# Deliverable D5.3

## Report of the user trials and evaluation

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**Abstract/what is new in this version?**

This is a new document since the MTR. D5.3 "Report of the user trials and evaluation" provides a detailed analysis of the interaction between 55 older adults,14 informal and 13 informal caregivers with the personal assistant Anne in three different country: Italy, The Netherland and Luxembourg.
This deliverable presents the main findings of the 'Field Trial'.

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**Content:**

# 1 Executive Summary

D5.3 "Report of the user trials and evaluation" provides a detailed analysis of the field trial. The rationale of the document is divided as follows:

- A brief sum up of the trial is reported in Section 2 "An Overview of the Trail Concept".
- "Recruitment strategy, participants' set-up and user instruction in each site" section summarizes the recruitment procedure in each site and the common user's set-up followed for the instruction phase.
- Section 4 "Results" is the biggest chapter of the document and offers an initial overview of socio-demographic characteristics of volunteers who used the system and then discusses in depth the major pillars of the validation study results.
- Section 5 shows a sum up of outcomes and failures/success criteria.
- "Problematic aspect faced during validation" is the section where the most frequent problematic aspects faced during the validation are reported and analysed.

# 2 An Overview of the Trial Concept

In this section a detailed description of the first field trial is presented.

According to the D5.1 "Trail Concept", 55 volunteers were enrolled in the Living Well with Anne study across three research centres: National Institute on Health and Science on Ageing (Italy), The Parabool (The Netherlands) and Stëftung Hëllef Doheem-SHD (Luxembourg).

Inclusion criteria were:

- aged 60 years or older;
- living independently;
- Mini Mental Status Examination (MMSE) [ Folstein et al., 1975] score between 24 and 30;
- overall good health condition.

The presence of at least one of the following criteria excluded the user from the enrolment:

- lack of written informed consent,
- presence of unstable chronic condition, a Mini Mental Status Examination lower than 24,
- presence of severe physical illness or disabilities that could be aggravated by the use of Anne.

When available, even the formal or informal caregivers were involved in the study.

The field trial run for at least 5 weeks in each site.

The whole study was managed by skilled personnel and researchers that guaranteed both the supervision of the tests by specialized staff and the detailed measurement of the first interaction between users. The first field trial procedure consists of the following phases:

- Recruitment and Baseline phase based on specific inclusion and exclusion criteria.

- Instruction Phase. In this phase, users were instructed to use the system's functionalities a detailed manual of use was provided for support.
- Evaluation of the interaction.

The following tests were used to evaluate the interaction among users and Anne. Data was collected in 2 different phases for both older adults and formal/informal caregivers:

1) First phase, the baseline (T0: before starting the field test). In this phase 5 tests were administered:

- Socio-demo data, Mini Mental (Folstein et al., 1975), SF12 (Ware et al, 1998), QOL-AD (Logsdon et al, 1999), Almere Model for older adults (Heerink et al, 2010);
- Socio-demo data, Caregiver Budren (Novak et al., 1989), QOL-AD (Logsdon et al, 1999) and Almere Model for caregivers (Heerink et al, 2010).

2) Second phase, at the end of the 5 weeks of usage (T1). In this phase

- 4 tests were administered for older adults: once again the QOL-AD and Almere Model plus the SUS (Brooke, 1996)) and the Closeness Scale (Gachter et al, 2015);
- 4 tests were administered for formal/informal caregivers: once again the QOL-AD and Almere Model plus the SUS and demand and cost information.

| **Tests to gather data from <u>older adults</u>** | | | |
|---|---|---|---|
| **Dimension** | **Method** | **Baseline (T0: before starting)** | **Evaluation (T1: after 5 weeks)** |
| Socio-Demographics Data | ad hoc items | X | |
| Cognitive State | Mini Mental State Examination | X | |
| Health Status | SF-12 | X | |
| Quality of Life | QOL-AD | X | X |
| Acceptance | The Almere model | X | X |

| | | | |
|---|---|---|---|
| Relation with the avatar | Closeness Scale | | X |
| Usability and Learnability | SUS | | X |
| Closeness | Closeness scale | | X |

Table 1 Tests to gather data from older adults

| **Tests to gather data from <u>formal and informal caregivers</u>** | | | |
|---|---|---|---|
| **Dimension** | **Method** | **Baseline (T0: before starting)** | **Evaluation (T1: after 5 weeks)** |
| Socio-Demographics Data | ad hoc items | X | |
| Burden | Caregiver Burden Inventory | X | X |
| Quality of Life | QOL-AD | X | X |
| Acceptance | The Almere model | X | X |
| Usability and Learnability | SUS | | X |
| Demand and Cost Information | ad hoc items | | X |

Table 2 Tests to gather data from formal/informal caregivers

Each instrument was verbally administered in a face-to-face session by a trained interviewer who filled the responses on a paper version of the questionnaire.

The trial started in September-December 2019 and recruitment began in September-October 2019 once all the ethical approval had been obtained in each of the field trial countries. Enrolment was completed in March 2020. Data collection was concluded in March 2020 and then data analysis was performed.

# 3 Recruitment strategy, participants' setup and user instructions

## 3.1 Netherlands

The enrolment and recruitment strategy at de Parabool (DPL) was performed in the city of Deventer under the direction of Stephanie Koenderink, staff member innovation and technique in collaboration with Kaspar Visman, ICT coordinator. 22 locations (where clients of de Parabool live), the team leaders and psychologists of de Parabool received an email and an information letter about the Living Well with Anne project (in Dutch). Together with formal caregivers of the locations and the psychologists we selected 22 potential participants who met the inclusion criteria. Most of our clients have difficulties with reading, so we made an appointment with them at their homes to inform them and their formal caregiver about the project. During this visit we planned the appointments to sign the informed consent, conduct the questionnaires and demonstrate Anne. For some of the participants the questionnaire was too long to answer all questions at once. Then we divided it into two appointments. At each stage it was possible for participants to end their participation.

The participants started using Anne after the questionnaires were completed. In total 16 participants were recruited to participate during the trail. The first installation of Anne found place in September 2019 and the trail ended in March 2020. All participants used the tool for at least 5 weeks but mostly they were able to use it for a longer period. 4 participants wanted to keep using Anne after the trail and are still using Anne.

During the field trial participants could ask their formal caregiver for help if they had questions. The formal caregiver filled in the dashboard of Anne (appointments in agenda, medications, photo's or videos). Every day they could contact DPL to ask questions or if they needed some support to learn to work with the dashboard. Multiple times we went to users or their caregivers to explain how to work with Anne again and helped them to get along. For technical issues Virtask was available to help. In total 15 participants filled in the pre - and post questionnaires and also 13 formal caregivers of these participants filled in the pre - and post caregiver questionnaire.

## 3.2 Luxembourg

Once the ethical approval was obtained, the recruitment process started. The project objectives and the inclusion/exclusion criteria were transmitted to the management team of the Luxembourg–west SHD Care Centre. Together with the formal caregivers, a list of potential participants was established.

An invitation letter with information about the project (in both French and German) was prepared and hand delivered to the potential participants by their usual caregivers. This was followed a few days later by a phone call, where appointments for a personal visit in their home were organised for all those who were interested in finding out more about the field trials. During the personal visits, the project objectives and field trials were explained in more detail and the tool "Anne" was demonstrated. Those older adults who agreed to participate were asked to sign the informed consent form, the baseline protocol was completed and Anne was installed. At each stage, the older adults were given the opportunity to refuse participation. A total of 20 older adults were recruited using the above procedure.

The 1st installation was done October 2019 and the last dismantling was done in March 2020. All participants used the tool for at least 5 weeks but many were able to use it a lot longer. During the field trials, SHD gave active support to the participants which resulted to several additional home visits. In order to help recruit and run the field trails (Installation/dismantling, questionnaire filling out and trial support, another member of the SHD organisational development team was trained. This allowed for the continuity of the service during the absence of the principal investigator.

During the recruitment, a number of "informal caregivers" were present. However, although they were all positive about the trial and agreed to support the older person during the trials, none were willing to be participate as "informal caregiver participants". The main reasons given by the informal caregivers were: too busy; not often enough with the older adults; not wishing to interfere with the autonomy of the older adult. This aspect had too major impacts:

- No questionnaire were completed by informal caregivers
- No family view of the Quality of Life for AD questionnaire

In addition, the families (e.g. adding appointments and medication; adding photographs; making video calls) were not testing certain functions adequately. This had to be done by the SHD staff. This particularly important regarding the management of appointments and medication where the participants would informed the SHD staff of all changes via phone or email and the latter would make the requested changes in the Dashboard.

