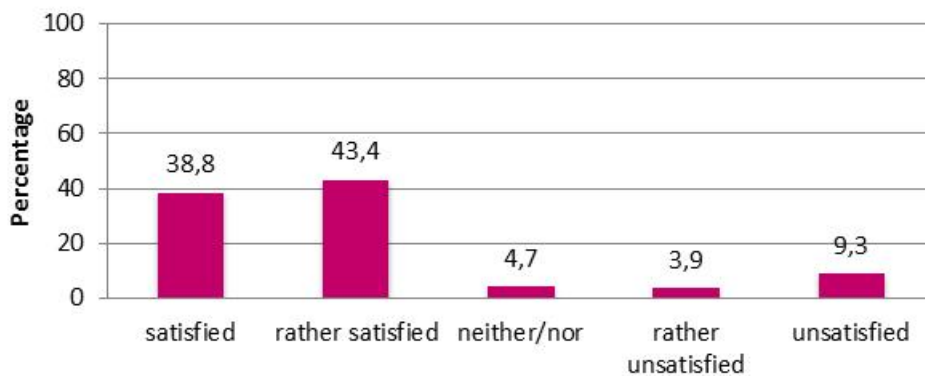


Figure 15: Satisfaction with the support

Satisfaction with the amount of support that is provided seems to be related with participants’ subjective quality of life. We identified a weak high significant correlation between the overall quality of life score and satisfaction (-0.205, sig. 0.005). The more participants were satisfied with the amount of support they receive the higher was their overall quality of life score. Moreover we could identify a weak correlation between the quality of life and the attitude that technologies enrich one’s everyday life. Participants, who thought that technologies enrich their everyday life, rather had a high quality of life score, whereas participants who thought that technologies do not enrich their everyday life rather had a low score (-0.192, sig. 0.003).

Summary

Participants’ social capital with respect to the organization of activities of daily living was closely related to the family (informal support) and professional household helps (formal support). The majority of respondents was supported by either their family or a professional household help regarding the variety of the household activities such as dusting, wiping the floor or tidying up. For other activities, i.e. grocery shopping, also friends and acquaintances played an important role in providing support. The results also indicate that the majority was satisfied with the support they receive and that this satisfaction is positively correlated with their quality of life. The “potential social capital” (participants’ attitude whom they could imagine to receive support) is closely related to informal support given by the family and formal support by a household help. Thus we can conclude that the actual and potential social capital regarding support for activities of daily living resides in the family and professional household helps.

2.3.5 RQ5 What information (content) needs to be provided to support ADLs and active participation?

Participants were also asked to indicate what kind of services would be important and what kind of services not. 81,6 % indicated that it would be important for them to have a service that allows them to contact their doctor, almost three thirds (74,5 %) said that it would be important that the system provides a mailing list (see Figure 16).

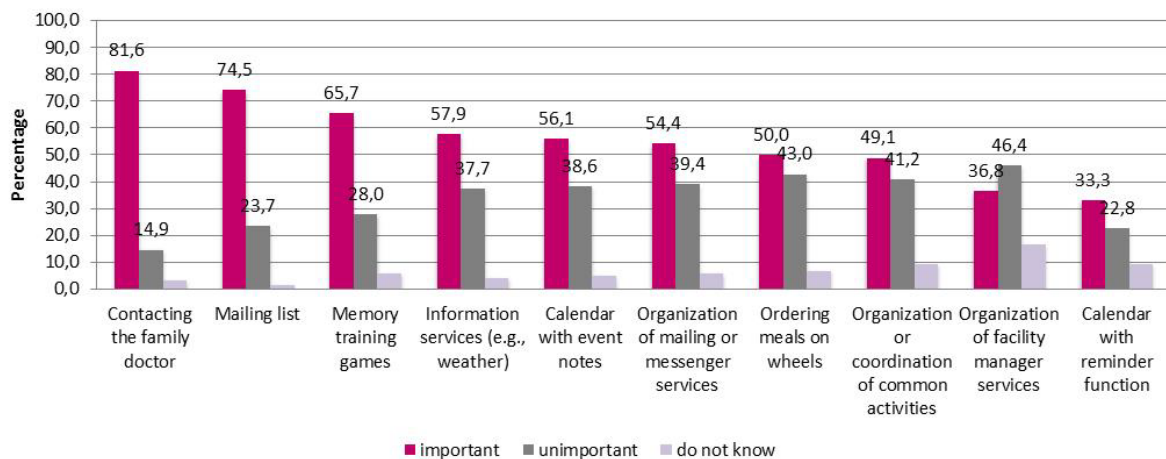


Figure 16: Functionalities that are important

To find out more about participants’ requirements for using the platform they were asked to indicate what would be important for them in order to use the platform by selecting from a list of predefined statements. Half of the participants (50,2 %) stated that they would need an introduction, almost half (46,8 %) said that it would be important that they have the possibility to only allow people they personally know to contact them and 43,7 % would only allow people they have accepted to have contact with them. 40,7 % said that they wanted to have an overview of the people they are in contact with, 38,5 % would want to have a contact

person that supports them in case of difficulties with the platform. Moreover, for 36,8 % it would be important to receive immediate response when they need help. For only one fifth (19,5 %) of the respondents it would be important to have a higher institution, which monitors and selects who can use the platform. Only a minority indicated that they would want to see pictures of the people they want to be in contact (15,6 %), to have regular exchange (15,6 %), and to identify if people they are in contact with are also active on the platform (14,3 %) (see Figure 17).

