



D 1.3 – Requirements List regarding User Manuel



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Del 1.3	Executive Summary
Requirements list regarding user manual	

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7	Released	TUM-GSing	29/06/2011

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1 Abstract

To a large extent user manuals are technology-orientated. Deliverable 1.3 is the attempt of preparing a guideline for a senior-friendly user manual. Therefore we give a brief overview on important physiological and psychological age-related changes. From these conditions we derive special needs of the target group, which should be taken into account when designing and preparing the user manual for the robot platform ALIAS. In doing this we distinguish between standards of traditional written user manual and new types of user manuals like web-based user manuals or video tutorials, that assist the target group of seniors with installing and using the robot platform ALIAS and also with troubleshooting. Furthermore the deliverable contains results from the ongoing user inclusion activities.

Keywords: User inclusion, selected functions, workshop results, user manual

2 Introduction and Purpose

The overriding aim of deliverable 1.3 is to establish a guideline, that helps the technical partners to develop a user-friendly manual for the target group consisting of elderly people. The emphasis is on the design of written user manuals, but we also focus on new types of user manuals like a web-based version or a video tutorial, because of their additional benefits for the target group.

- At the beginning we describe age-related physiological and psychological changes that influence the handling of user manuals and need to be taken into account to create a suitable design. In addition, we consider gender and important socio-economic factors.
- From these findings we derive important essential design features. Then we examine some general hints that are important for the target groups. Next will discuss special requirements for the web-based version of a user manual.
- Afterwards we are going to present new results from the activities of WP1, dwelling on our workshops with the VDI senior group (German Engineering Association) and the Senior Research Group in Berlin as well as the survey at the Centre of cognitive disorders and rehabilitation. Moreover we report on GSings new contact with the housing association “Aging at the Ackermannbogen”.
- At the end of the Deliverable 1.3 you will find a short checklist for the development of the user manual.

3 Age-related Physiological Changes and Characteristics of Aging

The presentation of the results in this chapter is - among others - the basis for a checklist for the design of a user manual. It is necessary to light up the situation of older women and men to have a secure idea of what is important for the target group in a user manual.

3.1 Target Groups

There is an old proverb “You are only as old as you feel”! At this juncture we would like to emphasize again that there is not only one kind of seniors. It’s also rather arbitrary to determine 60 years old humans as seniors. Old age and aging are characterized by a strong subjective component of the individuals. If you ask elderly people how old they feel right now most of the 50+ generation estimate themselves younger than they are. They feel that they are members of the group of “fairly young” humans as well as of the group of “middle agers”, but they decline that they belong to the group of silver agers (Tews 1992). Because of these self-descriptions a lot of surveys manage with the calendar age for an age differentiation. For example the World Health Organization (WHO) divided our target group into four parts:

- Humans between 60 – 75 years, the so-called elderly people,
- Humans between 76 – 90 years, the so-called old people,
- Humans between 90 – 99 years, the so-called very old people,
- Humans over 100 years, the so-called long-living humans.

Seniors don’t form a homogenous group, even if seniors belong to the same age group. They differ in a range of criteria, for example in gender and socio-economic characteristics. A meaningful classification of elderly people is only particularly successful and needs to be further discussed thoroughly.

The social sciences underline that the terms “age” and “aging” are conducted with social connotations as well as with individual dispositions. Aging is often associated with clear social roles. In general, the term “old age” is neutral (Tews 1992), it means

only the age in years. Nevertheless the term is often associated with decreasing skills and abilities.

Looking at the process of aging from a physiological and psychological perspective, it is associated with a variety of changes. Changes in sensory perception, motor skills, learning and information processing play an important role. Changes caused by aging must be considered in the design of technical devices to avoid or reduce problems of older people using the systems. The question of a senior-friendly design of human-machine-interfaces is thus closely linked with the question of changes in the process of aging. For that reason it is also necessary to describe age-related changes in the field of sensory perception in the physical and in the mental area that are relevant for a senior-friendly design of technical systems.

3.2 Age-related changes in sensory

With increasing age there are many changes in sensory functions. The intensity of the changes in specific areas is different from individual to individual. Here seeing (e. g. presbyopia) and hearing (e.g. decreased hearing ability of high frequencies) is foregrounded. The sensory abilities are of central importance to the daily life of elderly persons like communication, movement control, etc.

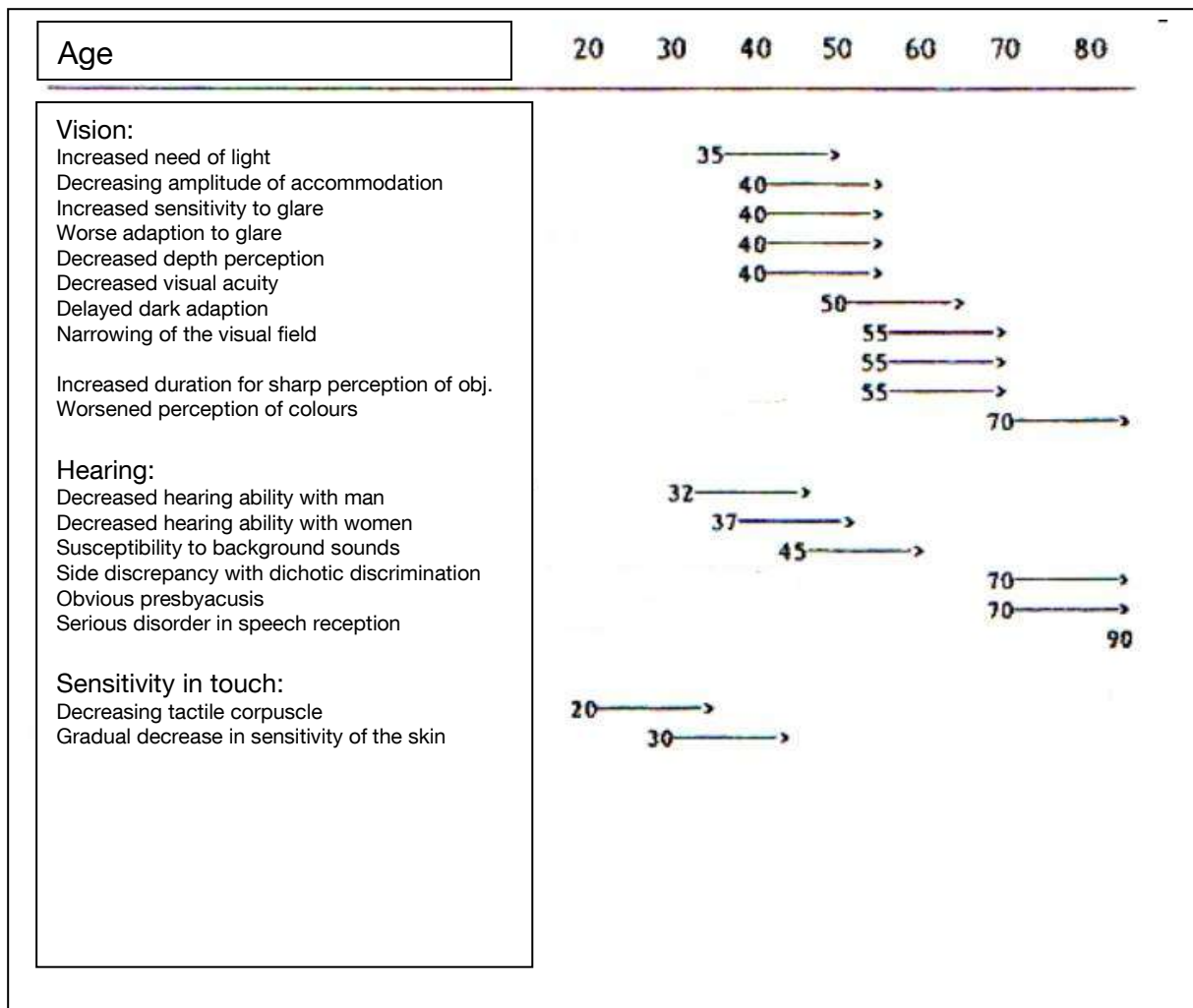


Figure 1: Changes in sensory abilities by age (Saup 1993)

3.3 Vision

Basically it is assumed that the sense of vision reduces in the process of aging. Visual acuity decreases with age, as has been shown in various studies (e.g. Verrist, 1985). A 60 year old still has 74%, a 80 year, only about 47% of the acuity of a twenty years old. Acuity depends on the illumination and the contrast. Visual performance can be improved by increased illumination, if excessive lighting and glare occur a reduction in visual performance can be seen. Increasing age leads to a reduction in pupil size and clouding of the lenses. Thereby contrasts cannot be perceived as intense as in young ages. Furthermore, hyperopia is common in old age also the eyes need longer to get used to lighting conditions. In very bright light the eye needs longer to recover from the glare. Changes in color perception can be attributed to a yellowing of the lens. Green, blue and violet cannot be distinguished

very well. From the age of 40 deterioration of the perception of depth, the accurate estimation of distances and dimensions of three-dimensional objects get difficultly.

3.4 Hearing

Also changes in hearing occur within the process of aging. The hearing ability decreases and often there may be difficulties in hearing. First signs of decreased hearing can occur at an age between thirty and forty years. A significant age-related decreased ability in hearing well usually comes up after the age of 70. In addition there may be an impairment of speech perception. Older people often suffer from problems in language understanding. In particular distortions (often with synthetic voices), slurred speech, fast speech and background noise affect their speech perception. Soft consonants (for example “f” or “g”) are partly perceived unclear or confused. They may also have problems in the localization of sound sources.

3.5 Feeling/Groping

The sense of touch by elderly people is usually slightly less sensitive than with younger people. Nevertheless, this is (especially regarding reduced sensitivity of other senses) an important aspect.