## 3.3 Italy

The enrolment and recruitment strategy at INRCA was performed in the city of Ancona where a staff composed by 2 psychologists, Elisa Felici and Susy Paolini, identifying 25 possible participants that met the inclusion criteria. All the activities have been performed under the responsibility of the chief of the Neurology Unit, Dr Giuseppe Pelliccioni. Each of them was contacted by phone by the psychologist Elisa Felici, and invited to the INRCA's hospital where the Living Well with Anne project was completely shown. The same day volunteers signing informed consent were assessed with the baseline protocol defined in D5.1 "Trial Concept" and they started with the instruction phase and begun to use the system. During the days of use, participants were supported in any kind of issues via both phone and home visit.
Having completed all ethical procedures and screening tests, participants started the instruction phase. Participants received a highly structured introduction to the system using step by step walkthroughs by the researcher and the user manual. The participant repeated each task after being shown how to do it by the researcher and this process was repeated until the participant could carry out each task without prompts or input from the researcher (the participant was encouraged to consult the user manual rather than ask the researcher). The manual explained

the basic services and commands which the user would be asked to use on a daily basis. Once the user was adequately instructed on the use of the system, the users returned home where they were instructed to start using the system immediately. Users were contacted daily by phone and advised that they could contact the lead researchers at any time.

# 4 Results

## 4.1 Participants

55 older participants, 13 formal and 14 informal caregivers, composed the total sample.

### 4.1.1 Older Adults

The mean age of the older sample was 70.8 years (SD= 9.9) where 36% were male and 64% were female. Most of the participants were married 47%, 31% were single, 11% were widowed, 9% were divorced and only 2% were separated. Regarding the education, the sample have reached a secondary level of education (42%), followed by the primary (35%), the tertiary 20% and only 3% no education. The average score of MMSE was 27 (SD=2.3) and the perceived health status (SF-12) reported was considered moderately damaged (M=24.5, SD=2.9). The socio-demographic characteristics present some slightly differences between Nations that are summarized in the following paragraphs.

| | ITALY N=20 | LUXEMBOURG N=20 | THE NETHERLANDS N=15 | TOTAL N=55 |
|---|---|---|---|---|
| **Age**, mean (SD) | 75.5(4.2) | 71.5(11.2) | 63.6(9.7) | 70.8(9.9) |
| **Gender**, % | | | | |
| Male | 30.0 | 45.0 | 33.3 | 36.4 |
| Female | 70.0 | 55.0 | 66.7 | 63.6 |
| **Marital status**, % | | | | |
| Married | 85.0 | 35.0 | 13.3 | 47.3 |
| Full time relationship | 0.0 | 0.0 | 0.0 | 0.0 |
| Separated | 0.0 | 5.0 | 0.0 | 1.8 |
| Divorced | 5.0 | 20.0 | 0.0 | 9.1 |
| Single | 5.0 | 15.0 | 86.7 | 30.9 |
| Widowed | 5.0 | 25.0 | 0.0 | 10.9 |
| **Education**,% | | | | |
| No education | 0.0 | 0.0 | 13.3 | 3.6 |
| Primary | 35.0 | 20.0 | 53.3 | 34.6 |
| Secondary | 20.0 | 70.0 | 33.4 | 41.8 |
| Tertiary | 45.0 | 10.0 | 0.0 | 20.0 |
| **MMSE**, mean (SD) | 25.2(1.3) | 29.2(1.2) | 26.6(2.0) | 27.0(2.3) |
| **SF-12** total score, mean (SD) | 26.2(1.6) | 24.1(3.5) | 23.3(2.6) | 24.5(2.9) |

Tab 3 Socio-demographic data of the involved older adults

Italy

The Italian sample was composed by 20 users where 30% were male and 70% were females. A large percentage were married (85%), only the 5% were divorced, single and widowed. 45% have a tertiary education and primary (35%), followed by the secondary educational level (20%).

Luxembourg

The sample was composed by 20 users, 55% women and 45% men. Regarding the marital status, 35% of the sample were married, 25% widowed, 20% divorced, 15% single and 5% separated. Most of participants have reached the secondary level of education (70%), while 20% have reached the primary one. Only the 10% have reached the tertiary level.

The Netherlands

The sample was consisted by 15 users, 67% was female while 33% was male. Most of the sample was single (87%) and the others were married (13%). Half of the sample has reached the primary level of education (53%), followed by the secondary (34%) and no education (13%).

### 4.1.2 Formal and informal caregivers

27 caregivers were involved in the field trial, 13 formal caregivers in the Netherlands and 14 informal caregivers in Italy. Even in this case, the socio demographic data presents slightly differences among individuals that are for the majority female, married or in a full time relationship and with a medium/high level of education. The Italian participants are a little bit older than the Dutch counterparts.

| | **ITALY (Informal caregivers) N=14** | **THE NETHERLANDS (Formal caregivers) N=13** | **TOTAL N=27** |
|---|---|---|---|
| Age, mean (SD) | 66.4(12.6) | 44.7(14.4) | 55.9(17.2) |
| Gender, % | | | |
| Male | 42.9 | 23.1 | 33.3 |
| Female | 57.1 | 76.9 | 66.7 |
| Marital status, % | | | |
| Married | 78.6 | 38.5 | 59.3 |
| Full time relationship | 7.1 | 61.5 | 33.3 |
| Separated | 0.0 | 0.0 | 0.0 |
| Divorced | 0.0 | 0.0 | 0.0 |
| Single | 14.3 | 0.0 | 7.4 |
| Widowed | 0.0 | 0.0 | 0.0 |
| Education,% | | | |
| No education | 0.0 | 0.0 | 0.0 |
| Primary | 14.3 | 0.0 | 7.4 |
| Secondary | 35.7 | 92.3 | 63.0 |
| Tertiary | 50.0 | 7.7 | 29.6 |

Tab 4 Socio-demographic data of the involved formal and informal caregivers

## 4.2 Pre-test and Post-test results

### 4.2.1 Quality of life among older adults

Quality of life was evaluated using the QOL-AD standardised instrument. The results for the quality of life scores as measured by the test, were similar across all three countries with higher values in The Netherlands and lower ones in Italy. The general quality of life is in between the fair and the good perception. Slight positive differences are observed in the delta difference between pre- and post-test in The Netherland (delta QoL, M=0.8) and in Italy (delta QoL, M=0.4). On the contrary the respondents from Luxembourg reported a soft worst situation at the post test (delta QoL, M=-0.3). Off course, no correlation can be attributed to Anne but to personal situations.

Comparing the scores with the variables gender and MMSE, the quality of life of male respondents is sensitively higher than female, but only in the female respondents, there is a light improvement in quality of life at the post-test (delta QoL, M=1.1). On the contrary, the males score at the post test is negative (delta QoL, M=-1.4). As it was expected the quality of life changed on the basis of the MMSE scores: those with the higher score (MMSE=30) perceived a better quality of life but only in the cases of medium high scores like 24 and 25-29 there is a light improvement in quality of life at the post-test (delta QoL, M=0.1 for MMSE=24; delta QoL, M=0.8 for MMSE=25-29).

| **Nations** | **ITALY N=20** | **LUXEMBOURG N=20** | **THE NETHERLANDS N=15** | **TOTAL N=55** |
|---|---|---|---|---|
| QoL pre, mean (SD) | 28.5(6.6) | 35.9(6.3) | 37.4(3.7) | 33.5(7.0) |
| QoL post, mean (SD) | 28.9(7.8) | 35.6(4.8) | 38.0(2.3) | 33.7(6.8) |
| delta Qol, mean (SD) | 0.4(4.6) | -0.3(5.3) | 0.8(1.6) | 0.2(4.4) |

| **Gender** | **Male n=20** | **Female n=35** |
|---|---|---|
| QoL pre, mean (SD) | 35.7(7.4) | 32.3(6.6) |
| QoL post, mean (SD) | 34.1(7.8) | 33.6(6.3) |
| delta Qol, mean (SD) | -1.4(6.0) | 1.1(2.8) |

| **MMSE** | **24 n=12** | **25-29 n=31** | **30 n=12** |
|---|---|---|---|
| QoL pre, mean (SD) | 27.3(6.4) | 34.5(6.2) | 37.4(5.9) |
| QoL post, mean (SD) | 27.3(7.9) | 35.2(5.6) | 36.5(4.3) |
| delta Qol, mean (SD) | 0.1(5.3) | 0.8(3.2) | -0.9(5.8) |