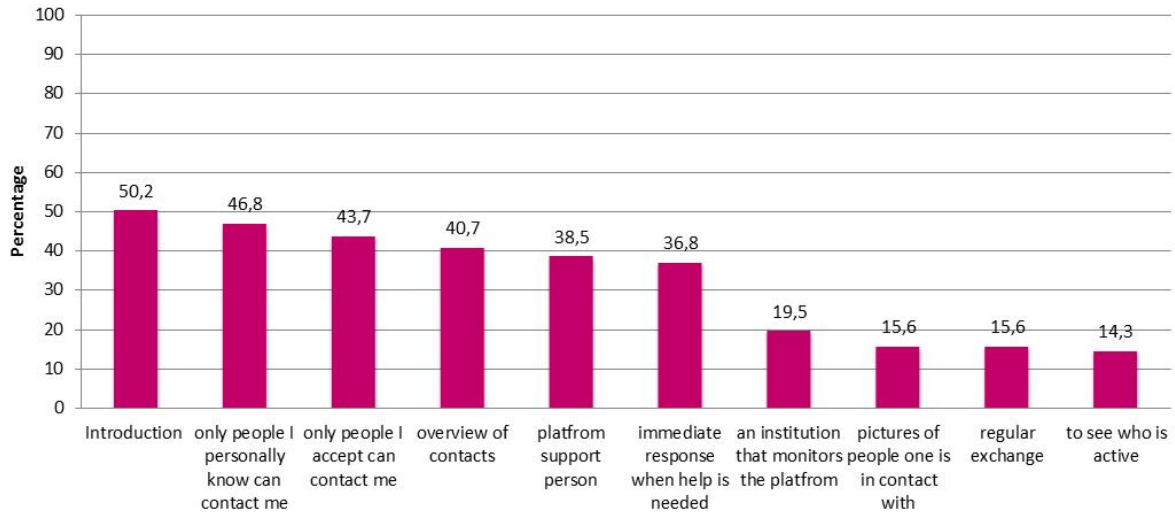


Figure 17: What is important to use the platform

Participants were also asked about their expectations when handling the tablet and regarding the information that is provided. More than three quarters of the respondents (78,8 %) agreed that the handling of the tablet must be easy (2,2 % disagreed and 19 % did not know) and that the information that is provided via the tablet needs to be easy to understand (75,7 %) (3,9 % disagreed and 20,3 % did not know). Moreover, 73,6 % agreed that the TV should not exclusively be controlled via the tablet (4,4 % disagreed and 22,1 % did not know). It has to be considered that quite a great amount of participants (one fifth) indicated that they did not have any expectations regarding the handling of the tablet and the information that is provided. This could be an indicator that the participants did not have any experiences with a tablet and thus did not know what they could expect (see Figure 18).

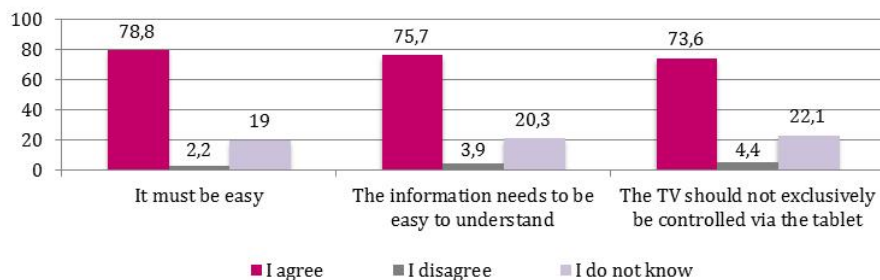


Figure 18: Handling of the tablet and information provided

Summary

Being and getting in contact with other people that are personally known is very important of the end users. An introduction to the platform and a platform support person are important for them as well. Information and aspects of trust seem to be important prerequisites for using the platform as for example a majority of participants stated that it would be important for them that only people whom they personally know or people whom they accepted to get in contact with them in advance should be able to contact them on the platform.

2.3.6 Misc – Willingness to use the GeTVivid platform

According to the main idea of the platform, not only acquiring support but also providing support for others, we were interested if participants would be willing to offer support and for whom (without expecting any service in return, e.g., getting support for themselves) and if they would be willing to use a service like the GeTVivid platform. More than half of the participants of our survey (60,2 %) could imagine supporting other people regarding activities of daily living. 39,8 % indicated that they could not imagine supporting other people. 42,9 % indicated that they could imagine using a service like the GeTVivid platform but more than half of the respondents (57,1%) said that they would not be willing to use such a service. The reasons for this might be various and some aspects we identified within the survey that need to be considered are outlined in the following:

- We identified a moderate correlation (4,54) between willingness to support other people and a willingness to use a service like the GeTVivid platform, which is highly significant (sig. 0.000). Thus, respondents who were in general not willing to provide support for others were not willing to use the platform.
- Moreover, participants, who received help regarding activities of daily living were not willing to support others (-0,296, sig. 0,000) and could rather not imagine offering support for others via the service than participants who did not receive any help (-2,87, sig. 0,000). Both correlations are weak and highly significant.
- Participants who were more technology affine rather indicated that they would be willing to use such a system than participants, who were not technology affine (weak correlation, highly significant) (0.338, sig. 0.000).
- Finally, age seems to be an influencing factor. The younger the participants the more they could imagine to support others regarding activities of daily living (0,409, sig. 0,000) (moderate, highly significant correlation) and the more they could imagine to use such a platform (0,386, sig. 0,000) (weak, highly significant correlation).

In general, 79,2 % of the participants could imagine offering support for family without expecting any service in return, 67,5 % would offer support for friends, more than half (57,1 %) could imagine offering support for acquaintances, and only 9,5 % would offer support to strangers without expecting any service in return. Among those participants, who are in using such a system, three quarters of the respondents (74,62 %) could imagine to accept support from their family, 63,2 % indicated that they could accept support from friends, almost half of them (46,5 %) from acquaintances and 21,1 % could imagine to accept support from strangers.

Summary

Participants' willingness in general to use the platform was rather low. Only 50 % indicated to be willing to use the platform, whereby this was closely related to the age, if they received help, and their general willingness to support other people with respect to activities of daily living. Thus, one of the main challenges will be to motivate potential users to be active on the platform. Among those participants, who were willing to use the platform it has to be considered that they would majoritarian support people they already know (e.g., family, friends) and would also majoritarian only accept support from people they know (e.g., only one fifth would accept support from strangers).

2.3.7 Overall Summary

The main goal of the survey was to deepen the understanding how older adults organize their activities of daily living. Our results indicate, that our target group is quite technology affine, uses new means of communication (the younger they are the more they use new means of communication) and that their social capital resides in their family and friends. The majority is still quite autonomous and can carry out a variety of household tasks by themselves. Nevertheless, they regular receive help either by their family or professional household helps.

Although the target group is quite technology affine, it has to be considered that only 50 % would be willing to use the GetVivid platform, whereby various different factors, such as age or general willingness to support others, etc. need to be considered. Moreover, aspects of trust seem to play an important role when using such a platform, which goes along with the finding that only a minority would be willing to offer or accept support from strangers. Thus, encouraging participants to get in contact with people they do not know and to start exchanging resources (support) will be one of the main challenges within this project.