Regarding the development of Ambient Assistant Living systems it also has to be described what kind of changes during the aging process can occur, for example the function of arms and hands. The mobility of the joints decreases and certain movements are often only partially possible. In addition, older people can suffer from diseases that restrict the mobility of joints or can only be feasible under pain. Furthermore, a decrease in muscle strength can be observed in the process of aging. In dealing with technical systems, this means that these persons have a reduced force when pressing buttons. Also on the reduction in time in which this pressure is exerted must be assumed. The fine motor skills decrease in old age due to the points mentioned above. Difficulties may therefore arise in the use of small buttons or buttons which are closely together. Regarding the motoric skills, moving sequences are often slow, for example systems operated by touch must provide an adequate time to complete an action.

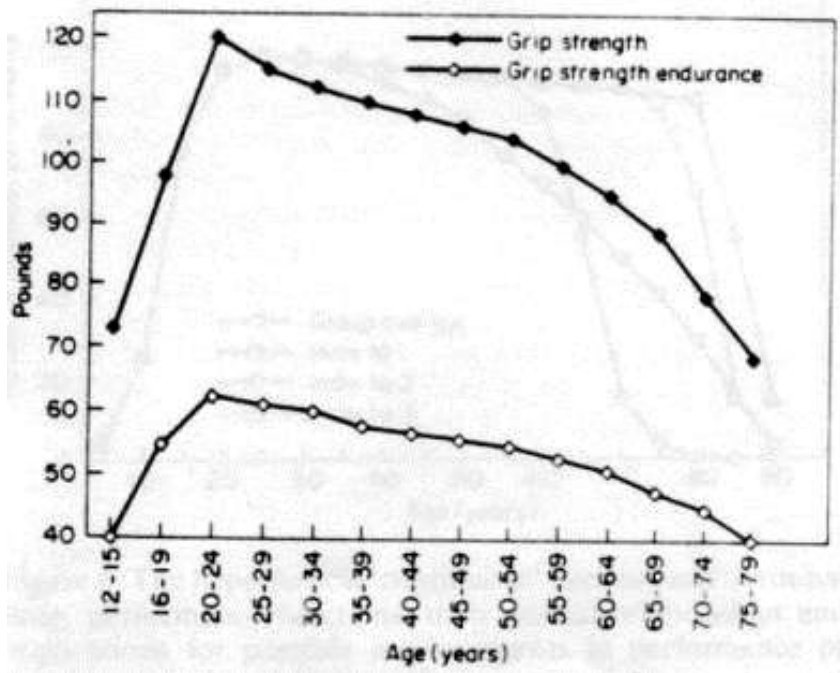


Figure 2: Relationship between age and maximum compressive force (Haigh, 1993)

3.6 Psychological Characteristics in Old Age

In addition to sensory and physical abilities the cognitive capacities of older people have to be considered. Whereas especially younger people often think that there is a general loss in cognitive ability during the aging process, the psychogerontological research shows that such a general standard is not suitable.

According to Cattell (1971) it is possible to distinguish two components of cognitive performance:

- Crystallized intelligence: strong knowledge-and culture-dependent, cognitive skills, ability to apply acquired knowledge to solve problems
- Fluid intelligence: basic ability of thinking, the ability to adapt to new situations and solve new problems (e.g. speed of perception, reaction time, inductive reasoning)

As research has shown crystallized intelligence remains stable into old age or even develop further. In contrast to this it was observed that there is a

reduction concerning the fluid intelligence with an ongoing aging process. A general loss of mental capacity should not be assumed. Rather it is likely that different cognitive abilities are also individual related to different aging processes.

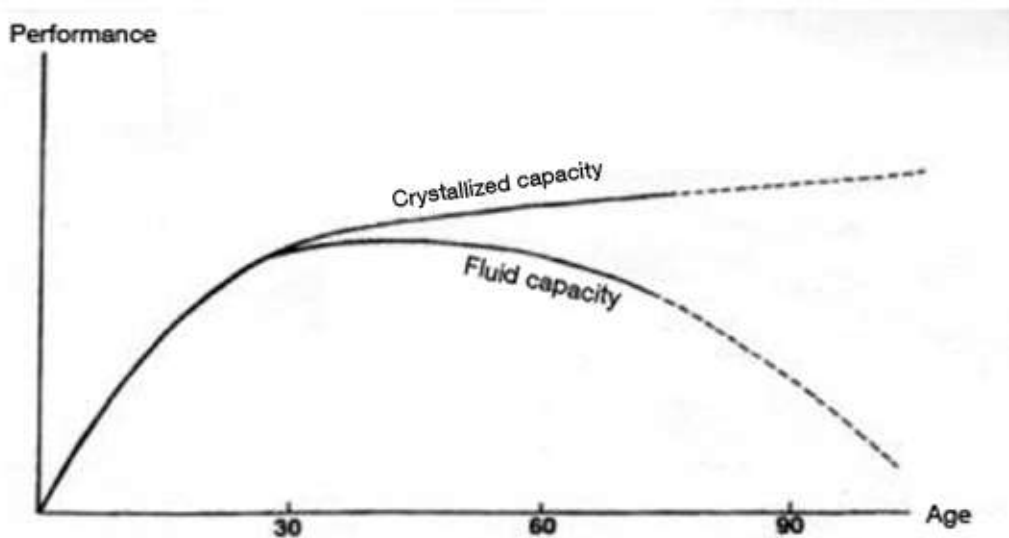


Figure 3: Changes in cognitive performance with age (Oswald, Gunzelmann, 1991)

3.7 Age-specific Requirement

The following changes can occur

- Increased sensitivity to interference at sensory overload, distractions and irritations
- warning recording and processing speed
- diminishing capacity of information processing
- gender differences in the reaction time at simple auditory and disjunctive tasks as Biermann and Weißmantel (1995) showed. Women and men always need more reaction time for the operation of disjunctive tasks than for simple tasks. In average women need more reaction time for both kinds of tasks than men. With increasing age also the reaction time for both tasks increases. In contrast to the simple tasks (parallel increasing for women and men), the reaction time for disjunctive tasks increases more in case of women than in case of men:

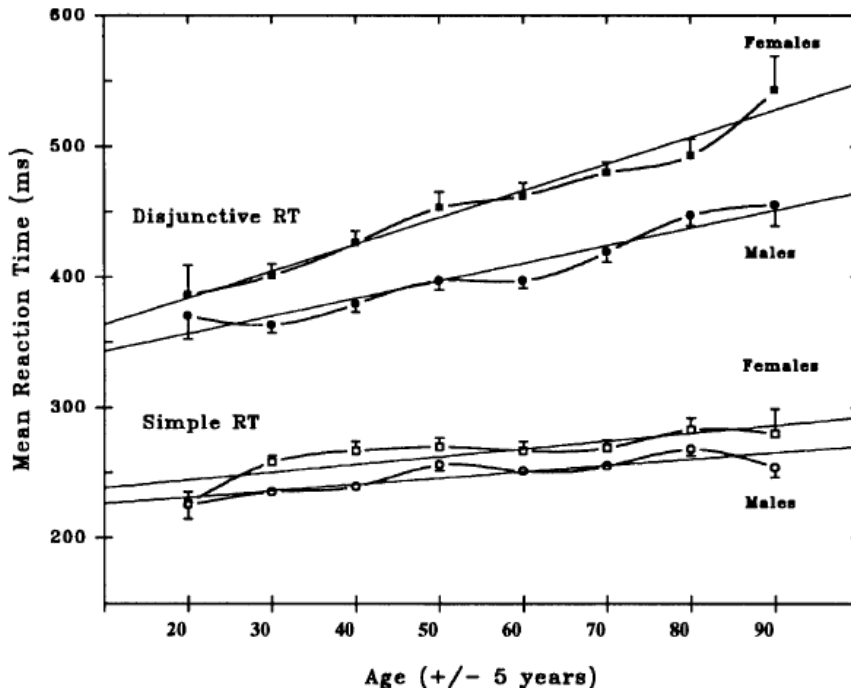


Figure 4: Increase in reaction time at simple auditory and disjunctive tasks (Biermann, Weißmantel 1995)

The more complex, for example a display scenario is created, the more time older people need to interpret it, prepare an action and run it.

- Slower and less effective decoding processes
- Longer learning time

Basically, older people take longer than younger ones to learn something new: they need more time to remember things and to understand operations. These results from a general show a slowing of information processing. But they can keep things that they already have learned as good as younger ones.

3.8 Gender Aspects and Aging

In the following chapter we dwell on the gender aspects in old age. Especially interesting for the development of a senior-focused user manual as well as of the robot are the following points:

- Life expectancy
- Financial resources
- Social resources
- Health habits
- Risk of diseases/different clinical pictures and

- Caring

In the gender studies usually two terms for gender are used: the biological sex and the social gender.