Tab 5 Quality of life scores among older adults, correlations with nations, gender and MMSE

### 4.2.2 Quality of life among formal and informal caregivers

The QOL-AD standardised instrument was used both for formal and informal caregivers. Even in the case of caregivers, the general quality of life is in between the fair and the good perception. Minimal differences are reported among the two Nation with higher values in The Netherlands. The delta difference between pre- and post-test is negative so there is a light worst situation reported at the post-test (delta QoL, M=-1) and especially in Italy (delta QoL, M=-1.5).

| | **ITALY (Informal caregivers N=14** | **THE NETHERLANDS (Formal caregivers) N=13** | **TOTAL N=27** |
|---|---|---|---|
| QoL pre, mean (SD) | 35.5(5.7) | 38.7(3.4) | 37.0(4.9) |
| QoL post, mean (SD) | 34.0(7.6) | 38.3(3.1) | 36.0(6.1) |
| delta Qol, mean (SD) | -1.5(3.8) | -0.4(0.7) | -1.0(2.8) |

Table 6 Quality of life score among formal and informal caregivers

### 4.2.3 Closeness Scale

In our research we made use of the Closeness scale. The Closeness scale "Inclusion of the Other in the Self" (Arthur Aron and colleagues, 1992) was used as instrument of acquiring both qualitative and quantitative data of the "Inclusion of the Other in the Self". This tool from social psychology is normally used to visualize the perception of closeness between individuals. In the light of our project we strive for that Anne is not perceived as technology but as an entity with a positive prolonging effect on social experience. The first related question was about the role of Anne.

***Role of Anne***

We were interested in which role users would attribute to Anne. The first question related to closeness was about which role the elderly users attributed to Anne. It was an open question. After coding (merging data to one variable) participants apply four roles to Anne. Anne as assistant, companion, distractor or no role. Assistant and companion was attributed the most for those who attributed a role to Anne.

**Role Frequencies**

| | | Responses | | Percent of |
|---|---|---|---|---|
| | | N | Percent | Cases |
| Role[a] | Role_assistant | 22 | 43,1% | 44,0% |
| | Role_companion | 13 | 25,5% | 26,0% |
| | Role_distractor | 4 | 7,8% | 8,0% |
| | Role_no_role | 12 | 23,5% | 24,0% |

| | | | |
|---|---|---|---|
| Total | 51 | 100,0% | 102,0% |

Table 7 Role of Anne (percentages)

We asked our elderly users what this specific role meant for them and we asked in which need it fulfilled. This was an open-end question. Data was coded by inductive coding; all codes raised directly from the survey responses. Most of the participants who did not answer this question (15) were Dutch. This is due to the fact that the Dutch users had problems with open-end questions.

Results show that if elderly think Anne will apply in a certain need they see Anne as an assistant (27,5%), companion (17,5%) or distractor (15%).

**Need**

| | | Responses | | Percent of Cases |
|---|---|---|---|---|
| | | N | Percent | |
| Need[a] | no_need | 7 | 15,9% | 17,5% |
| | I don't know | 1 | 2,3% | 2,5% |
| | No need maybe in future | 7 | 15,9% | 17,5% |
| | Distractor | 6 | 13,6% | 15,0% |
| | Reminder | 11 | 25,0% | 27,5% |
| | Companionship | 7 | 15,9% | 17,5% |
| | Independent | 1 | 2,3% | 2,5% |
| | Brain gym | 1 | 2,3% | 2,5% |
| | Relaxing | 2 | 4,5% | 5,0% |
| | Tech-savvy | 1 | 2,3% | 2,5% |
| Total | | 44 | 100,0% | 110,0% |

Table 8 Need (percentages)

**Need per country**

| | | Country | | | | | | Total |
|---|---|---|---|---|---|---|---|---|
| | | Italy | | Luxembourg | | The Netherlands | | |
| | | Count | % within Country | Count | % within Country | Count | % within Country | Count |
| Need[a] | No_need | 1 | 6,7% | 6 | 30,0% | 0 | 0,0% | 7 |
| | I don't know | 0 | 0,0% | 0 | 0,0% | 1 | 20,0% | 1 |
| | No need maybe in future | 1 | 6,7% | 6 | 30,0% | 0 | 0,0% | 7 |
| | Distractor | 3 | 20,0% | 2 | 10,0% | 1 | 20,0% | 6 |
| | Reminder | 4 | 26,7% | 4 | 20,0% | 3 | 60,0% | 11 |
| | Companionship | 5 | 33,3% | 2 | 10,0% | 0 | 0,0% | 7 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Independent | 1 | 6,7% | 0 | 0,0% | 0 | 0,0% | 1 |
| | Brain gym | 1 | 6,7% | 0 | 0,0% | 0 | 0,0% | 1 |
| | Relaxing | 1 | 6,7% | 1 | 5,0% | 0 | 0,0% | 2 |
| | Tech-savvy | 1 | 6,7% | 0 | 0,0% | 0 | 0,0% | 1 |
| Total | | 15 | | 20 | | 5 | | 40 |

Table 9 Need per country (percentages)

There are some differences per country. The Luxembourg participants indicate that they do not need Anne or only might use Anne in future which differs from the Dutch and Italian participants. Compared to the Italian and Luxembourg participants the Dutch strongly refer to Anne as a reminder function.

One of the final questions within the closeness aspect has to do with a visualisation of the perceived relationship. The elderly were asked to circle the picture below which best describe the relationship with Anne.

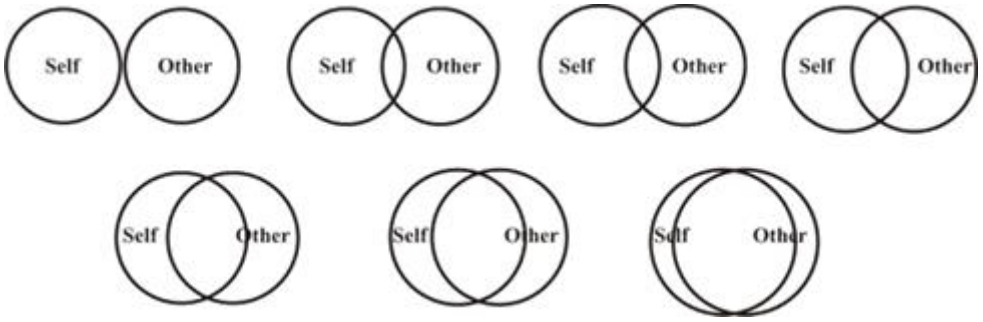


Figure 1 Closeness Scale

For the analysis we numbered the visualisation as following:

1= no overlap; 2= little overlap; 3= some overlap; 4= equal overlap; 5= strong overlap; 6= very strong overlap; 7= most overlap.

Results shows us that elderly women visualize their relation with Anne as 'no overlap' more than men do. But their spreading is wider than that of the male users. Generally most elderly users do visualize their relationship with Anne with little to most overlap. Not really surprising regarding the role 'companionship' some of the elderly users attributed to Anne.

**Gender and Relation to Anne**

| | | Gender | | | | Total | |
|---|---|---|---|---|---|---|---|
| | | Male | | Female | | | |
| | | Count | % within Gender | Count | % within Gender | Count | % within Gender |
| Relation | no overlap | 4 | 25,0% | 11 | 33,3% | 15 | 30,6% |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | little overlap | 6 | 37,5% | 7 | 21,2% | 13 | 26,5% |
| | some overlap | 4 | 25,0% | 5 | 15,2% | 9 | 18,4% |
| | equal overlap | 0 | 0,0% | 5 | 15,2% | 5 | 10,2% |
| | strong overlap | 1 | 6,3% | 4 | 12,1% | 5 | 10,2% |
| | very strong overlap | 0 | 0,0% | 1 | 3,0% | 1 | 2,0% |
| | most overlap | 1 | 6,3% | 0 | 0,0% | 1 | 2,0% |
| Total | | 16 | 100,0% | 33 | 100,0% | 49 | 100,0% |

Table 10 Gender and relation to Anne (percentages)

**Anne and well-being**

The majority has indicated that Anne attributed to a sense of well-being (61,5%).