2.4 Design Workshops

As a last activity for the requirements analysis we conducted design workshops in order discuss first design ideas with our end users.

2.4.1 Research Goals

The design workshops aim at discussing first ideas of how the information on the platform could be visualized (e.g., how icons could look like) and to gain insights on the target group's requirements when using such a platform (e.g., what would be important to trust in the system or other users on the platform, or what would be "WOW-Features" motivating them to use the platform).

2.4.2 Research Questions

Accordingly to the definitions mentioned above, the following three research questions were defined:

RQ5 What kind of functionalities does the platform need to provide to meet the target group's needs?

RQ6 How does the information on the platform need to be visualized?

MISC What are participants concerns regarding security issues?

2.4.3 Approach

Our design workshops were based on the idea of participatory design, the approach of involving users through a design process [Read et al., 2002]. The structure of the workshop allows users to express themselves and provide feedback on first ideas how the GetTVivid platform could look like. Small videos, design sketches, etc. will encourage participants to reflect on different topics, e.g., functionalities or security issues. The participants were recruited according to our predefined recruiting profile. The Design Workshops were carried out at all three EUOs places (VMKN Germany, EURAG Austria and CURAVIVA Switzerland), whereby two Design Workshops have been conducted at CURAVIVA Switzerland.

2.4.4 Results

In the following, the participants and the summarized results for the research questions will be presented.

2.4.4.1 Participants

Overall 31 participants took part in the Design Workshops, whereby 77,4 % of the participants were female and 22,6 % were male. The participants were aged between 62 and 105 years old with an average age of 77,6 years. Two third of the participants do not need regular support, some get support with regards to shopping, using the PC, cleaning, laundry, cooking, or going for a walk. Most would accept support from others for household activities and shopping. However, most of them were not sure where they could provide support.

2.4.4.2 RQ5 What kind of functionalities does the platform need to provide to meet the target group's needs?

With regard to the design and visualization of certain features on the platform, the participants clearly outline, that the potential users on the platform need to be as concrete as possible about what they need/offer on the platform. The system, hence, should respond to this need by providing a rather restricted framework (e.g., structured sheet with questions about what to enter) to enter information, and therefore give "little room for interpretation" of information/content on the platform. This finding goes also in line with the visualization of icons ('symbols') on the platform, as the older adults highlight that their meaning needs to be unambiguous – if they are not self-explanatory they are sceptical about the usage of icons in general. We could mainly identify the following functionalities and layout related issues that are required by the older adults:

- 1) sub-categories would be helpful (e.g., "Leisure" --> sub-category: "cinema") to find ones way through, and, if needed to go more into detail for further information,
- 2) the results-list should be visualized with key-words,
- 3) the amount of posted offers and requests of support should be indicated with numbers, and
- 4) presented offers on the platform should be labelled with the corresponding providers.

Important information when requiring for support

It is important that people know each other on a personal level, especially those ones that provide the support need to be known and trusted to the users. The users on the platform need to be as concrete as possible about what they need (i.e., only give little room for interpretation and define the offers as clearly as possible, e.g., grocery shopping, cleaning windows). It is important to be able to state when (day or time) support is needed. The offerings on the platform need to fit the users' needs (matching of offers and needs).

Important Information about users on the platform

- Name, Gender, Phone number, Residence
- Pictures of users (profile pictures)
- What kind of support is required
- What kind of support can be provided

Profile pictures are considered as crucial to support trustworthiness. Every user on the platform should have an own profile picture (or if married, a picture of the married couple), as profile pictures are considered as a pre-condition to actually require for support from someone. Some participants furthermore, outline that the description of user profile 1 sounds more like a "dating-profile". Here, they highlight that the emphasis of the user profiles should lie on concrete and clear descriptions about provided support services and less on personal interests of the users.

The participants within three workshops are rather limited in what information they want to provide about themselves to others on the platform. Here, they mainly want to provide personal information that is related to the provision or demands of support (i.e., what kind of support they need or can provide). Furthermore, it would be fair for them to provide a photo and information about gender, hobbies, interests, age and residence. Again, they outline that previous personal contact or contact with people they already know would be the best pre-condition to actually interact with others on the platform. In general, less text is more, concrete and precise key words are required and the information needs to be "scan able" within seconds. Within one workshop the participants, do not consider information about the age of users as relevant and meaningful information to establish contact and interaction on the platform. If they require for support on the platform, they want to make as little as possible information visible on the platform as they fear unrequested applications from others.

General attitude towards icons

The attitude of participants towards utilizing icons on the platform is rather distinct. Participants are sceptical about icons in general, as they mostly consider them not being self-explanatory and hence might lead to misunderstandings on the platform. Contrary to those participants, who don't want icons on the platform, there are also participants who would appreciate 'symbols' under the condition that they are self-explanatory, as text would be too complex and is partly also considered as tedious to read for those ones who have visual impairments. For the design of icons it is important that

- Icons are large, colourful and high in contrast
- Alphabetically ordered is not necessary
- Indications about the amount of posted offers and requests of support (within the different categories)
- Used visualization of icons ('symbols') needs to be unambiguous about what is meant with it
- The list of results should be visualized with key-words and should provide the possibility to go more into detail for further information if needed

Additional comments

Requiring support from strangers is generally considered as an inhibition threshold as long as there is still the possibility to ask family and friends for support (as it is currently done via phone calls or face-to-face conversations). Participants mentioned that they would like to support others under two conditions: not much time that has to be invested and an ongoing possibility to say no. This results from the fears of spending too much time with people who need support and being utilized by others. Participants mentioned that being spontaneous in providing support is of great importance (exceptions can be made for visiting concerts or taking a short holiday together).

2.4.4.3 RQ6 How does the information on the platform need to be visualized?

In general, the participants like the vividness and colourfulness of both sketches. In particular, they appreciate the matching of coloured icons and their relating offerings, as the colour mapping makes it easier for them to allocate the relating offering (intuitive colour coding). Within all design workshops the participants appreciate the colourfulness of the design proposal. In particular, they liked the colourful icons and the matching of coloured icons and their relating offerings. This colour mapping makes it easier to allocate the relating offering (intuitive colour coding). Furthermore, the participants believe, that they do not even have to read the different provided 'offerings' anymore (i.e., the text), as the colours are memorable enough (i.e., colours provide orientation). Furthermore, within two workshops, the participants appreciate the general neatness of the design.