- To define the biological sex physical differences are used.
- The social gender is also known as „societal constructed gender“ (Nunner-Winkler 2003). „It is the ensemble of distinctions and valuations that reflects the distribution of power and the culture of a society as well as social functions. (ebd.)“

As mentioned in the Gender Data Report, the life forms of women and men in the age from 60 on differ from each other:

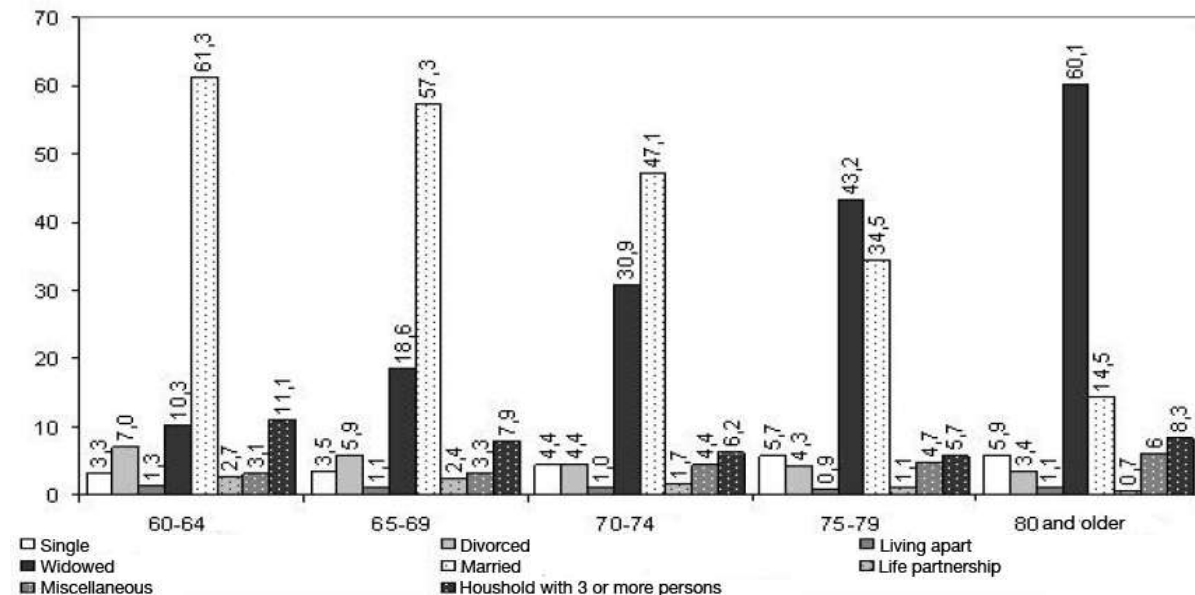


Figure 5: Life form of women in the age from 60 on (Gender Data Report 2005)

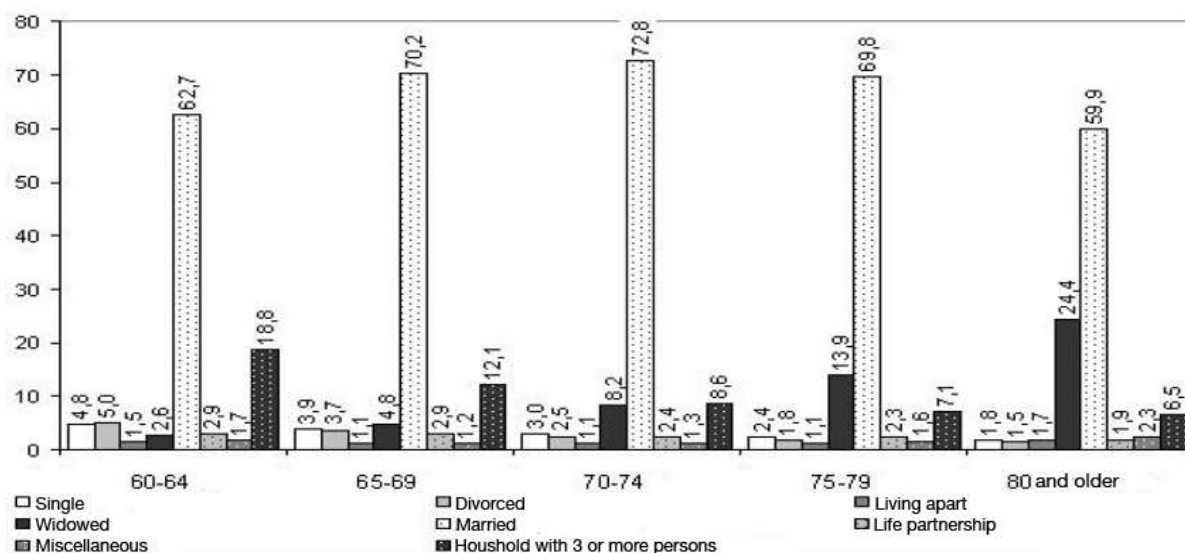


Figure 6: Life form of men in the age from 60 on (Gender Data Report 2005)

3.8.1 Life Expectancy

From statistical point of view women have a higher life expectancy than men (6 years in average). That is the reason for the majority of women in the group of very high age. Currently – not at least caused by the war – 75% of the very old people are female. Extrapolations expect that in 2050 60% of the very old people will be female. Scientists also speak of the phenomenon of the „feminization of age“. For that reasons and because their life partners are mostly older than them, women often live alone in old age. The different distribution of women and men at different life forms is striking: In the retirement age men still live predominantly in a partnership, while the proportion of women living alone is steadily increasing with age. These gender differences can be explained by the higher life expectancy of women, the average age difference between (marriage) partners and more often rebinding of men which are divorced or widowhood.

3.8.2 Financial Resources

Women have a disproportional risk at old-age poverty. Reasons for that can be found in the fact that they often have lower professional qualification, interrupted work biography caused by marriage and childrearing periods and often badly paid, exhausting work. Also a high rate of women works in the tendentially worse paid service sector. Women are more often dependent on institutional help than men. “From the average pension consisting of their own gainful employment, that women

get when retiring in 2003 they could not subsist on. (Women in West-Germany 2003: 417 €, Women in East-Germany 2003: 675 €).“ Women further have to rely on the widow’s pension.

3.8.3 Social Resources

Studies show that there is much heterogeneity within the group of elderly women when it comes to their lifestyles and life circumstances. Lifestyles often continue in old age, but a reorientation in old age is easier for women than men.

The results regarding the question, if elderly women are more threatened of isolation in old age is differentiated: The fact that women get older fortifies the risk of being isolated. But it is also a fact that elderly women show more voluntary dedication in the field of social services than men (men and women are almost equally dedicated, there are only differences in the fields; men prefer political volunteering and the field of sports). Also mostly women take part at cultural activities and educational offers. Single males in age have much smaller social networks, especially contacts with family members are made less often in contrast to elderly women.

3.8.4 Health Habits

Compared to women men do more often smoke or consume alcohol. But in the younger generation a slow approach of women and men can be seen. In comparison women are more often medication-dependent. Women estimate their health worse than men. Also different clinical pictures can be seen in old age, there are gender specific aspects for example concerning the dementia illness of older people:

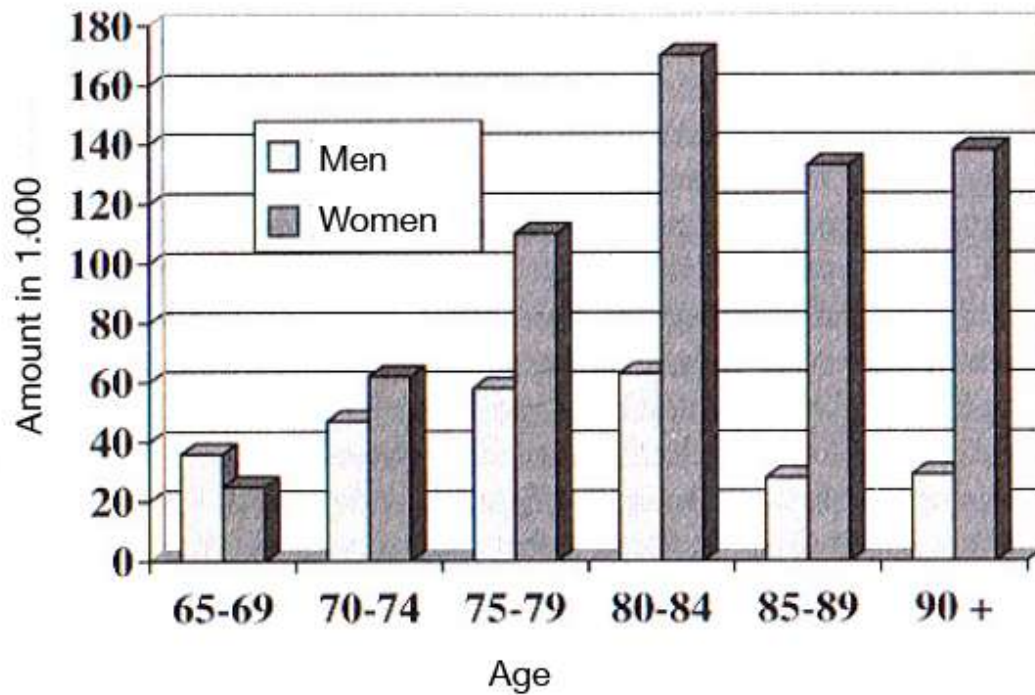


Figure 7: Number of people with dementia by age and gender (Data of EURODEM, Lobo et al., 2000)

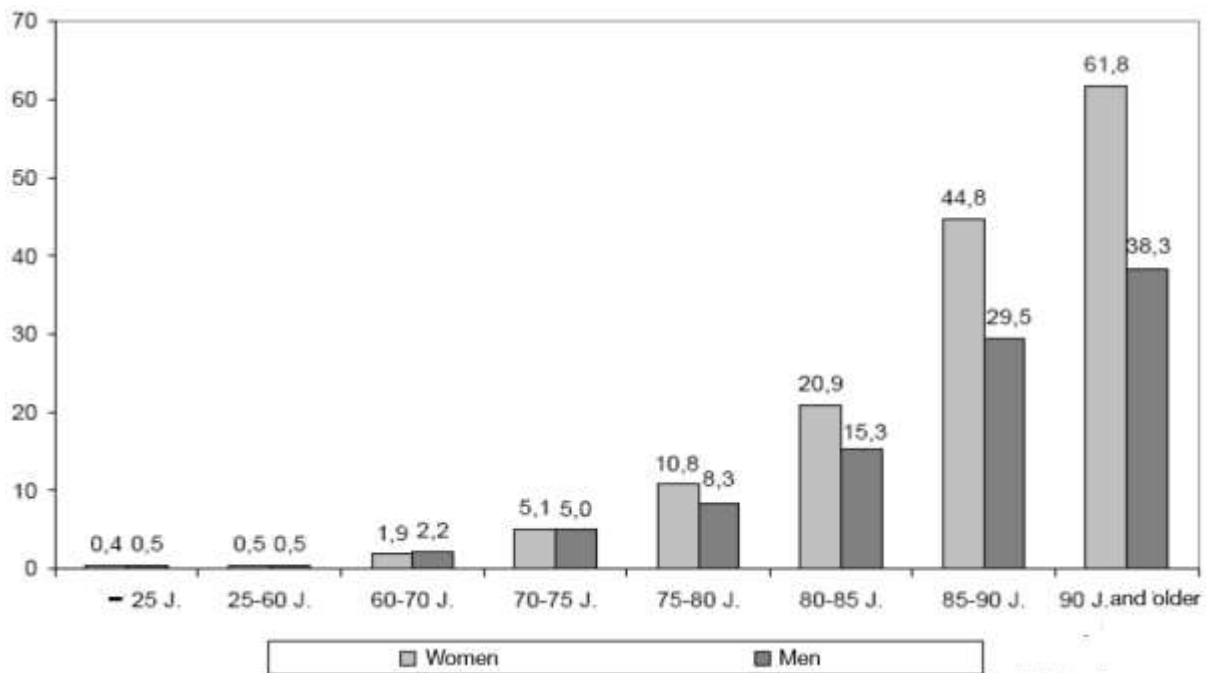


Figure 8: Proportion of the dependent women and men in each population group in Germany (Gender Data Report 2005)

3.8.5 Caring

In individual households 73% of the caregivers are women (Gender Data Report 2005, 263f.). The care of a relative often implicates a temporal, mental and physical burden for the caregivers. Because of demographic changes to care sector is gaining importance. Since more than two-thirds of the dependent people are women and the caregivers are mostly women, the range of care in two ways is gender segregated.