**Anne to well-being**

| | | Frequency | Percent | Valid Percent | Cumulative Percent |
|---|---|---|---|---|---|
| Valid | yes | 32 | 58,2 | 61,5 | 61,5 |
| | no | 19 | 34,5 | 36,5 | 98,1 |
| | I don 't know | 1 | 1,8 | 1,9 | 100,0 |
| | Total | 52 | 94,5 | 100,0 | |
| Missing | 99 | 3 | 5,5 | | |
| Total | | 55 | 100,0 | | |

Table 11 Anne to wellbeing (percentages)

Those (51 respondents) who did response positively to the above question indicate that Anne contributed to well-being in a sense of Memory (31,4%), Mood (25,5%), 'Self as a whole ' and 'do things for fun' (each 17,6%). 37,3% did not apply Anne to an aspect of Quality of Life.

**How Anne attributes to aspects of Quality of Life**

| | | Responses | | Percent of Cases |
|---|---|---|---|---|
| | | N | Percent | |
| Anne and QOLAD[a] | Physical_help | 2 | 2,3% | 3,9% |
| | Energy | 6 | 7,0% | 11,8% |
| | Mood | 13 | 15,1% | 25,5% |

| | | | | |
|---|---|---|---|---|
| | Living_situation | 3 | 3,5% | 5,9% |
| | Memory | 16 | 18,6% | 31,4% |
| | Family | 2 | 2,3% | 3,9% |
| | Friends | 1 | 1,2% | 2,0% |
| | Self_as_a_whole | 9 | 10,5% | 17,6% |
| | Do_things_for_fun | 9 | 10,5% | 17,6% |
| | Life_as_a_whole | 6 | 7,0% | 11,8% |
| | No QOLAD | 19 | 22,1% | 37,3% |
| Total | | 86 | 100,0% | 168,6% |

Table 12 Anne and quality of life (percentages)

### 4.2.4 Acceptance of the system among older adults

The Almere model was used as the main instrument of acquiring quantitative acceptance data. The constructs of the Almere model are shown in table 13.

| Code | Construct | Definition |
|---|---|---|
| **ANX** | Anxiety | Evoking anxious or emotional reactions when it comes to using the system |
| **ATT** | Attitude towards technology | Positive or negative feelings about the appliance of the technology |
| **FC** | Facilitating conditions | Factors in the environment that facilitate use of the system |
| **ITU** | Intention to Use | The intention to use the system over a longer period in time |
| **PAD** | Perceived adaptiveness | The perceived ability of the system to adapt to the needs of the user |
| **PENJ** | Perceived Enjoyment | Feelings of joy/pleasure associated with the use of the system |
| **PEOU** | Perceived Ease of Use | The degree to which one believes that using the system would be free of effort |
| **PS** | Perceived Sociability | The perceived ability of the system to perform sociable behaviour |
| **PU** | Perceived Usefulness | The degree to which a person believes that the system would be assistive |
| **SI** | Social Influence | The persons perception that people who are important to him think he should or should not use the system |
| **SP** | Social Presence | The experience of sensing a social entity when interacting with the system |

| | | |
|---|---|---|
| **Trust** | Trust | The belief that the system performs with personal integrity and reliability |

Table 13 Construct of the Almere model

Most constructs (7) of the Almere model suggest a relative high internal consistency (alpha coefficient of .80 or higher), two constructs have acceptable consistency (alpha coefficient of .70 - 0.80) and one construct Perceived Ease of Use has a questionable internal consistency (alpha coefficient of .60).

| Construct | Pre-test MEAN | Post-test MEAN |
|---|---|---|
| ANX | 4.1 | 4.4 |
| ATT | 3.7 | 3.7 |
| FC | 3.7 | 3.7 |
| ITU | 4.1 | 3.4 |
| PAD | 3.4 | 3.0 |
| PENJ | 3.2 | 3.5 |
| PEOU | 3.2 | 3.9 |
| PS | 3.3 | 3.2 |
| PU | 3.4 | 3.0 |
| SP | 2.4 | 2.2 |
| TR | 3.4 | 3.7 |

Table 14 Pre-test and post-test differences for the Almere Model

After recoding negative questions like 'I find Anne scary ' (ANX) results show that from a scale of 1-5 the elderly users became less anxious during time. We have the same results for perceived enjoyment (PENJ), perceived ease of use (PEOU) and Trust (TR). Some constructs did not or nearly change during the time of use: Attitude towards technology (ATT) and Facilitating facilities (FC). Some constructs did change negatively during time: intention to use (ITU), perceived adaptiveness (PAD), perceived sociability (PS), perceived usefulness (PU mainly Italy and Luxembourg) and social presence (SP mainly Luxembourg).

We could conclude that the elderly users are less anxious about Anne during time (mainly Dutch and Italian users) and the intention to use Anne is not changing during time although the way in which Anne adapt in their needs declines during time. Interesting to see that people do subscribe a role as companion to Anne does not seem to match the results of the construct social presence but maybe more the perceived enjoyment (PENJ).

### 4.2.5 Acceptance of the system among formal and informal caregivers

13 Dutch formal caregivers and 14 informal Italian caregivers successfully completed the Almere Model. Table 15 shows the results of both formal and informal caregivers. In relation to the results of the elderly users, the evaluation presents a more negative picture than the pre-test phase.

| Construct | Pre-test MEAN | Post-test MEAN |
|---|---|---|
| ANX | 4.7 | 4.8 |

| | | |
|---|---|---|
| ATT | 3.8 | 3.5 |
| FC | 3.9 | 4.1 |
| ITU | 3.7 | 3.2 |
| PAD | 3.5 | 3.2 |
| PENJ | 3.8 | 3.5 |
| PEOU | 3.5 | 3.6 |
| PS | 3.4 | 3.0 |
| PU | 3.7 | 2.9 |
| SP | 2.0 | 1.9 |
| TR | 3.6 | 3.3 |

Table 15 Almere Model results among formal/informal caregivers

When we split these results per country relevant information is shown (table 16)

**Means per construct per country**

| | Country | | | | | |
|---|---|---|---|---|---|---|
| | Italy | | | The Netherlands | | |
| | N | | Mean | N | | Mean |
| | Valid | Missing | | Valid | Missing | |
| ANX_pre | 14 | 0 | 4,8214 | 13 | 0 | 4,5577 |
| ANX_po | 14 | 0 | 4,8214 | 13 | 0 | 4,7308 |
| ATT_pre | 14 | 0 | 3,9524 | 13 | 0 | 3,6154 |
| ATT_po | 14 | 0 | 3,4762 | 13 | 0 | 3,6154 |
| FC_pre | 14 | 0 | 4,1429 | 13 | 0 | 3,7308 |
| FC_po | 14 | 0 | 3,9286 | 13 | 0 | 4,3077 |
| ITU_pre | 14 | 0 | 3,7381 | 13 | 0 | 3,6923 |
| ITU_po | 14 | 0 | 2,9762 | 13 | 0 | 3,4615 |
| PAD_pre | 14 | 0 | 3,7143 | 13 | 0 | 3,1795 |
| PAD_po | 14 | 0 | 3,1667 | 13 | 0 | 3,2821 |
| PENJ_pre | 14 | 0 | 4,1571 | 13 | 0 | 3,4923 |
| PENJ_po | 14 | 0 | 3,5000 | 13 | 0 | 3,5077 |
| PEOU_pre | 14 | 0 | 4,1000 | 13 | 0 | 2,9077 |
| PEOU_po | 14 | 0 | 4,2143 | 13 | 0 | 2,9846 |
| PS_pre | 14 | 0 | 3,9107 | 13 | 0 | 2,9423 |
| PS_po | 14 | 0 | 3,1964 | 13 | 0 | 2,9615 |
| PU_pre | 14 | 0 | 3,9286 | 13 | 0 | 3,4103 |
| PU_po | 14 | 0 | 2,6607 | 13 | 0 | 3,0962 |
| SP_pre | 14 | 0 | 1,5857 | 13 | 0 | 2,5077 |
| SP_po | 14 | 0 | 1,4286 | 13 | 0 | 2,4423 |

| | | | | | | |
|---|---|---|---|---|---|---|
| TR_pre | 14 | 0 | 3,7143 | 13 | 0 | 3,3846 |
| TR_po | 14 | 0 | 3,0357 | 13 | 0 | 3,5769 |

Table 16 Construct of the Almere model per Country (means value)

For some of the constructs the Italian informal caregivers where less positive during pre-test unlike Dutch formal caregivers: attitude towards technology, Intention to Use, Perceived adaptiveness, Perceived Enjoyment, Perceived Sociability and Trust. In general the informal caregivers were less positive after a period of time (pre-test). This difference could be attributed to age or role.