The desirability to alphabetically order the provided categories depends on the relating design sketch. A listing of the content "in the tag cloud" in an alphabetical manner is needed (to overcome confusion/complexity) whereas the categories should be ordered according to their usage frequency. This goes also in line with a finding concerning the visualization of symbols/icons/buttons, as the participants within both design workshops outline that symbols/icons/buttons that are just rarely used, should fade out after some time.

Furthermore, they would also appreciate, if the symbols that are touched by the cursor should automatically appear in a bigger size (both design sketches) and the font size of the shown information on both design sketches needs to be bigger. Regarding the font size, some participants also outline, that the poor readability of the information might be also due to the colours of the text. Here they suggest, using colours that are of high contrast. Overall, when comparing both design sketches, the participants would prefer the first one over the second one, as visualizing content by means of a tag cloud, was considered as confusing for the participants as they are not used to the mental model behind this visualization.

Regarding the user profiles, we could identify mainly “profile pictures” as being highly required by the participants, as they are considered as crucial to support trustworthiness. Furthermore, they require information about others name, age, residence and personal interests. In contrast to the rather high amount of required information about other users, the participants are not that ‘open’ to provide information about themselves. They mainly want to provide personal information that is directly related to the provision and demands of support (further it would be fair for them to provide a profile pic, hobbies, age, gender). In contrast to the positive feedback, the participants provide fewer aspects they consider as negative about the sketch. Within two workshops, the participants outline concerns about the font size, as they have issues in reading the text. In relation to the hard readability of the text some also highlight that this might not only be due to the font size but maybe also due to colours (dark colours, little contrast of colours).

The displayed symbols were on the one hand, reviewed as excellent because they were considered as being self-explanatory, visible (including text) and enable a clear overview. On the other hand they were considered as being ambiguous because not all of them could be matched with activities (e.g. the clock), in this case the participants suggested to add an explanatory text to the symbols. The participants of one workshop completely disliked the second design sketch. The tag cloud was considered as being confusing, unclear, hardly readable, difficult to search, and they could not allocate why some words were capitalized and others were minimized, the explanation therefore was considered as being confusing as well. The small words were hardly readable for some participants. The participants outlined the following improvement suggestions: 1) write all text in the same and more readable font size, 2) arrangement of the words in lists with alphabetical order to facilitate search. Altogether the participants mentioned that the platform has to be usable with only a few steps, which have to be self-explanatory. The access to the system should be enabled through pushing only one button and symbols, which are touched by the cursor, should automatically appear in a bigger size. Another suggestion was to show only symbols, which are used frequently, and to fade out the symbols, which are not used.

Improvement suggestions:

- Interface design needs to be clear/neat and the participants for example suggest, that size of the symbols increases when clicking on them. Further they suggest, that after some time of frequent usage, only those icons remain that are needed on a regular basis.
- The access to content needs to be as easy as possible, maybe just with one click. Within one workshop, the participants were confused about the tablet as control device. They outlined, that everyone knows how to use and control a TV set but only a few know how to handle a tablet.
- The font size and readability of text needs to be improved (e.g., use colours for text that are of high contrast to the colouring of the icon or that the text is positioned below the icon)

- Some functions are missing (e.g., 'help function` and a 'back-button')
- Number of offerings besides relating categories and supplementary pictograms
- After frequent usage, the categories should not be ordered alphabetically

2.4.4.4 MISC - Concerns regarding security issues

The participants seek to establish interpersonal trust on the platform through personal contact and intermediation with someone familiar on the platform. They believe that interpersonal trust has to be developed 'over time' on the platform and that profile pictures of other users would support the development of interpersonal trust. Further, they would appreciate a feature that verifies if the counterpart on the platform is a 'real' person (e.g., in terms of affiliation criteria). Concerning data security, the participants are worried if other users are able to see private data (e.g., phone numbers). They outline, that they would suggest making private data only accessible for administrators and not for users, and that the administrators have the possibility to trace all users in case 'something' happens. In general, the participants require information about potential risks on the platform. The idea of implementing a rating-system on the platform, is seen rather critical by the participants as e.g., one could evaluate oneself and therefore falsify the ratings or it constitutes a feeling of getting grades in school or like 'being a hotel facility'.

2.4.4.5 Overall Summary

The participants appreciate the vividness and colourfulness of the sketches, whereby they particularly liked the matching of colour icons and their relating offerings in the first design sketch. The participants highlight, that regarding the visualization of symbols/icons/buttons it is crucial, that those symbols/icons/buttons that are rarely used should fade out after some time. Furthermore, they suggest making symbols that are touched by the cursor to appear in a bigger size (for both design sketches) and to generally increase the font size of the shown information in both visualizations. Concerning the user profiles, the participants highly require profile pictures as they are crucial to support trustworthiness.

We identified interpersonal trust and safety as critical factors mentioned by the target group. In general, the participants seek to establish interpersonal trust on the platform through personal contact and intermediation with someone familiar on the platform. Here they highlight, that profile pictures would support the development of interpersonal trust. Regarding data security, the participants suggest making private data only accessible for administrators and not users, and that the administrators have the possibility to trace all users in case something happens. With regard to the idea of implementing a rating-system on the platform, the participants reflect on this topic rather critical as they for example believe that this may constitute a feeling of getting grades in school or like being 'a hotel facility'.

The participants would appreciate sub-categories for the demand/provision of support, second they would like to have key-words for the results-list, and third the amount of posted offers and requests for support should be indicated with numbers. The participants emphasize the need, that potential users on the platform need to be as concrete as possible about what they need/offer on the platform (i.e., the system should respond to this need, by providing a rather restricted framework). Regarding the use of symbols, the participants highlight that they definitely have to be self-explanatory – otherwise, they are sceptical about their use in general.

3. PERSONAS AND SOCIAL ROLES

The results from the requirements analysis were finally the basis for the creation of personas. Personas are fictive users, which represent potential users (see e.g., [Cooper, 2007]). Thereby, not an average user is presented, but one with specific characteristics of the target group.