Understanding of caregiving for men and women:

Table 1: Understanding of caregiving for men and women

Men	Women
care acquisition is not internalized as a duty and is not expected by society	care acquisition is internalized as a duty and is expected by society
receive praise and recognition for their healthcare assistance	Obviousness of care giving. No recognition
care can be denied, this is socially acceptable	Refusal of care is difficult, it is hardly accepted by society
The tasks that are to take in a care are often new to them	The tasks of the care are structurally known

4 Design Guidelines for User Manuals from Literature Research

In this chapter, we give specific design information for written user manuals. The recommendations incorporate studies of designing information for seniors as well as for handicapped people. However, the emphasis is on the target group of elderly people. The needs derived from the special needs caused by manifestations of old age and diseases. A user manual, which is also known as an user guide, can be defined as technical communication document intended to give assistance to people using a particular technical system (http://www.io.com/~hcexres/textbook/user_guides.html). It is usually written by a technical writer, sometimes even by programmers or project managers. The user manual normally contains instructions on installing, using or troubleshooting a technical product. The more complex the product, the greater the extent. A user manual can also include a brief tutorial, for example getting users started using the product.

4.1 Format

The format of the written user manual is another important discussion point. A handy size might be selected, because both a too large and too small book may cause difficulties for seniors. A sufficient paper strength and quality should be given. It should have a certain roughness, which facilitates flipping the pages.

What should go for any publication is necessary here as well the user manual must be clear and well structured. This can be realized by clearly highlighted headings. Too much information in the form of long and confusing blocks act as a deterrent and not to achieve its goal.

4.2 Language

To avoid misunderstandings a clear and simple language as well as a clearly arranged syntax should be used as it helps communicating complex contexts more easily. Short and concise phrases refer to particular information. Foreign technical terms overload the user manual and deter elderly people using the information book

more than making them curious. Also it may cause unnecessary misunderstandings. Unusual abbreviations should be avoided as well as using different terminologies. In general, however, the language is addressed to the target group of generally interested elderly people – not to technical experts. This circumstance must be taken into account when preparing the user manual. Seniors and other users do not have the same vocabulary and background. These may lead to the result that even simple terms require explanation to make them understandable for seniors.

4.3 Characters

An user-friendly manual should be composed of a clear and simple presentation of the characters. This underlines the extraordinary importance of sufficiently large fonts, character spacing as well as line spacing for a better readability. Typefaces that have serifs should be waived. This will result in a quick and clear identification of the text. More details about this topic you will find in DIN 1450, DIN EN 62079, ISO-Standard 9241 and ISO IEC 62079:2001.

4.4 Graphics

In general, graphics simplify complicated facts for an audience familiar with technology and for the ones who are not. Long descriptions can be softened and divided including illustrations, photos and tables. It is important to make sure that visualization has a close and unique relationship to the text around and not to be used indiscriminately. A well-balanced relationship between text and images ensure the supportive nature of graphics. Overload of information has the opposite effect. Studies have shown that the usage of too many graphic elements lead to a negative assessment of the respondents, because it confuses users. This is similar to the choice of the graphic itself. Striking graphics with disquieting colours should be avoided as well as collages with a huge variety of elements. In contrast simple and clear icons that are commonly used in other areas of daily life are advantageous. We should also pay attention to the screen selection that should stigmatize the target group of elderly people. The mere representation of “old people” with physical limi-

tations as well only young people are not desired from the seniors. As mentioned earlier, older people still see themselves as "fairly young and active" and wish to find this self-perception in the user manual.

4.5 Colours

Colours are another important point for the textual and graphical presentation of a senior-friendly manual. They can help structuring the given information, they take signal functions and they make the user manual more esthetic. Healthy humans perceive 80-90 percent of the world around them with their eyes. The age-related failing vision affects the ability of orientation of seniors considerably. Poorly designed information sets high demands on the concentration and orientation so problems are the result. Different color combinations and clear color contrasts can offset age-related problems. Because of that a tone on tone design of the user manual should be avoided. Colours help to make different things clear. Following we would like to list two arguments for using colours:

- Our visual perception can only deal with information when appropriate optical characters stand out from the area. An important physiological parameter is the difference in brightness, also called light-density contrast.
- Depending on which colours are used a suitable combination of colours contrast the text and support illustrating the user manual.

A survey conducted by the German Federal Ministry of Health came to the following conclusions:

Colour combinations with small differences in brightness, like the combination white/yellow or blue/black are recognized poorly, because of the low contrast (bright colours vs. dark colours). The color combinations that proved to be advantageous have one or more of the following features:

- High differences in brightness like black and white
- An achromatic element like the combination white/black, white/purple, white/red or green/black.

- Combinations of complementary colours (yellow/blue) and the use of red only as the dark part (White/red, yellow/red).

Characters on a dark background can be read less easily than characters on a light background. Therefore light characters on a dark background should always be larger than dark characters on a light background. Based on a representative study, the Federal Ministry (1996) of Health suggests printing them about 25 percents larger. The following findings refer to the study of the Ministry of Health in Germany.

Since about 8% of men and 0.4% of women suffer from a red-green disorder, the combination of red and green should be avoided.

In addition to the light-dark contrast (black/white), contrasting colours provide additional guidance. Here, the colours yellow and green on a not multicoloured background can be recommended (black to gray).

The colours yellow and green are recommended for a not multicoloured background (From black via grey through to white). With combinations of colours bright colours in the foreground (yellow, green) on a dark background (violet, blue, red and black) are to be chosen.

Combinations with red get a special meaning since red is a signal colour. It should be regarded that red is only used as a dark component, because even of people with a dyschromatopsia lighter characters can be seen. Following table 4 shows a range of recommended colour combinations.

4.6 Web-based User Manual

In this chapter we examine the specific requirement of a web based user manual. But of course the general hints from above apply here as well.

4.6.1 User-friendly Usability

In general, older people need more time for reading and writing text in input fields than younger and technology-used people. This is something which should be taken into account during the design phase of a web-based user manual. In particular, the following points should be considered for a target group-oriented design:

- Time limits for the input of data should be avoided. Not only motorically disabled seniors have problems to react in time (for example to reply), but also seniors, who need more time for reading the information like persons with visual impairment. That is something that should be taken into consideration.
- The status of the system may be indicated during the processing. That can be realized by visual signals or audio signals. Here, you should try using a language, which is understandable, for example: “Please wait until the system has built the page”. Here it is proved to have two sensor channels (for example: speech and text) at the same time.
- A simple and intuitive operation should be ensured; thereby the design should be independent from the previous experiences of the user and her/his language skills. Unnecessary complexity should be avoided.
- We should take different levels of tolerance of errors into account. That means random operations or involuntary operations should not have wide consequences. This can be solved by a final confirmation where the user has the possibility to check all entered data. In this case the elderly user has the chance of correcting any discrepancies.
- The system does not use the double-click function. Seniors as well as motorically handicapped humans have problems to click double, even if the time limits are wide estimated. They possibly have problems to use keyboard shortcuts (like CTRL A on a personal computer) too. Visually handicapped seniors also would like the possibility to use just the left or the right hand to process the robot.

Small buttons should be avoided if possible because of poor usability.

4.7 Conclusion – General Design Guideline

Several special challenges for the design of an assistant system for elderly arise from the age-related changes and characteristics described above. The following recommendations relate to a web-based user manual:

Recommendations for the design considering age-related changes in vision:

- Sufficient lighting should be provided.

- Bedazzlement should be avoided.
- High-contrast colours should be used and especially combinations of blue, violet and green should be avoided.
- The screen, the control elements and the displays as well as letters, numbers and icons should be as large as possible; the font size should be at least 9mm.
- Contrast between font and background should be maximized.
- The screen, the control elements and the displays should be positioned in the bottom part of the field of vision to make sure elders with bifocal glasses do not have problems with the operating.

Recommendations for the design considering age-related changes in hearing:

- Background noises should be held at a minimum.
- Acoustic signals should have a frequency of 800-1000 Hz, because elders can perceive such a frequency best and fastly.
- Two sensory channels should be addressed if possible, that means acoustic signals should be fortified with visuals and vice versa.

Recommendations for the design considering age-related changes in touching:

- For the most important control elements tactile marks should be there, which should be at least 0.5 mm in height.

Recommendations for the design considering age-related physical changes:

- Control elements should have a sufficient size and be easy to press, turn or move.
- It should be possible to operate the robot with just one hand (left or right).
- An appliance to hold on and maybe for lying little utensils on it should be given.
- Operating processes should be as short as possible.

Recommendations for the design considering the changes in the mental field:

- Distracting background noises should be minimized.