**AGE**

| | | | |
|---|---|---|---|
| Italy | N | Valid | 14 |
| | | Missing | 0 |
| | Mean | | 66,50 |
| The Netherlands | N | Valid | 13 |
| | | Missing | 0 |
| | Mean | | 44,69 |

Table 17 Age (mean value)

Another interesting result is the comparison of both caregivers and users. Shown in table 18.

| Construct | Pre-test MEAN USERS | Pre-test MEAN CARER | Post-test MEAN USERS | Post-test MEAN |
|---|---|---|---|---|
| ANX | 4.1 | 4.7 | 4.4 | 4.8 |
| ATT | 3.7 | 3.8 | 3.7 | 3.5 |
| FC | 3.7 | 3.9 | 3.7 | 4.1 |
| ITU | 4.1 | 3.7 | 3.4 | 3.2 |
| PAD | 3.4 | 3.5 | 3.0 | 3.2 |
| PENJ | 3.2 | 3.8 | 3.5 | 3.5 |
| PEOU | 3.2 | 3.5 | 3.9 | 3.6 |
| PS | 3.3 | 3.4 | 3.2 | 3.0 |
| PU | 3.4 | 3.7 | 3.0 | 2.9 |
| SP | 2.4 | 2.0 | 2.2 | 1.9 |
| TR | 3.4 | 3.6 | 3.7 | 3.3 |

Table 18 Comparison between primary and secondary users

During pre-test the carers were generally more positive about Anne compared to the elderly users. The intention to use and perceived social presence is perceived higher by the elderly users. During post-test there is a remarkable change. The users are generally more positive about Anne compared to the carers.

### 4.2.6 Usability of the system among older adults

The System Usability Scales was used as the main instrument of acquiring quantitative usability data in the pilot sites. Questionnaires were administered to the participants directly after they had completed the testing period and they were asked to provide their own personal feedback on the use of the system.

The 55 older participants successfully completed the SUS. The SUS is scored out of 100, with a higher score indicating greater perceived usability. Anne received a mean score of 66.2.

Firstly, the SUS was compared to what is considered an acceptable score in terms of usability, using data from a study of 500 interactive systems carried out by Sauro et al. (2011), where they found that the average usability score for these 500 products was 68. The SUS scores from each centre and overall are presented in Figure 2.

No significant difference between the cross-national centres is detected and the average across the 3 centres is just below the average calculated by Sauro et al (ibidem). but considering that Anne is a **TRL 7** – **System prototype demonstration in operational environment**, it reached a very good result. It could reach excellent results in the next TRL stages with a starting point of 66.2.

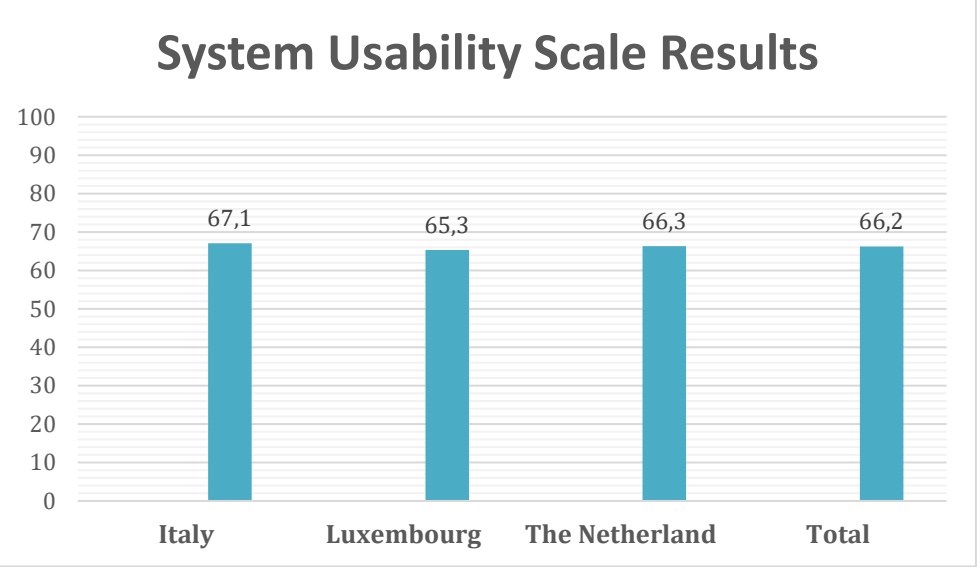


Figure 2 SUS results among countries

Moreover, the SUS score was analysed considering the following variable: gender, MMSE score, level of education and having or not experience with a tablet before the testing period with Anne. As reported in table 19, female participants judged better (M=67.7) the usability of the system respect to the male users (M=63.5). As expected, the test obtained an incremental value with the higher MMSE score, with user with tertiary educational level (M=74.1) and with previous experience with a tablet (M=71.6).

**Mean(SD)**

| **Gender** | **Male n=20** | **Female n=35** |
|---|---|---|
| SUS, mean (SD) | 63.5(20.7) | 67.7(18.2) |

| MMSE | 24<br>n=12 | 25-29<br>n=31 | 30<br>n=12 |
|---|---|---|---|
| SUS, mean (SD) | 55.8(24.4) | 66.9(19.2) | 73.3(7.9) |

| Education | No Education<br>n=2 | Primary<br>n=19 | Secondary<br>n=23 | Tertiary<br>n=11 |
|---|---|---|---|---|
| SUS, mean (SD) | 40.0(.) | 67.2(19.8) | 62.7(16.5) | 74.1(21.2) |

| Have tablet | Yes<br>n=22 | No<br>n=29 |
|---|---|---|
| SUS, mean (SD) | 71.6(13.6) | 61.5(22.9) |

Table 19 Sus score for gender, MMSE, education and use of technology

Secondly, we split the overall SUS into the single item that expressed the sub-scales usability and learnability. Likert items 4 and 10 can be used to estimate the learnability of the system, while the other 8 items can be used to estimate pure usability.

| SUS Items | IT | Lux | NL | Total Mean |
|---|---|---|---|---|
| *SUS_1 I think that I would like to use this system frequently* | 3.8 | 2.5 | 3.5 | 3.2 |
| *SUS_2 I found the system unnecessary complex* | 1.8 | 1.7 | 1.8 | 1.7 |
| *SUS_3 I thought the system was easy to use* | 4.1 | 3.8 | 3.1 | 3.8 |
| ***SUS_4 I think that I would need the support of a technical person*** | **2.9** | **2.2** | **2.2** | **2.2** |
| *SUS_5 I found the various functions well integrated* | 3.7 | 3.1 | 2.5 | 3.1 |
| *SUS_6 I thought there was too much inconsistency* | 2.4 | 2.6 | 2.3 | 2.6 |
| *SUS_7 I would imagine that most people would learn quickly* | 3.9 | 3.7 | 3.3 | 3.7 |
| *SUS_8 I found the system very cumbersome* | 2 | 2.2 | 1.7 | 2.2 |
| *SUS_9 I felt very confident using the system* | 3.3 | 3.5 | 3.4 | 3.5 |
| ***SUS_10 I needed to learn a lot of things before I could get going*** | **2.9** | **2.4** | **2.8** | **2.4** |

Table 20 SUS items (mean values) among older adults

The items about learnability did not overcome the mean value of 2.5 that is the threshold between the strongly disagreement and the strongly agreement of the 5 Likert scale.

This result manifests the ease of use and of the system and its good design that does not require many things to learn. It is important to mention that the pilot sites representatives and the software developer (Virtask) spent significant efforts in editing the user manual.

### 4.2.7 Usability of the system among formal and informal caregivers

Anne receives a score of 67.4 among formal and informal caregivers. Even in this case, the score is slightly under what is considered an acceptable score in terms of usability, but it is an interesting result considering its technology readiness level (TRL 7 – System prototype demonstration in operational environment). The general score obtained a higher value in Italy (M=71.4), positioning Anne in a more than acceptable usability level.