3.1 Personas

For the creation of the persona, we used a combined approach by integrating both quantitative and qualitative data (see [Moser et al., 2012] for an overview of the different persona creation approaches). The first step was a cluster analysis of all relevant aspects for the persona (i.e., behavioural variables), in this case age, living situation, living independently, receiving support, means of communication, willingness to offer support. From those data, two clusters were extracted in SPSS 21¹⁸. Those two clusters were then used as the basis for the creation of two personas. Afterwards, the qualitative data (i.e., observation and interview transcripts) were used and also clustered according to the outcome of the quantitative clusters for enriching the personas with narrative information. Finally, the names and occupation was added as purely fictive data. Those were sensitively chosen according to their existence in the project partners' country of origin, so that they were appropriate and understandable for all partners. The final personas (Frank and Anna) are illustrated in

After finishing the personas, they were presented to end user organizations (EURAG, CURAVIVA and VMKN) for evaluation. They indicated that the personas would illustrate their end users well.

¹⁸ <http://www-01.ibm.com/software/analytics/spss/>

	<p>Living Situation</p> <p>He and his wife are living in a house in the outskirts of a larger city. They have two TV, and in the evenings they like watching together films (in total between 1-3 hours per day). He had a disk herniation right after his retirement and is, therefore, restricted in his mobility and not allowed to carry heavy things.</p>	<p>Technology Usage</p> <p>He uses the computer with internet, has a smartphone and a tablet, which he recently bought. His computer and mobile phone skills are rather good. His TV skills even better (e.g., he uses EPG, Teletext, media library and is digitally recording films).</p>
<p>Demographics</p> <p>Name: Frank Age: 67 years</p> <p>Family Situation</p> <p>He has one sister that is living in other city in the same country. He also has two children that are married and have 3 young grandchildren. In general it is important to be in contact with family and friends.</p>	<p>Frank and his wife still life rather independently and only need sporadically help regarding ADLs. Then his family supports him, for example, for doing grocery shopping, tidying up or cooking. If he and his wife would go for a longer trip he would also ask his family to take care of the house and garden. In general he is very satisfied with the support he receives.</p> <p>He can imagine receiving support from his families regarding ADLs, but also from friends and acquaintances, for example, regarding shopping, watering the plants or other activities (like support in the garden). If he would need help, then he would accept help from a household regarding most ADLs, but would prefer help regarding cooking, watering plants and shopping from his family. He is very cautious letting strangers into his house, as someone previously attempted a burglary in his house.</p> <p>For organizing help he, he typically personally talks with the people, uses the mobile phone to call somebody or writes an email. Sometimes he also uses video telephone to arrange support.</p>	
<p>GeTVivid Platform Usage Goals</p> <ul style="list-style-type: none"> • He is interested in being there for others and spending time with them. • He is rather interested and would request support from family and friends, but maybe also from acquaintances or sometimes even strangers (e.g., gardening). He would also offer support to friends, acquaintances, and family. • For him it would be nice to receive an introduction to the platform, but he could also imagine trying it out by himself. 	<p>GeTVivid Platform Functions</p> <ul style="list-style-type: none"> • It is very important for him to decide which people can contact him and rather important to have a good overview of the people he is in contact with. • Next to the offer and demand functions, he would be interested in a calendar with reminder and event notification. • He would also be rather interested in other information services and third party service provider, organization of facility manager services or joint activities, a mailing list to send messages/notifications for friends and training games. • Regarding security issues, from his perspective the platform does not have to be monitored via a higher institution that allows people to use it. 	<p>GeTVivid Frustrations and Pain Points</p> <ul style="list-style-type: none"> • He does not like it, if a lot of people he does not know could contact him. • He would be frustrated, if he cannot rely on others or if no one would help him when needed. • Handling of the tablet is not easy • The provided information is not easy to understand. • That the TV is exclusively controlled via the tablet.

Figure 19: Persona Frank

	<p>Living Situation</p>	<p>Technology Usage</p>
<p>Demographics</p>	<p>She and her husband are living in a flat in an assisted living community, where they get professional support if needed. They moved there, as her husband is suffering from mild cognitive impairments and she has problems with climbing stairs. She also has an age-related visual impairment (e.g., difficulties when reading small text). They have one TV in the living room, where they watch together TV (in total between 1-3 hours per day).</p>	<p>She uses the computer with internet and has a new mobile phone, which she recently bought. Her computer and mobile phone skills are rather good, same as her TV skills (e.g., she uses EPG or Teletext).</p>
<p>Name: Anna Age: 75 years</p>	<p>Anna and her husband still live rather independently. They do not need help regarding ADLs on a daily base, but as she is not that fit any more and restricted in her mobility, she gets support from a household help regarding ironing, vacuuming, cleaning the floor and windows. Her family also supports her once in a while, for example, regarding shopping and sometimes in doing the laundry, but she does not want to become a burden for them. Of course, her husband also supports her whenever possible. Therefore, she is currently satisfied with the support she receives when needed.</p>	
<p>Family Situation</p>	<p>She can imagine receiving support from her family regarding ADLs, but also from friends and acquaintances, for example, regarding shopping, watering the plants or other activities. If she would need help, then she would accept help from a household help regarding most ADLs and would prefer help regarding cooking, tidying up, watering plants and shopping from her family. She would be very cautious regarding strangers, as she read a lot of the stories about the 'Neffentrick' in the newspaper, where strangers pretend to be a niece or nephew in order to get access to the home and steal something.</p>	
	<p>If she needs help, she typically personally talks with the people or uses the mobile phone. Sometimes she also writes emails to arrange support.</p>	
<p>GeTVivid Platform Usage Goals</p>	<p>GeTVivid Platform Functions</p>	<p>GeTVivid Frustrations and Pain Points</p>
<ul style="list-style-type: none"> • She is interested in being there for others and spending time with them. • She is rather interested and would request support mainly from family, but maybe also from friends, acquaintances or sometimes even strangers (e.g., window cleaning). She would also offer support to family, friends, and acquaintances. • Before using the platform, she would like to receive an introduction to the platform and get to know the other users. 	<ul style="list-style-type: none"> • It is rather important for her to decide which people can contact her and to have a good overview of the people she is in contact with. • Next to the offer and demand functions, she would be interested in a mailing list to send messages/notifications to her friends. • She would also be rather interested in a calendar with reminder and event notification, other information services and third party service provider, as well as memory training games. Rather unimportant are "functionalities" that support the organization of joint activities or facility manager services. • The platform does not have to be monitored via a higher institution that allows people to use it. 	<ul style="list-style-type: none"> • She does not like, if too many people she does not know contact her. • She would be disappointed, if one cannot rely on each other or if no one would respond. • She is afraid that offering support once could end up in a duty. • Handling of the tablet is not easy • The provided information is not easy to understand. • That the TV is exclusively controlled via the tablet.