- The system should be as self-explanatory as possible and be based on existing knowledge and expectations of elders.
- Instructions should be possibly short and easy.
- The user interface should be easily understandable.
- Control elements should be organized neatly and logical.
- Consistency in command language should be maintained.
- The extent of sensory stimuli by using the robot should be as small as possible.
- Small cognitive effort for handling with information should be necessary (irrelevant information should be avoided, but it should be presented as much as necessary).
- Enough time until the next operation step should be provided.
- On eventual screens guidance notes to find the cursor should be provided (e.g. a flashing cursor).
- It should be possible to operate the system with just one hand.
- Information about what the system is doing at the moment should be provided (e.g. “in process”, “please wait”).

5 Results of a User Workshop about User Manuals (YOUSE & pme)

The results of the workshop at pme Familienservice, 7th of June 2011, Berlin, of relatives and professional care givers are described below. The schedule of the workshop is in the appendix.

Aim of the workshop

- Evaluation of different basic types of user manuals (speech based manuals, written manuals, video based manuals)
- Evaluation of specific user manuals aiming on the identification of specific requirements

Time, Place and Participants

Place: pme Familienservice – Flottwellstr. 4-5 – 10785 Berlin

Time: 7 June, 2011; 16:00 – 19:00

Participants:

- 7 seniors (aged between 66 and 79 years)
- 3 family members of persons in need of care (aged between 29 and 65 years)
- 1 eldercare consultant

Moderation:

- Sebastian Glende (YOUSE)
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Please note, that the results only show the opinions and wishes of the users.

Additional information on the design and usability of manuals, software products etc. will be delivered in a different paper of WP1 and can also be found in ISO: IEC 9126 and ISO 14915.

5.1 Scenarios for Use of User Manuals

The decision, which types of user manuals should be developed for a product, depends on the functions a user manual should fulfill and the situations a user manual is used in.

Functions of a user manual are:

1. Passive function: A user manual should provide help and explanations, when the user has issues with the product, e.g. with troubleshooting or understanding use processes
 - a. Troubleshooting or support in specific use situations (e.g., if the user does not understand how to give access to his own calendar to other persons)
 - b. Repeated reading of explanations regarding specific functions and their effects
2. Active function: A user manual should – particularly with an innovative product – present new functions and their use to the user and thus, activate the users interest in these functions.
 - a. Presentation or first encounter and installation of the robot (also possible with secondary (e.g. caregiver) and tertiary users (e.g. service))
 - b. Overview on basic and special functions
 - c. First use of a function
 - d. Tutorial for specific functions

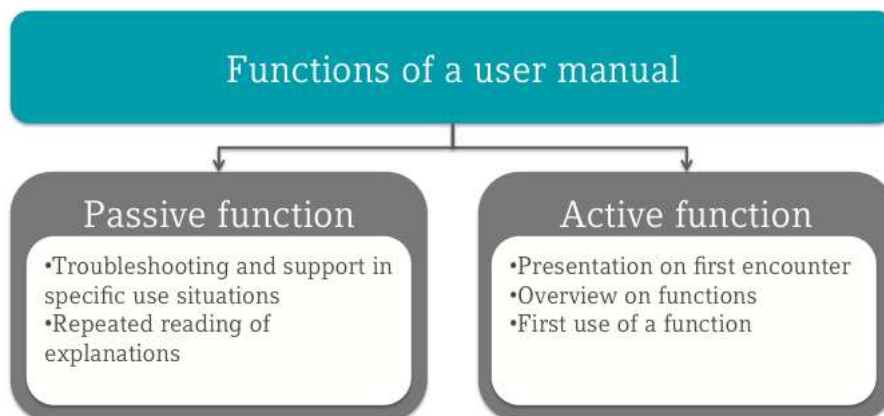


Figure 9: Functions of the user manual

5.2 Types of User Manuals, Applicability and Specific Requirements

Different types of user manuals are appropriate for different use scenarios. Below six types of manuals with reference to robots are described:

- Introduction Event (Active)
- Tutorials (Active)
- Video Based Manuals (Active/Passive)
- Help Function (Passive)
- Written User Manuals (Passive)
- Hotline (Passive)

5.2.1 Introduction Event (Active)

Definition:

An Introduction Event is to present the robot and its functions to the user – in an appropriate ambiance for a high-tech product. The functionality and its benefits should be pictured optimally to motivate the user to use the robot efficiently. A technician should attend this event to answer questions.

Applicable for:

- Overview of functions
- Introduction of first encounter
- Explanations of basic functions and their effects

Specific requirements:

Ambiance:

- Appropriate, first-class ambiance (similar to the ambiance provided when buying first-class cars)

Tangibility and language:

- Consistent use of terms
- Few technical terms
- Few „german-english-mixtures (denglish)“
- Slow and clear speech of technician

- Listening and responding to the customer

5.2.2 Tutorials (Active)

Definition:

The robot itself leads the user through various functions and gives instructions. He introduces himself, explains what he is able to do, answers questions and asks the user if issues can be solved.

A tutorial should be worked through step by step, avoiding an information overload. E.g. at a first encounter only basic functions are explained, later the robots asks its users regularly, if he wants to know more about specific functions. If so, he leads the users through these functions step by step.

Applicable for:

- Overview of functions
- Introduction of first encounter
- Explanations of basic functions and their effects
- Description of special functions and troubleshooting (high efforts necessary), e.g. if the robots realizes, that a users conducts specific tasks inefficiently
- Overview on background information (e.g. development, history of the robot)

Specific requirements:

Structure and content:

- Interactive, like a real conversation (posing questions, receiving answers and advices)
- Robot could introduce himself and its functions
- „step by step" explanations (e.g. at a first encounter only basic functions, if necessary more details – e.g. by question: „Do you want to know more about making a call with my help?“; „Should I explain this know or later?“)

Controllability:

The user should always be able to pose detailed questions, if some explanations have been not clear, or to let the robot repeat answers (optimally via speech com-

mand „again“ or „I did not understand“). In case of uncertainty the user should be provided with links to written user manuals or printouts of the help function.

Tangibility and language:

- Consistent use of terms
- Few technical terms
- Few „german-english-mixtures (denglish)“
- Direct conversation with user
- Loud and clear speech
- No background music, no „bells and whistles“

5.2.3 Help Function (if applicable multimodal – Speech plus Screen based) (Passive)

Definition:

The help function is part of a software and provides explanations and concrete advice for the use of the robot. It can be accessed via display and/or speech dialogue with signal words. It is available during the use of the software or robot.

Applicable for:

- Description of special functions and troubleshooting
- Supplement or parallel instruction for other types of user manuals (e.g. written user manual or short manual)

Specific requirements:

Structure and content:

- Structure „from general to specific“ (tree structure should be available)
- Displaying or announcement of categories
- Ability to search for catchwords or groups of words
- Easy-to-use repetition of explanations (e.g. with the command „again“)
- Memorizing of conducted searches and suggestion of these during new searches with colour-marking (where it adds value)of the most adequate suggestions

Design, text, pictures:

- Clear position and colour-marking of search box
- Clear position of answer / solution box so that this solution can be applied without hiding the solution box
- Display of several solutions (only one sentence) which can be chosen to read / hear more details

Tangibility and language:

- Consistent use of terms
- Few technical terms
- Few „german-english-mixtures (denglish)“
- Speech output should be adaptable to users with reduced hearing or hearing devices

Other:

- If no written manual is provided, the help function should allow to print out instructions

5.2.4 Written User Manuals (Passive)

Definition:

A user manual is defined as an „instruction, how to use something“ or as „written instruction delivered by the manufacturer“.

A short manual is a special form of a written user manual, which presents basic functions with a focus of drawings and pictures instead of text).

Applicable for:

- Overview on functions, explanation of their use and effects
- Description of special functions and troubleshooting
- Repeated reading and internalizing of functions
- Improving the confidence to use a product correctly

Specific requirements:

Structure and content:

- Structure
 - Index of contents

- If applicable: Index of contents as organisational diagram, printed in the cover pages of the user manual
- Overview of robot with description of most important display and actuator parts, printed in the cover pages of the user manual
- Installation
- Explanation of functions
- If applicable: Technical data
- Troubleshooting
- Contacts to service
- Glossary
- If user manual contains several languages, specific language should be easy to remove
- Use of drawings as complement, possibly without overlap between text and drawings
- Short texts with additional drawings (like in comics)

Additionally, a short manual with most important functions and advices for first encounter should be attached

- Size: About one standard page, folded or as a small booklet
- Use of pictogramms
- Overview of robot with description of most important parts
- Links to other types of user manuals
- Stowable in the robot
- If applicable: Contact to hotline

Design, text, pictures:

- Avoid information overload
- High contrasts
- Sufficient text size (min. 3,75mm)
- Coloured guidance system (contents that belong together can be marked with same colours)
- Use of colours only if it provides additional information
- Consistent use of colours
- Realistic drawings of exactly the product the manual belongs to

Tangibility and language:

- Consistent use of terms
- Few technical terms
- Few „german-english-mixtures (denglish)“

Other:

- User manual should be able to be stowed in the robot to avoid displacing the manual
- User manual should be prepared to be filed away

5.2.5 Hotline (Passive)

Definition:

A Hotline is a customer telephone service.

Applicable for:

- Support in cases of emergency (e.g. if the robot is “frozen”)

Specific requirements:

Transmission of problem:

- Via telephone, if possible contacting a real person, not an electronic guidance system
- Via display = tele-maintenance

Tangibility and language:

- Consistent use of terms
- Few technical terms
- Few „german-english-mixtures (denglish)“
- Loud and clear speech

5.3 Access of User Manual

Some of the manuals described above need to be accessed during the use of the robot (e.g. Help Function, Video Based Manuals). Therefore, several ways should be provided in parallel:

- Access via question, e.g.: How can I...?
- Access via signal words, e.g.: „Question“, „Support“, „User Manual“

- Access via coloured, big and if necessary illuminated button on display
- Remote control, tele-maintenance

5.4 Recommendations for ALIAS

The descriptions below are aggregated recommendations of the workshop. They give an overview on types of manuals that should be used for specific scenarios, and they explain what requirements have to be taken into account when designing these manuals.