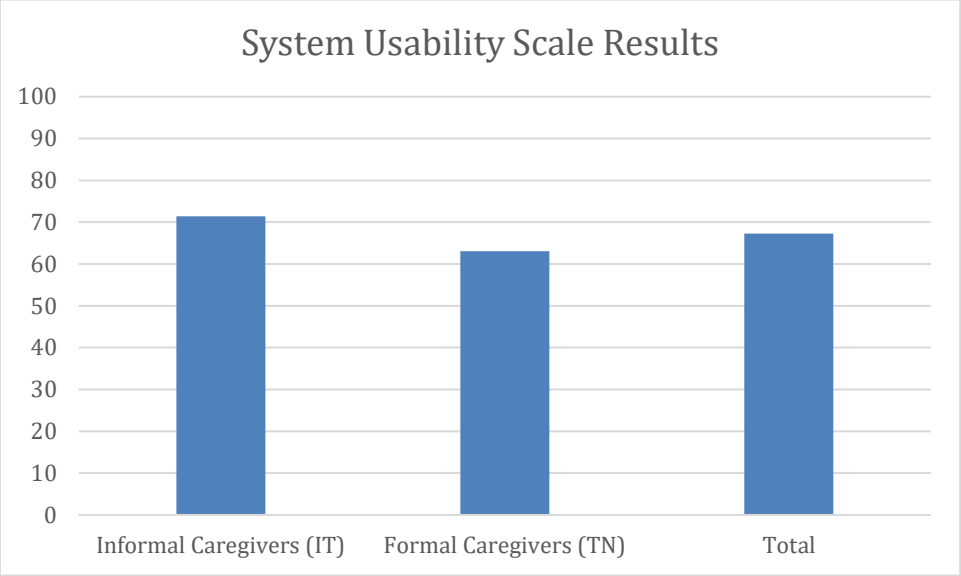


Figure 3 SUS score among formal/informal caregivers

Splitting the overall SUS into the single item that expressed the sub-scales usability and learnability, the items about learnability (items 4 and 10) did not overcome the mean value of 2.5.

This result confirmed the perspectives gathered from older adults that the system is ease to use and it does not require many things to learn.

| SUS Items | IT | NL | Total Mean |
|---|---|---|---|
| *SUS_1 I think that I would like to use this system frequently* | 3.2 | 3.6 | 3.4 |
| *SUS_2 I found the system unnecessary complex* | 1.5 | 1.9 | 1.7 |
| *SUS_3 I thought the system was easy to use* | 4.2 | 3.5 | 3.9 |
| ***SUS_4 I think that I would need the support of a technical person*** | **2.2** | **2.5** | **2.3** |
| *SUS_5 I found the various functions well integrated* | 3.6 | 3.3 | 3.4 |
| *SUS_6 I thought there was too much inconsistency* | 2.1 | 2.6 | 2.4 |
| *SUS_7 I would imagine that most people would learn quickly* | 3.8 | 3.2 | 3.5 |
| *SUS_8 I found the system very cumbersome* | 1.6 | 2.0 | 1.8 |
| *SUS_9 I felt very confident using the system* | 3.2 | 3.6 | 3.4 |
| ***SUS_10 I needed to learn a lot of things before I could get going*** | **1.9** | **3.0** | **2.4** |

Table 21 SUS items (mean values) among formal(informal caregivers

### 4.2.8 Caregiver's burden

The stress perceived by caregivers was assessed using the Caregiver Burden Inventory (CBI) standardised tool.
The sample obtained a total average score of 11.6. Considering that scores near or above 36 indicate a greater need for respite and other services, our sample does not perceive high levels of burden. There are some differences between the two countries, showing higher perceived stress values in Italy and lower in the Netherlands. This may be explained by the fact that in Italy the sample was composed exclusively of family members compared to the Dutch sample where caregivers were professionals. The Italian sample was not involved in specialized dementia care networks and therefore, family caregivers might have less professional support in caregiving.

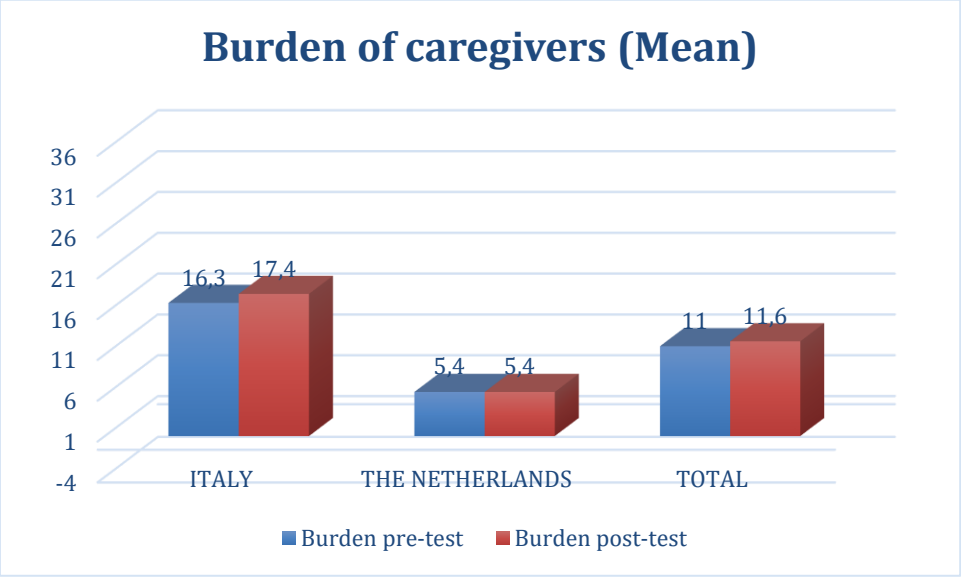


Figure 4 Burden Score among formal/informal caregivers

Comparing the scores with the variables gender, there are differences in the caregiver population with respect to burden in both pre and post-test. The data suggest the women experience higher levels of burden when compared with men caregivers, but in the female respondents, there is a light deterioration at the post-test (Delta Burden M= 1.3). On the contrary, the males score at the post test is negative (delta M= -0.9) probably because caregivers' coping strategies influence their perceptions of burden.
About the education, it was found that the level of education represents a significant variable in the total burden score. In particular, caregivers with a higher schooling (11 to 18 years of study) have a higher overall stress compared to those with a lower schooling (maximum 5 years of study). There are some slight differences between the pre and post-test. Caregivers with lower schooling showed a slight improvement in burden at the post-test (delta Burden, M=-1.0). On the contrary, the data showed a slight decrease in the post-test burden for those with a higher level of education. (Delta Burden, M=1.6)

| | **Male n=9** | **Female n=18** |
|---|---|---|
| Burden pre, mean (SD) | 8.0(13.6) | 12.6(13.6) |

| | | |
|---|---|---|
| Burden post, mean (SD) | 7.1(8.1) | 13.9(15.8) |
| delta Burden, mean (SD) | -0.9(5.9) | 1.3(3.9) |

| | **Primary n=2** | **Secondary n=17** | **Tertiary n=8** |
|---|---|---|---|
| Burden pre, mean (SD) | 5.0(1.4) | 10.2(13.3) | 14.5(15.9) |
| Burden post, mean (SD) | 4.0(0.0) | 10.4(13.8) | 16.1(15.5) |
| delta Burden, mean (SD) | -1.0(1.4) | 0.2(1.6) | 1.6(8.5) |

Table 22 Burden score among formal/informal caregivers

### 4.2.9 Demand and cost information

Formal and informal caregivers rated the following statements with points from 1 (weak, does not matter for me) to 5 (strong, I strongly agree).

| **Above all, I'm/would be willing to pay for Anne, because:** | **ITALY (Informal caregivers)** | **THE NETHERLANDS (Formal caregivers)** | **TOTAL** |
|---|---|---|---|
| • I can save time with her in our daily life. | 1.3(0.6) | 2.6(1.0) | 1.9(1.1) |
| • Thanks to Anne, I can do things more efficiently | 1.1(0.4) | 2.5(1.0) | 1.8(1.0) |
| • Thanks to Anne, I feel less stressed | 1.2(0.4) | 1.4(0.5) | 1.3(0.5) |
| • With her, I can be more like family again and not a carer | 1.1(0.4) | 1.4(0.7) | 1.2(0.5) |
| • **I have more time for myself with her / she frees me up more time for myself.** | **1.5(0.8)** | **3.5(1.1)** | **2.4(1.3)** |
| • **she/the use of her makes the person I care for happier (than without her).** | **1.9(0.9)** | **3.1(1.1)** | **2.5(1.2)** |
| • **With Anne, I think the person I care for feels more in control of her/his own life** | **1.9(0.9)** | **2.9(1.0)** | **2.4(1.1)** |
| • With Anne, I think the person I care for feels saver/more secure | 2.0(1.0) | 2.2(0.6) | 2.1(0.8) |
| • **With Anne, I think the person I care for feels more independent and he/she can stay longer at home** | **1.9(1.0)** | **2.6(1.0)** | **2.3(1.0)** |
| • I have more control over the whole situation with Anne | 1.6(0.7) | 1.7(0.9) | 1.7(0.8) |
| • I feel safer with Anne | 1.7(1.0) | 1.7(0.8) | 1.7(0.9) |
| • Anne brought us closer together (better relationship, more contact, more comprehension) | 1.5(0.9) | 2.0(0.7) | 1.7(0.9) |

Table 23 Mean (SD) of the answers

The sample seems to not have a great knowledge about cost of senior tablets in the market. Only the 11, 1% of them is aware of the cost of such devices.