Figure 20: Persona Anna

3.2 Social Roles

In order to identify social roles in the informal care practices, we analysed the results of the observations and interviews with the following procedure: (1) content analysis to identify real world support practices, (2) the assignment of role expectations, and (3) grounding of clustered practices and expectations in relevant social settings by using the Affinity Diagram technique.

A compact summary of our investigation is provided in Figure 21, in terms of illustrating the identified social roles extracted from particular offline support practices and the social settings in which these practices are enacted, as well as the relations (i.e., complementary or contrary) we found between those role types. Of course, the illustration of those identified social roles is an abstraction of a wider and more complex picture of relationships and social settings (that can change over time) in older adults' lives.

In particular, from these 10 social roles, 4 are considered as complementary roles (i.e., Opportunity Provider and Opportunity Receiver, Preserver and Re-User). This means that we identified a complementary role for each of the given receiver or provider roles i.e., they complement one another in terms of providing or receiving specific support. Another 4 social roles were identified to be contrary roles (i.e., Companion vs. Immediator, Relieving vs. Responsible Person). These roles stand in clear opposition to each other, differing in particular role characteristics (e.g., distinct willingness of time investments when providing support). For the remaining 2 social roles, no relations and ties to other social roles were found (except for their grounding in the same social setting).

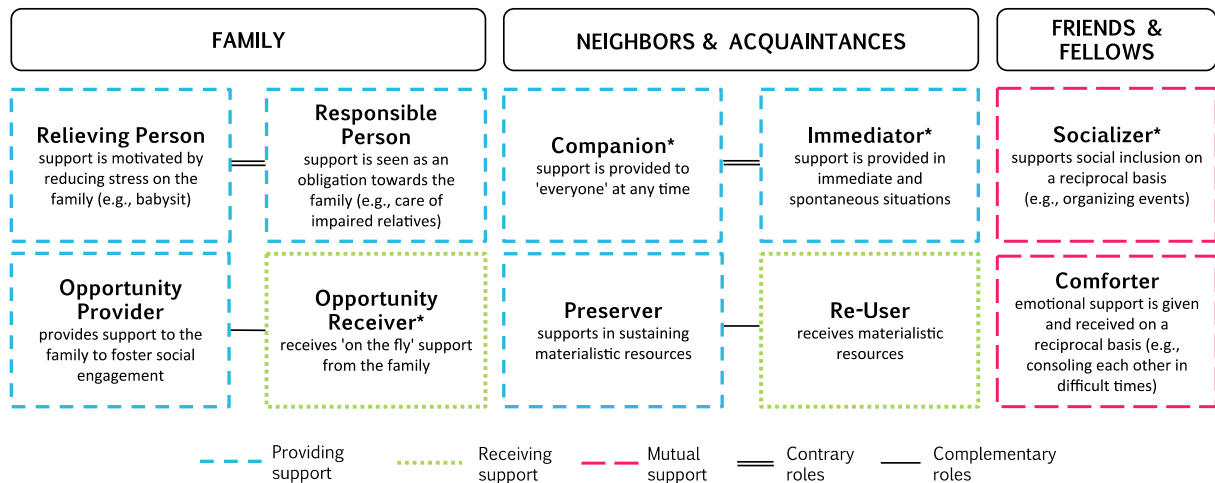


Figure 21: Visualization of identified social roles in offline support-exchange dependent on relevant social setting. Social roles indicated with a * will be described in more detail.

In the following, we describe 1 complementary role, 2 contrary roles, and 1 role where support is reciprocally organized. These roles were selected, to illustrate the very characteristic differences (e.g., due to social settings) these roles imply to highlight what is important to consider when mediating offline support roles online.

3.2.1 Opportunity Receiver

Older adults enacting the social role of Opportunity Receivers have a certain need for support in organizational issues to manage their daily lives. The in-group from which this type mainly receives support, is the closer inner-familial circle (e.g., son, daughter, husband, wife, son and daughter in-law). All of the relating activities, where support is needed, are characterized by little time-consuming activities, often enacted in conjunction with activities the provider has to do anyway for him/herself (e.g., grocery shopping or lifting heavy objects). Opportunity Receivers see the support from the respective providers as rather tentative, in terms of not expecting their close relatives to support them on a compulsory basis (no *'shall'* expectations). The Opportunity Receivers mostly receive support that can be seen as *'on-the-fly'* support activities. They value these support activities as ideal behaviour from their reference group that indeed crucially supports them in organizing and managing their daily lives.

3.2.2 Immediator vs. Companion

The social role of Immediators stands in contrast to the social role of Companions in terms of the provided effort (i.e., time resources), as both roles are willing to provide in support activities. Immediators are individuals that are definitely willing to provide support, *but* only in cases where little time-resources are needed (e.g., bringing along some milk from grocery shopping). They are willing to provide support in spontaneous and more pressing situations (e.g., when someone is not feeling well). In contrast, Companions are individuals that are *'always there'* for someone that is in need of support. The potential receivers are usually aware of the Companion's availability and her/his *'open doors'*. Companions are considered as focal points, for example, within professional care institutions, where informal support is frequently needed. Nevertheless, what unites Immediator and Companion is that both actively support the same in-group - their neighbours and acquaintances. All support activities done by Companions are considered as ideal behaviour (*'can'* expectations), whereas Immediators also provide support in situations where they are expected (*'shall'* expectations) to react to a particular need (e.g., urgent situations where someone needs medication).

3.2.3 Socializer

Older adults playing the role of the Socializer are situated in mutually balanced relationships where support is given and received on a reciprocal basis. Socializers are organizing but also going to coffee parties, dinners, or ladies' circles. All of these practices relate to activities enacted with respective friends and fellows. Socializers expect (*'can'* expectations) from their close circle of friends to be there for one another and to be socially present. Furthermore, they see their relationships to others on a balanced basis, in terms of giving and taking. This means when organizing events (e.g., coffee parties) for this in-group, Socializers also expect to be re-invited. They are active, enjoy being involved in social life, and motivate others to participate in social activities (e.g., invite someone over).

In summary, with the social roles we demonstrate that older adults – even though mildly impaired and in need for support – are highly willing to provide support to others (i.e., seeking for balanced relations). By presenting 4 selected identified social roles, we highlighted the inherent characteristics of these roles revealing the diverse and complex nature of support-exchange practices in the real world. On basis of the presented findings, we will now continue to discuss what is important to consider when mediating offline enacted support roles online.