5.4.1 Favoured types of User Manuals

1. Tutorial or Video Based Manual for the explanation of basic functions, e.g.:
 - Overview of functions
 - Introduction of first encounter
 - Explanations of basic functions and their effects
2. Written User Manual:
 - Overview of functions, explanation of their use and effects (preferably with a short manual)
 - Description of special functions, installation and troubleshooting
 - Repeated reading and internalizing of functions
 - Improving the confidence to use a product correctly
 - Contact to customer service
3. Help Function with Speech Dialogue
 - As parallel realization of the written user manual
 - Particularly for troubleshooting

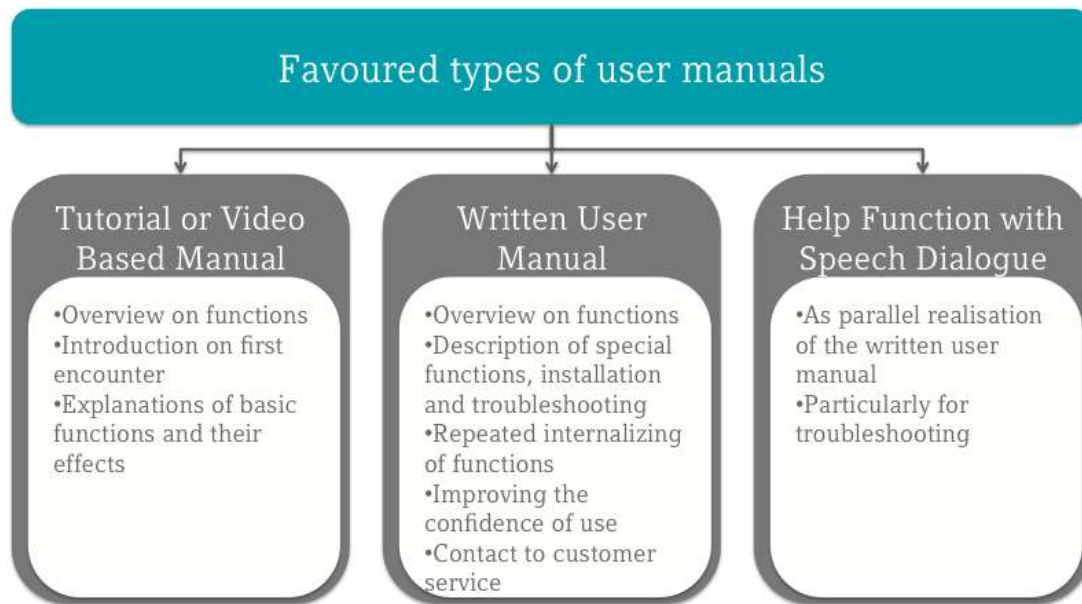


Figure 10: Favoured types of user manuals for ALIAS project

5.4.2 Functions to explain at first Encounter with Robot

- Introduction of robot
- Explanation of basic functions (written and video or speech based)
 - Switching On/Off
 - „Senses“: speak, listen, understand, learn (e.g. learning the user’s name), see etc.
 - Ways of locomotion
 - Charging (duration, availability during charging etc.)
 - „Parking position“
- Overview over functionality
- Description of menu structure and use principles
- Description of help function or user manuals

5.4.3 Basic Requirements

General

- Use of a user profile to individualize robots behaviour and help function
 - Consideration of limited hearing or vision
 - Choice of language
 - Choice of preferred voice of the robot

- Consideration of user's experience with product
- Consideration of linguistic specialties (e.g. dialect, speech disorders)
- Save voices, interaction of friends and other persons in the user's surroundings

- Use of multimodal communication (speech + text or text + drawings)
- Slow and clear speech
- Consistent use of terms
- Few technical terms
- Few „german-english-mixtures (denglish)“
- Direct conversation with user
- No background music,
- No frills

Design, text, pictures:

- Prefer drawings instead of photos
- Avoid information overload
- High contrasts
- Use of colours only if it provides additional information
- Consistent use of colours
- For videos: controllability

6 Further Activities of WP1

In this chapter we will present the recent results of WP1 activities. First we report on the survey at the Centre of Cognitive Disorders, then we dwell on the two workshops with the VDI senior group realized in cooperation of GSing and TUM-MMK. Finally we present the new contact and experiences with the housing association “Aging at the Ackermannbogen”.

6.1 Centre of Cognitive Disorders and Rehabilitation

The Centre of Cognitive Disorders and Rehabilitation is the first ambulance for memory (Memory Clinic) in Europe. In the Centre of Cognitive Disorders patients with memory disorders, depressive disorders and other age-related diseases get thorough diagnostics and therapy. The range of service includes neuropsychologic diagnostics as well as interrogation of the family. Treated are for example Alzheimer’s disease, frontotemporal degeneration and Parkinson’s disease.

Though the Centre of Cognitive Disorders is specialized in brain capacity disorders, which occur mainly in the second half of life, yet the institution is not a typical institution for geriatric medicine; the average age of the patients is under 70, many of them still have a job. The Centre consists of an ambulance and a day hospital with 12 places available. The patients are treated by an interdisciplinary team consisting of medical doctors, psychologists, social education workers, occupational therapists and physiotherapists.

http://www.psykl.med.tum.de/index.php?option=com_content&task=view&id=45&Itemid=28).

It is worth noting that the self-help initiative Alzheimer Gesellschaft München e.V., founded 1986, has its origins in the union of former patients [<http://www.agm-online.de/>], which merged with similar initiatives of other cities all over Germany in 1989 to the „Deutsche Alzheimer Gesellschaft“ [www.deutsche-alzheimer.de].

Further information about the Centre and its activities can be found here: http://www.psykl.med.tum.de/index.php?option=com_content&task=view&id=45&Itemid=28

In January and February 2011 GSing conducted a survey at the Centre of Cognitive Disorders. Family members of ambulance patients were polled. Altogether 16 persons took part at the poll, 7 women and 8 men. One person refused to response. The persons polled had an average age of 75 and most of them (13 persons) live in a two-person household, the rest (3 persons) live alone. The educational range of the interviewees is broad, so the educational background does not play a certain role for the answers: Four people attended a secondary school, five attended the middle school and seven have a higher education (grammar school, university degree). Because of the high age of the focus group, what we knew from a preliminary talk with Mrs. Dr. Diehl-Schmid, we used the questionnaire for seniors. Following we present the most important results from the poll:

More than every third person described his or her current health situation as “not well” or “not well at all”. In addition five seniors affirmed the question about physical impairment and mentioned the following types of impairment:

Table 2: Type of physical limitations:

Diabetes mellitus II
Knee pain due to a hip fracture
Hearing loss
Hearing loss
Hearing loss, slight paralysis in the legs (stroke)

The interviewees live more secluded, maybe because of the disease of their family member. Only two of the interviewees said that they “regularly do something with their friends”.

The seniors seem to be open for new (communication-) technologies, if they think they can simplify their daily life. 15 interviewees stated to use their cell phone regularly and four stated to regularly use a navigation device. As the next table shows, the handling of technology has a different ease for the seniors:

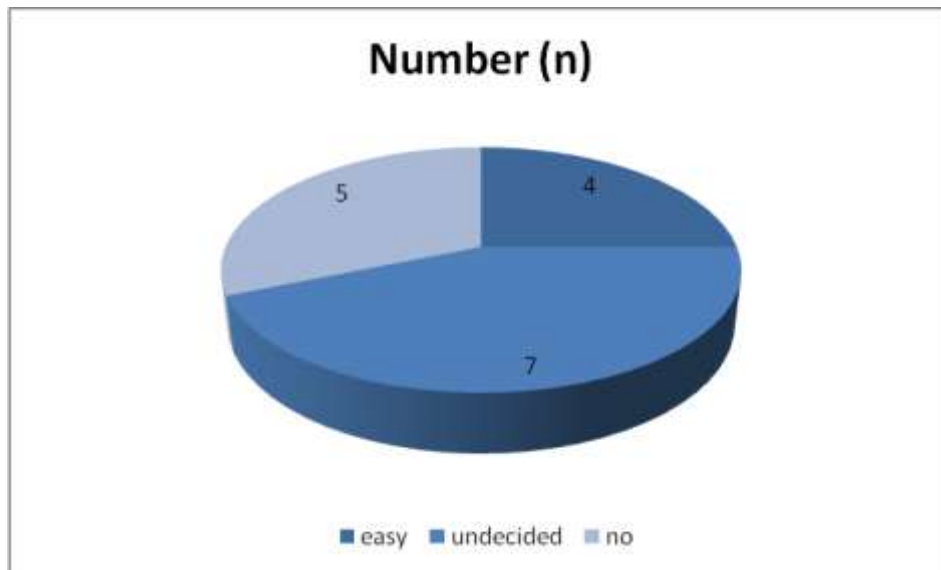


Figure 9: Do you easily deal with technology?

Only two interviewees use the internet as a medium of communication, as the following table shows:

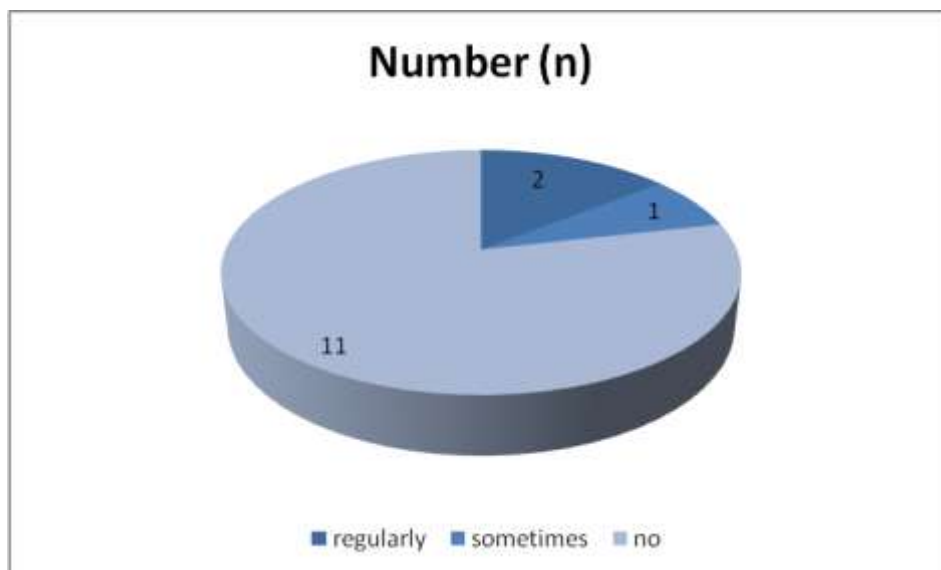


Figure 10: Do you use the internet?