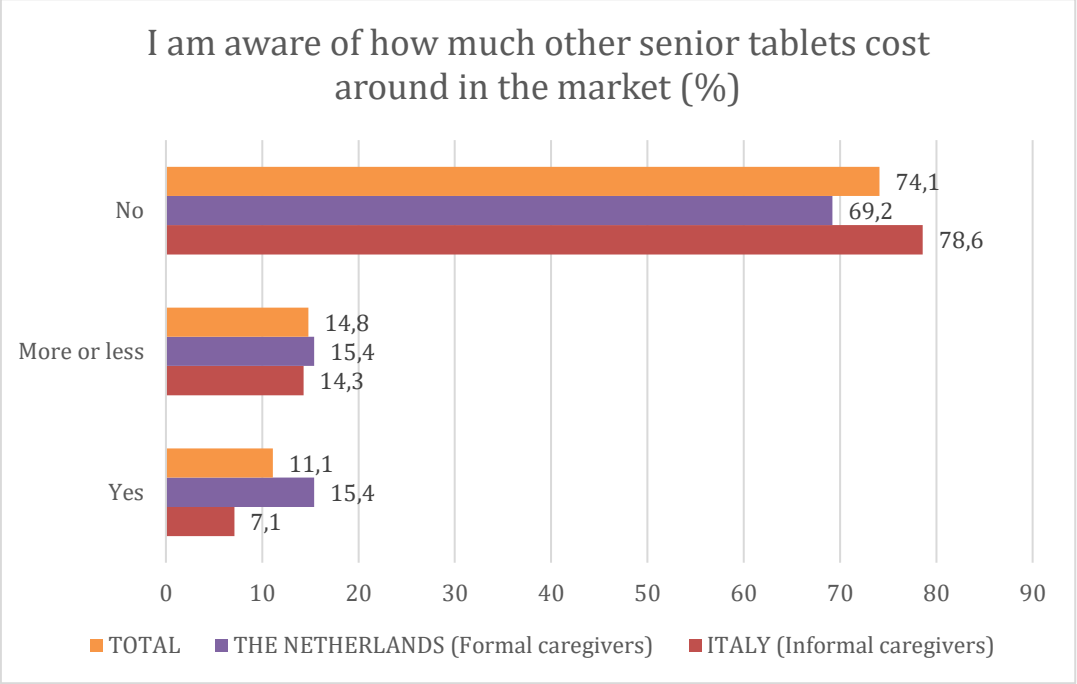


Figure 5 Awareness of cost among formal/informal caregivers

For a monthly fee (basic package including Internet browser, time and date, calendar and reminder function) of 18 euro, formal and informal caregivers would like to buy and use Anne. For the following features, they would also be willing to pay some additional amount of euros each:

| Feature | Euro (mean values) |
|---|---|
| News (reader) | 2,4 |
| **Medication Reminder** | **6,8** |
| Agenda | 2,2 |
| Radio/Music | 1,4 |
| Video Call | 2,3 |
| **Games** | **10,5** |
| My Media: Photo album | 1,5 |

Table 24: additional amount

Another question was if caregivers would pay for data security choosing between two packages with different levels of security (indicative prices). The majority of the sample (M=25.2, SD=10.8) preferred the 20 Euro offer. This choice was confirmed even after having received further information about data security.

| 20 Euro | 40 Euro |
|---|---|
| Basic Anne | Basic Anne |
| Software System runs on Google | Private Software System of Living well with Anne |

Table 25 Data security willingness to pay

Another question was about the willingness to pay for no advertisement. Once again, the caregivers preferred the Basic Anne with general advertising (Mean=24.4, SD=11.5).

The last question was if caregivers would like to order Anne bindingly for the price of 75 Euro per month (excl. Tablet). The 44,5% expressed no interest in ordering Anne since it was too expensive for the majority of them or just because it was not considered useful for the relative. The remaining caregivers would order for 1 year (25,9%) or for 3 months (14,8%). The 14,8% of them were doubtful.

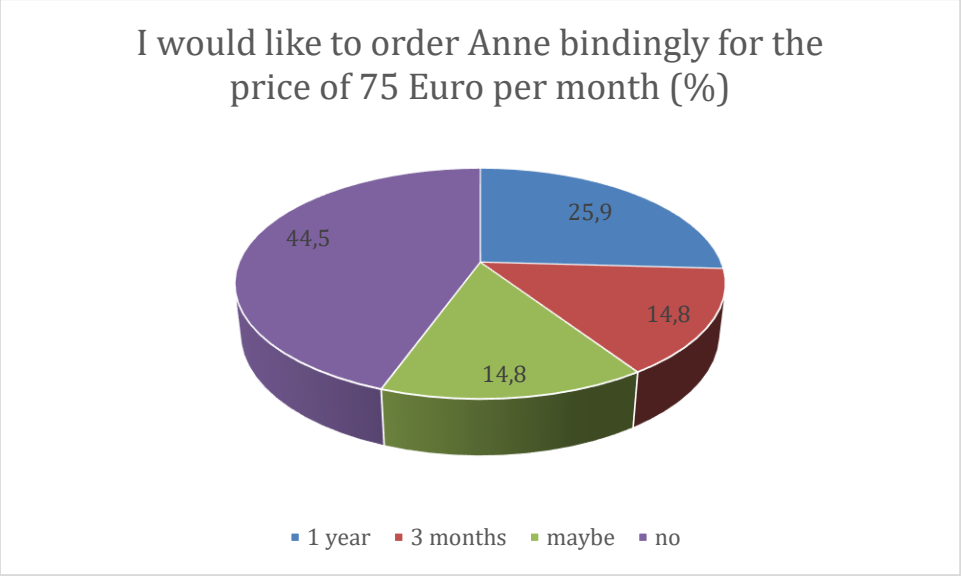


Figure 6 Willingness to order Anne among formal/informal caregivers

## 4.3 Telemetry Data Results

### 4.3.1 Study objective and basis of data

In this analysis, we give an overview to the entire recorded telemetry data of the end users of the final LivingWell field test. We aim at giving intuitive contextual interpretations based on an elaborated pre-processing pipeline, briefly explained below.

The users live in different countries. There are 20 users from Luxembourg resp. Italy and 15 users from Netherlands. The overall considered time span for the final field test is from 1.9.2019 to 12.5.2020. However, notice that a user does not necessarily need to use Anne this entire time span. A typically planned usage is around 6-8 weeks.

The data was technically generated by automatically logging activities of the users on Anne. As a consequence, there were frequently activities of a single user logged within a hundredths of a second and even below. Even more, there were logged activities that were not triggered by a user. In order to interpret meaningfully the data, a plausibility methodology for assessing the data quality in terms of interpretability and a subsequent pre-processing pipeline were needed to be established. After applying this pre-processing pipeline, there were a total amount of 230'142 events. Here, an event refers to a technically logged activity of a single user.

### 4.3.2 Target and transition events

As explained above, the event logging mechanism registers every event caused by a user's activity such as a click on the touchscreen or voice interaction. In order to meaningfully analyse the user behaviour, we need to introduce two distinct classes of events: *Transition events* describes events for navigating through Anne. Mostly, these are actually the events caused by clicking on the device[1]. On the other hand, *target events* include the usage of actual functionalities of Anne such as reading news and listing to radio.

For example, a user clicks ten times on the touchscreen before he can read the news that was his actual intention. This gives an event path of ten transition events followed by the target event originating from reading the news. As we can see from the example, the distinction of transition and target events helps us to assess usability and learning effects of handling Anne.