4. OVERALL CONCLUSION

The following section provides an overview of the most important findings for each research question and the related implications for the project.

4.1 Organization of activities of daily living

The understanding the organization of older adults everyday lives involves manifold perspectives and inherent related issues and barriers that are related to the organization of older adults life world. Many of our participants were unaware about their current health situation in terms of decreasing mental and physical capabilities. Consequently, they were mostly not aware about actually being in need of support for certain activities. The participants negatively connoted being in need of support because that was seen as being a burden to others. However, regarding the necessity for help and support, some participants highlight that if someone is significantly feeling worse than oneself, the participants tend to act (in terms of support) in an altruistic manner with no expectations to receive something back from the person that is in need of help.

RQ1 How does the target group organize their activities of daily living?

Older adults need support with respect to different impairments (e.g., memory, visual abilities, heart diseases, or restriction in mobility), which negatively affect the quality of life, i.e., subjective well-being. For the process of support exchange, we identified two different real-world practices that both are based on the idea of “give and take”: 1) Older adults expect informal support of their family members when it comes to IADLs that sustain their autonomy and independency. The concept of “give and take” is temporarily shifted, as the older adults have already given support to their family members, whereas now the support is returned by the younger generation. 2) Friends and acquaintances represent those group of persons from whom they expect to do social activities with that leads to cognitive well-being. Here, the concept of “give and take” is of high importance, if the involved people in support exchange are in an equal health condition. In the light of our target group, representing older adults with mild impairments, ‘everyone’ is able to provide any kind of support, either practical support (e.g., grocery shopping) or social support (e.g., providing time for a conversation) – it’s just about the right matching of people and activities (wherein support is provided or needed).

The two above outlined, real-world practices in support exchange do not exclude each other, it’s more about the systems awareness about the support exchange context. For example, it might be useful to implement a kind of support exchange “criteria catalogue” wherein the older adults can individually select their criteria under which they are willing to receive and provide support from particular groups of persons (criteria could be, for example, “*I don’t want strangers to support me with grocery shopping, as I do not want strangers in my own home, but in contrast I can imagine to get in touch with strangers in leisure activities as for example a bus tour for older adults from my hobby club*”).

For the GeTVivid project it might be a good to distinguish between older adults living in their homes or in residential homes, in terms of a platform that is sensitive to the special needs that derive from these contexts (such as information regarding weekly lunch menu in an institution or information about specific events in the nearer surrounding of people still living in their homes). We aim to generate an additional benefit over other communication media that are commonly used by older adults (e.g., phone).

RQ2 How do social roles affect the way people organize their activities of daily living?

We identified 10 social roles, whereof 4 are considered as complementary roles (i.e., Opportunity Provider and Opportunity Receiver, Preserver and Re-User), meaning that they complement one another in terms of providing or receiving specific support. Another 4 social roles were identified to be contrary roles (i.e., Companion vs. Immediator, Relieving vs. Responsible Person), meaning that they stand in clear opposition to each other, differing in particular role characteristics (e.g., distinct willingness of time investments when providing support). For the remaining 2 social roles, no relations and ties to other social roles were found (except for their grounding in the same social setting).

Additionally, we found that the *expected* support exchange is critical for a 'successful' and mutual organization of the *actual* support exchange. These actual support exchange practices are highly diverse, which is also true for older adults' expectations. There exists no standard or unique practice of how support needs to be given or received. In spite of this, we reflect on four aspects that are relevant for multiple role types, i.e., strength of expectations, balancing relationships, matching complementary roles, and duration and frequency of support.

- First, we found the strength of expectations to be a central characteristic for support exchange practices. When seeking mutual support exchange, the strength of expectations has to be *equal* for both parties to facilitate satisfying support practices (i.e., a 'shall' expectation may not be satisfied with a 'can' support). For example, if a neighbour offers to bring something along from the pharmacy and another older adult asks to bring along medicine the same day from the pharmacy ('shall' expectation), then it would be insufficient if the neighbour 'can' only bring it by the end of the week. Therefore, it is important to clarify the expectations online to match the appropriate counterparts for offline enactment.
- A second critical aspect is the possibility to find or match people that complement each other in providing and receiving support (e.g., Opportunity Provider/Opportunity Receiver). The identification of appropriate counterparts to fulfil one's needs is the basis to create meaningful relationships on the platform (e.g., through matching complementary roles). This, in turn, contributes to users' social capital, i.e., the benefit they gain out of the relationships. Here, the right matching of 'similar users' can encourage a more active participation and result in satisfying support practices for both parties.
- Third, it is critical for the emergence of relationships that they are balanced on a reciprocal basis. We found out that the older adults with mild impairments are in need of support but are also highly willing to provide support. For example, our identified role of the Socializer incorporates the characteristic of balanced 'giving and taking'. Bellotti et al. [2012] found out that in unbalanced relationships, the inability to reciprocate may decrease the quality of life of older adults. The importance of reciprocal relationships is supported by related research that states that older adults desire independence and autonomy and are more enthusiastic about giving help than receiving it [Lee, 1985]. Therefore, if older

adults only take over roles wherein they provide support (e.g., Companion, Immediator, or Preserver), they should be proactively recommended tasks related to posting demands or taking advantage of support from others. Frequent and important supporters (e.g., Companions) can be confirmed in their role, by giving an 'official status' in the online community [Pfeil et al., 2011]. Nevertheless, every support exchange activity performed in an altruistic manner (i.e., even if unbalanced or not matched) contributes to the social life [Pelaprat and Brown, 2012] of older adults and fosters activity on the online platform, as well as in the real world.

- Fourth, our research has shown the significance of time investments (i.e., frequency and duration of support), vividly illustrated in our Immediator and Companion role (i.e., spontaneous, little time-resources vs. time whenever needed).

From our perspective, it is not about mirroring offline social roles (1:1) onto the GeTVivid platform, but to foster role characteristics (e.g., expectations) online to facilitate the identification with social roles that are enacted in the real world. We assume that a successful mediation and matching of specific role characteristics online supports the creation of meaningful relationships. The involved individuals should be given knowledge online about how to act towards others (i.e., role expectations) in order to facilitate offline support.

RQ3 How does the target group “use” their social capital to organize activities of daily living?