When we asked the seniors to share their experiences with the internet, we got the following answers:

Table 3: Please describe your experience with the internet:

Daily life is unthinkable without it; especially I'm on familiar terms with friends all over the world.
The screen and font size are too small. Too much advertisement.
Useful information!
No experience.
I have a computer which is ten years old. It's too slow.

Though the internet is useful physical limitations and problems with the technology partly hinder the using of the medium. There is much evidence that seniors will use the internet, if ALIAS succeeds to ease the use of the internet and to create the technological requirements for a secure and stable use of the internet.

After all, two of the polled seniors stated that they had made experiences with social media in the past (both with Facebook), although they do not use it regularly.

The question, if the seniors can imagine using a nursing roboter like ALIAS regularly, caused reserve. This can be given by the fact that the interviewees in the Centre of Cognitive Disorders only saw a photo of ALIAS.

Table 4: Can you imagine using a robot that can help you in everyday life?

	Frequency
yes	4
indifferent	7
no	4
Total	15

The majority of the interviewees would not feel observed when the robot would be in the same room with them or cross the room to get to the charging station. The results can be seen in the following two tables:

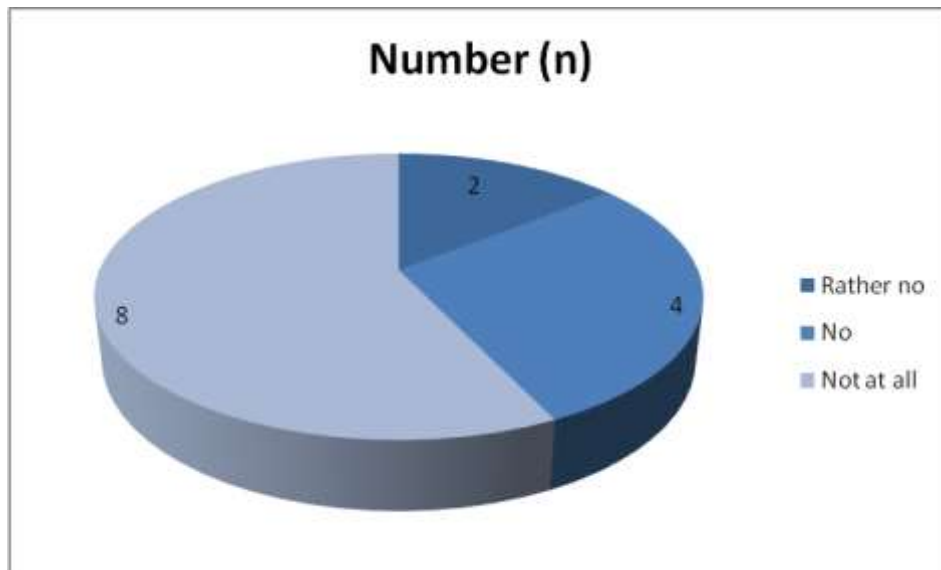


Figure 11: Do you feel observed, when a robot (as seen on the picture) is in the room with you?

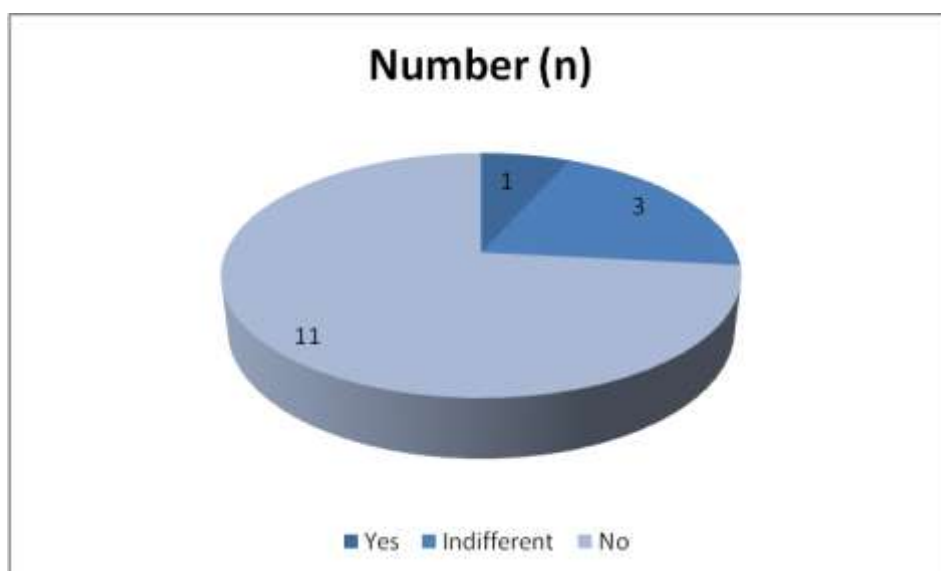


Figure 12: The robot has to go to its charging station and passes in front of you. Is that uncomfortable for you?

The question, which speed of the robot the seniors prefer, caused the following table:

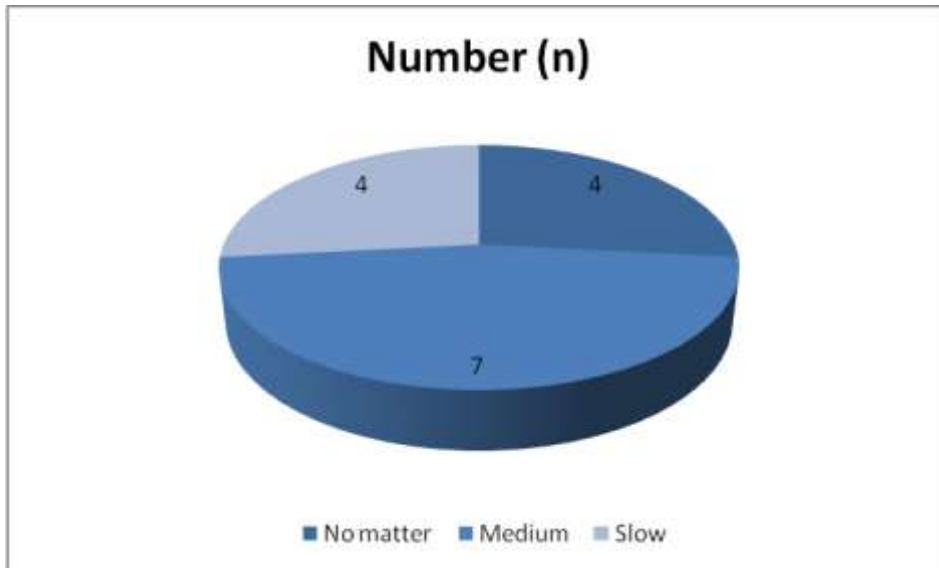


Figure 13: Which speed of the robot would you prefer?

As the following table shows, the majority would be scared, if ALIAS would move fastly:

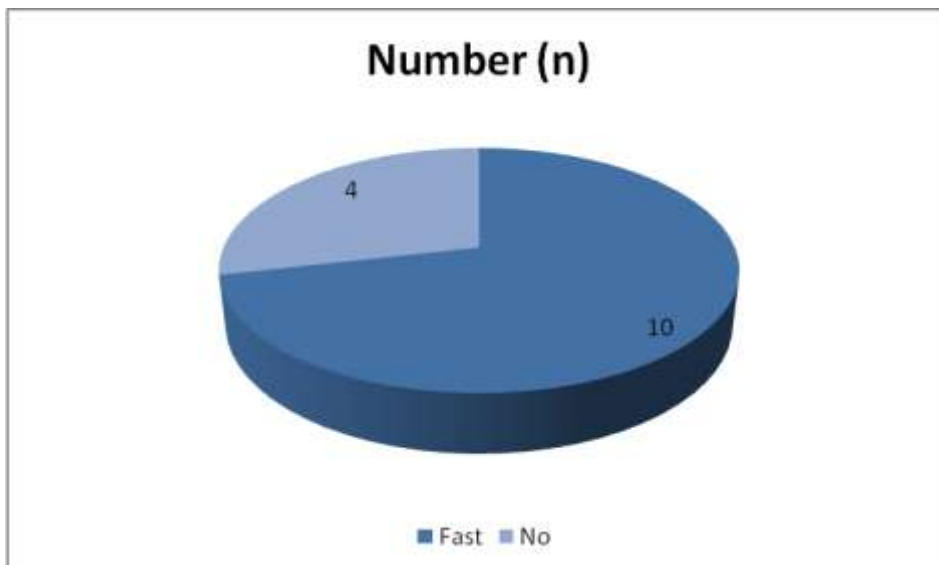


Figure 14: Are you afraid about some of the following speeds of the robot?

Because of that and our already carried out survey, ALIAS should move at a medium speed. Another possibility would be that the speed is adjusted to the user or can be

set individually by the user. In that way ALIAS could react to progressing signs of old age and the changing needs of the target group.