Aspects that belong to life circumstances are not just of tangible nature (e.g., housing space or financial capital), but especially intangible values such as available social networks. The physical health of an individual belongs to the subjective valuation of one's personal life circumstance. The perception of these conditions (tangible, intangible and personal health) is what constitutes to an individual's life world [Kraus 2006].

We identified constituting factors for a positive well-being of older adults, mainly relating to aspects that concern the involvement of other individuals (i.e., the older adults' social environment). This indicates that certain activities are considered as valuable in terms of well-being, if they are done together. In particular, the participants consider the balancing of social contacts and privacy, shared time with others, cross-generational contacts, and the feeling of being needed by others as contributing to a positive subjective well-being. The time for one's own (private time) is important, but also the need to establish and foster social relations to other individuals. This is the reason, why older adults often state that friends and acquaintances above family members and formal caregivers, to be the group of people with which they feel socially connected. One participant explicitly outlines, *“friendships are the most important things in life”*.

This goes is in line with the findings gathered throughout the analysis of hindering factors for subjective well-being, as the participants consider a lack of interpersonal contacts and communication (due to e.g., the rapid pace at which modern life is lived) as restricting for their subjective well-being. Demanding support is seen as burden for most of the participants; this might explain the fact that the participants feel more socially connected to their friends and acquaintances than to their family members, which are the ones that mostly provide this support. The loss of social relations (e.g., due to death) is also negatively contributing to their subjective well-being.

Active participation is related to psychological and physiological well-being of older adults. However, technological products designed for supporting older adults often highlight the value of the technology for the user as a recipient of support. GeTVivid aims at emphasizing the role of the user as a provider and a recipient of support, conveying the benefit one's participation might have for others instead of implying one's need for help. Fostering and motivating active participation are the demands we want to meet through the design of the platform. We want to support older adults in establishing new networks and communities, where they are willing to offer active support for others and receive services in return, when help is needed.

RQ4: What does the target group need to feel part of a community?

Being part of a community is essential as it influences one's subjective well-being and QoL. In order to feel part of a community, opportunities for active participation and to share common interests is important. Hence, the GeTVivid platform wants to motivate older adults to use existing communities (with family and friends/acquaintances) and establish or join new communities (with neighbours or strangers living close by), wherein the exchange of support can take place based on a give-and-take principle. Additionally, the following needs to feel part of a community should be considered, i.e., the personal contact (e.g., the feeling of connectedness), doing things together (e.g., sharing the same interest or doing a course together), knowing that someone is there if you need support, and the chemistry within the users on the GeTVivid platform needs to be right.

4.2 Qualities of information

RQ5: What information (content) needs to be provided to support ADLs and active participation?

In terms of subjective well-being a platform (the participants would like to use) should provide practical help in everyday life. Social contacts and privacy should be balanced, it should be possible to be unavailable for others when one would like to be alone, but there should be enough participants on the platform to avoid that one of them is desolated when seeking contact. The platform should provide features that support the participants to escape from everyday life, for example, enable them being proactive in life and start self-motivated activities, like building cross-generational contacts or starting group activities, which will contribute to their physical and mental fitness.

On the GeTVivid platform, offers and demands need to be clearly defined and articulated by other users (i.e., the more precise other users ask a question, the accuracy of replies is higher), as well as offers on the platform need to fit the user's needs (i.e., matching of offers and needs). User require as much information about other users as possible (i.e., to reduce the fears concerning the unknown factor "Internet"). In particular they required information in terms of name, profile picture (to support trustworthiness), age, gender, residence (or proximity to their own residence), offers/demands on the platform, or personal interests (hobbies/leisure activities).

RQ6 How does the information on the platform need to be visualized?

It has to be considered that there is a rather big gap in the affinity of older adults in using technology (e.g., one participant is using an iPhone at the age of 93 whereas others do not know or want to use a mobile phone at all). Thereby, we found out that those ones that are familiar with the usage of technologies such as computers tend to use other communication media (e.g., email, Skype, or Facebook) do not see the necessity of another communication and networking platform. Contrary, those that are not yet familiar with those technologies are not likely to invest time and money in such a system as the GeTVivid platform, as they do not see any benefit for themselves. Further, they fear the usage of such a platform due to several reasons such as financial consequences due to wrong usage. This issue is not related to the visualization on the TV; it's much more about the input modality by means of a tablet. Those older adults familiar with the usage of computers do not see the need for "another computer-like device" and the others, that do not use any communication media yet, do not want to use "another computer-like device" due to the above outlined fears, either. Therefore, it is decisive within the next development steps, to decide which user group, (e.g., with regard to technological affinity, living situation), we want to address with our platform. The older adults prefer a vivid, colourful and neat design, a colour guiding scheme, and the use of icons if they are self-explanatory. They are afraid of a too small font size (leading to poor readability), missing contrast between the colours, and too ambiguous meaning of icons.

4.3 User Requirements

The following user requirements summarize the gained insights from the analyses performed:

1. Support autonomy, independence and proactivity in life to enhance the QoL
2. Consider **different abilities** of the target group, i.e., provide opportunities for support with respect to a variety of different impairments
3. Consider **variability** in terms of **daily routines** and raise awareness, i.e., enable responsiveness to older adults' habits and preferences of structuring a day (chronologically structured vs. "take each day as it comes")
4. Consider that **family members** are most active **support providers** (one directed support)
5. Consider that **friends** are most active in **social activities** (mutual)
6. Encourage the target group to **offer support** also **for strangers** – raise awareness of mutual benefits and the feeling of being needed (supports the physical and mental health)
7. Consider the following criteria for the **willingness to provide and receive support**:
 - Raise awareness for necessity for support with the mutual benefit of "give and take" (not valid if someone is significantly more in need of support)
 - Every user is free to give and take support - support an overall balance on the platform (e.g., motivate users to request/offer something)
 - Make use of one's particular strengths

- Support temporal limitations of exchange (i.e., avoid feeling of one-time-support leading to long-time-duty)
 - Support exchange “criteria catalogue”, which enables older adults to select criteria under which they are willing to receive and provide support from particular groups of persons
8. Support the **establishment of personal contact** via the platform (functions) (i.e., support the intangible values)
- Find a balance between what is needed to establish social contact and privacy issues (i.e., user want to provide as little as necessary personal information vs. want to have as much information as possible about others)
 - Enable cross-generational contact (supports subjective well-being)

The personas, social roles and user requirements will guide the development of the GeTVivid platform (i.e., the mobile and TV client) of WP3 and WP4.

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