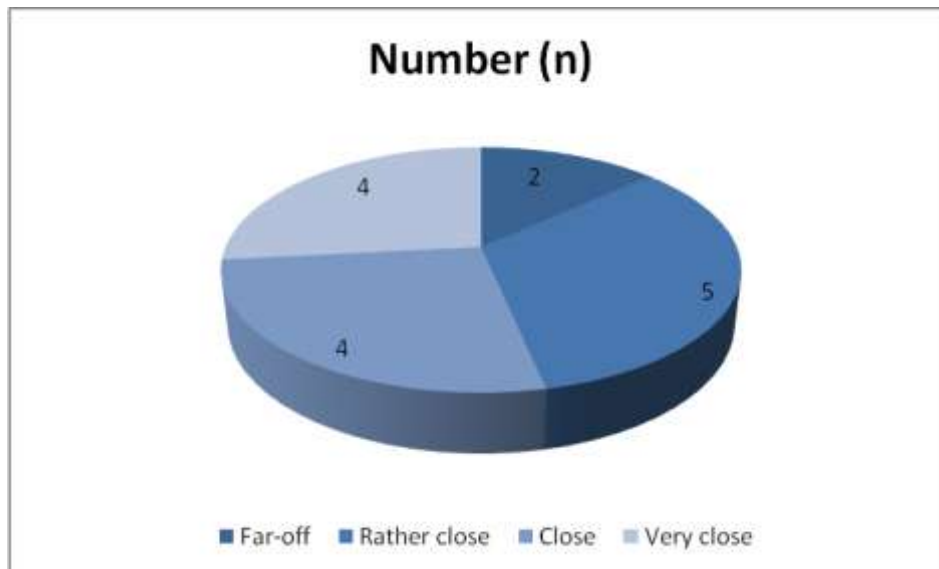


Figure 15: Imagine the robot moves to you to help you (for example when you measure blood pressure). How close should the robot drive up to you?

All of the interviewees prefer a natural voice for the robot (13 persons) rather than a synthetic voice (0 persons), whereas for two interviewees it is equal, which voice the robot would have and one person refused to answer. The majority of the seniors would prefer a female voice over a male one as the following table shows:

Table 5: Which color of the robot's voice would you prefer?

	Frequency
No matter	7
Male voice	2
Female voice	6
Total	15

The majority of the seniors interviewed were willing to learn a few commandos to operate ALIAS:

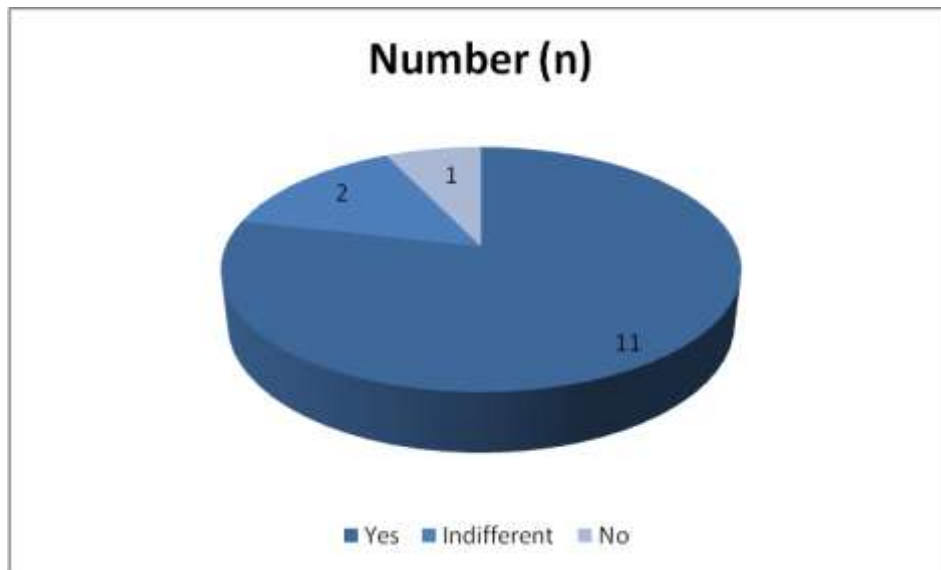


Figure 16: Are you willing to learn a small number of commandos to control the robot?

This broad consent is also an evidence that they can imagine using new technologies in old age.

When asked how they would continue operating the robot when it does not understand a commando, ten seniors answered that they would repeat the commando, two seniors answered that they would continue with the keyboard control and another two seniors answered that it is the same for them.

Table 6: The robot does not understand your commando. How do you want to continue the control of the robot?

	Frequency
Others	1
No matter	2
Keyboard control	2
Repeat speech control	10
Total	15

At the end of the questionnaire the seniors had the opportunity to comment the project and the questionnaire. Following are the wishes, improvement suggestions and critics of them:

Table 7: Criticism

To my knowledge, there is such a device already in Japan.
No human relationship, no human warmth, no human contact, I can't talk about my worries, I don't see any comfort from it etc.
The robot should be a friendly, helpful and peaceful service provider, so I can faith in it and its functions.
The robot shouldn't be too big, maximum 1,50 m.
The robot should be operated even with diminishing mental activity, simple comandos.
How to overcome stairs?

6.2 VDI Seniors

On March the 22nd 2011 GSing and MMK have jointly organized an information session on "Adaptable Ambience Living" at TÜV Süd. The event was arranged for former engineers and it was jointly organized by the VDI senior working group. First GSing and MMK informed the audience about the project, user inclusion and technical implementation of ALIAS.

After the presentations the participants discussed about more or less useful features, visions as well as weak points. We would like to briefly summarize the main points of the discussion:

- The event was attended by 20 former engineers, 17 men and three women. Based on the written survey we know that they are between the age of 60 to 87, about half of them showed initial elderly diseases.
- The participants described loneliness as one of the main problems of old age and they were concerned that ALIAS destroys contacts but does not help to carry on relationships/establish contacts. They told us that especially their contacts to the deliverers of "meals on wheels" are important in their daily routine. Otherwise only the TV would remain.
- The seniors invited us to check the complexity and the operation manual of ALIAS. Not all technically possible functions are necessary. They explicitly appreciate a close cooperation between engineers and social scientists in the project.

- The seniors criticized the fact that ALIAS needs a barrier-free environment. This is one of the major obstacles buying such a technology.
- The participants describe that one of the major problems in everyday life is their forgetfulness. A senior told us that he is concerned to forget switching off the oven etc. Therefore it would be good if ALIAS can check such things.
- Moreover the seniors believe it's important that ALIAS can monitor the vital signs and make an emergency call if they need help.
- Furthermore the participants raised the question, if a robot saves money in the reality.

Because of the success we have decided to invite the VDI senior working group to a workshop at the TU München, CCRL. This took place on May the 19th 2011. Four male and one female senior took part. They came from VDI and TÜV SÜD. They had the opportunity to meet different types of robots and provide feedback on the demonstrations.

First the participants got an overview about the Excellence Cluster "Cognition for Technical Systems (CoTeSys)" at the TU München (held by Dr. Uwe Haass) and an insight in projects dealing with robotics and cognitive systems at the CCRL. Afterwards PhD-students showed a few results of their work during the last years and demonstration scenarios were presented to the participants. At each demonstration scenario the elderly people had the opportunity to discuss with the PhD-students and the ALIAS members about the work in the Cluster CoTeSys. Furthermore functions and abilities of the ELIAS-robot were presented and debated. At the end a final discussion with the workshop members was held.

6.3 Aging at the Ackermannbogen

Next we'll report on GSing's meeting with two co-founders (Mrs. Cranach/Mrs. Wagner) of the housing association "Älter werden am Ackermannbogen" (Aging at the Ackermannbogen) on May 4th 2011. The project group can also be called by their acronym "ÄlWA".

First GSing presented the ALIAS project and our aims for the user centered design, then the two ladies told us about their project group, which we'll summarize for you

below. For more details about the housing association see this website: <http://www.ackermannbogen-ev.de/de/projektgruppen/aelwa> (page only in German).

Älwa was developed in 2010 from the association “Cousinenverein” (Cousin-Association), which was setup from the desire for neighborly help during hard times. For cases of emergency the Cousin-Association had the contact data from family members, attending physicians and other important persons in a confidential register. In a second register the CousinAssociation collected their experiences with physicians, hospitals and other institutions of daily life. As a result of their personal experiences with illness and nursing cases among friends, acquaintances and neighbors, it was obvious that the activities of the CousinAssociation would not be enough for the aging process. That was the reason why they decided to search for a place where they can live together including the option of professional care. This was the birth of the ÄlWA project group, which includes 23 women and two men between the age of 60 and 75 years. The housing association bought a plot in the center of Munich and built barrier-free apartments for all members. At the moment all residents are healthy and don't need any help, but in the future the building should be enhanced by a nursing service point in the direct neighborhood.

Next GSing and MMK will invite the elderly people to an information session and demonstration of ALIAS at the TU München. Mrs. Cranach provides an opportunity of testing ALIAS in an apartment; afterwards the residents get to know the robot at the TU München. GSing has seen some of the apartments which are suitable for tests because of parquet and accessibility.

7 Appendix

7.1 Schedule of the YOUSE/pme workshop

16.00-16.20 Introduction

- Presentation of workshop topics
- Introduction of project and robot

16.20-16.40 Brainwriting (6-3-5-method)

- Basic retrieval of use cases, likes and dislikes – What type of manual do users need for various use cases? Questions for participants:
 - In which situations with the robot would you use a user manual?
 - How should instructions be presented to the user? Why? What specific requirements do you have?
 - How to access a user manual?
 - Which functions of the robot should be explained at a first encounter with the robot?
 - How could the robot support you when having concrete questions regarding its use? How should the robot explain in an easy-to-understand way?

16.40-17.40 Presentation of results and discussion

- Presentation of results
- Discussion of questions / answers
- Documentation of relevant results on flipchart
- Determination of adequate types of manuals for specific scenarios

17.40-18.20 User manual test and identification of requirements

- Presentation of three types of manuals
 - Group 1: Video Based Manual (Example: www.dropbox.de)
 - Group 2: Written Manual of a coffee maker
 - Group 3: Help Function of Microsoft Word
- Examination of types of manuals in small groups
- Discussion of following questions:
 - Which strengths and weaknesses do the manuals have?

- How useful for users of robots are these specific types of manuals?
- Which requirements are relevant for specific types of manuals?
- What makes the specific type of manual user-friendly?
- What design advices can be given for all tested manuals from a users point of view?

18.20-19.00 Results and closure

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