### 4.3.3 Overview

Half of the events are transitions (116'541). The second largest majority is the event type game with 43%. These are two strongly dominant types. The other ones usually have only one to three percentages or even below (see Figure 7 based on absolute numbers). A plausible explanation of this pattern can be given as follows. Every time a user changes a feature such as from listing to radio to reading news, he requires a transition event for navigating. In this sense, a transition event is closely connected to every target event. Thus, it is plausible that transition events are the most frequent event type. To some extent, the large number of game events can be explained by the design of Anne. Every time a user starts, quits and restarts a game, creates a new event. It is rather common to do these actions in a game very regularly. As a consequence, game events are very frequent. Nevertheless, game is a very popular feature.

[1] The event logging mechanism only records successful speech interactions that are logged together with their actual intent, i. e. their target event (as defined in the following). For example, the successful speech interaction "play radio channel ABC" is logged as radio. There is no separate event for the speech interaction.

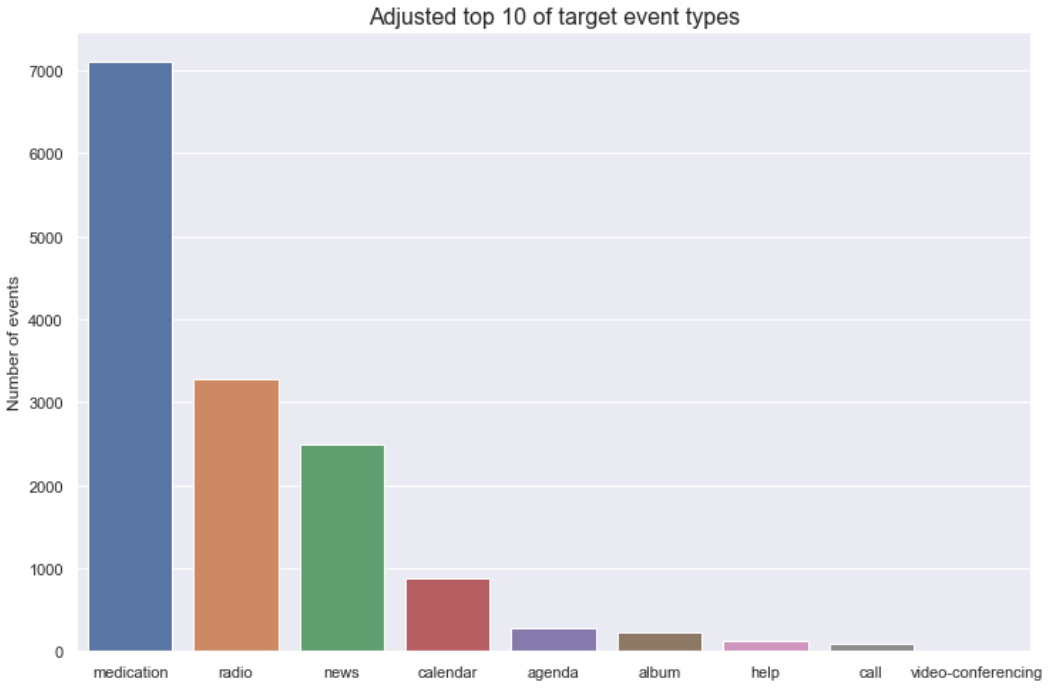


Figure 7: Adjusted top 10 of target event types

A *session* is created when the device where Anne is deployed is started. For example, restarting the device five times would create five sessions. Thus, we may interpret the number of sessions per day as a measure for the ability of technically handling the device as well as technical functioning of the device. Indeed, a device that does not work is often restarted several times. However, notice that a new session is not created when the device loses the internet connection and afterwards is reconnected. 70% of the users have one session per day (on median) and only 20% have two sessions. We may conclude the technical handling and functioning of the device works well.

### 4.3.4 Habitual daily patterns

Users often tend to use the same functionalities of Anne, e.g. confirming that the medications were taken, over the day. In order to identify the daily patterns, we divide a day in the following sections:

- *Early Morning*: From 6 to 8 o'clock
- *Morning*: From 9 to 10 o'clock
- *Lunchtime:* From 11 to 13 o'clock
- *Afternoon: From 14 to 17 o'clock*
- *Evening*: From 18 to 22 o'clock
- *Night*: From 23 to 5 o'clock

We focus here on target events as they represent the actual user's intention. Figure 8 identifies the second half of the day, *Afternoon* and *Evening,* as the peak usage times.

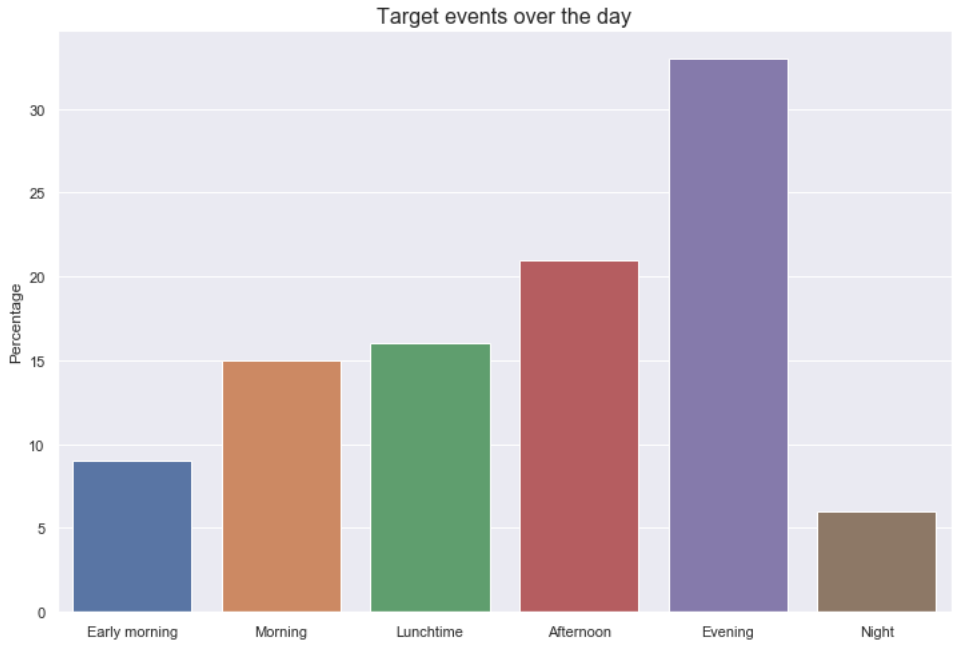


Figure 8: Target events over the day

In the *Early Morning and Morning*, medication events strongly dominates compared to other (Figures 1-2 in the appendix). These medication events are based on the user's confirmation of taking his medications. Similarly, in the day sections *Evening* and *Night* medication confirmation is the most important event type, but to lesser extent meaning for example that gaming is also a frequent event type during lunchtime (Figures 3-4 in the appendix).

We see that during the day sections where meals are consumed, users usually confirm to take their medications. An exception is here *Lunchtime* where gaming is the most frequent activity but still medication is very relevant (see Figure 3 in the appendix). Medications are often medically prescribed to be taken during meal times. This gives a plausible explanation of this pattern.

During *Lunchtime* and *Afternoon*, Anne is usually used for entertainment, particularly for playing games, listening to radio and reading news. The visualizations of the most important event types during the different day sections can be find the appendix (Figure 9).

In conclusion, Anne helps one hand to remind the user to take their medications and on the other caregivers assure that medications were taken. Moreover, Anne is a source of entertainment.

### 4.3.5 User behaviour over time

Generally, a user who starts using a new device or application changes his behaviour over time. In the beginning, a user tries out the different functionalities and learns how apply them (exploration period). Afterwards, a user has professionalized his usage and knows exactly how to handle the device or application. During this time, the effective peak usage takes place. In the last period, a user slowly stops using the device, e.g. due to decreased curiosity or changing to other devices. This generic user journey can be found in case of Anne.

We defined the following six periods of using Anne for each applicant:

- From day 1 to 6
- From day 7 to 13
- From day 14 to 20
- From day 21 to 27
- From day 28 to 34
- From day 36 to 42

Notice that there were users who used Anne more than 42 days. These days were not considered in in the analysis of this section.

Let us first analyse the number of users over time (Figure 7 in the appendix). There is a strong decrease from 56 users in the first period (1-6 day) to 41 users in the second (7-13 day) compared to other periods. A plausible explanation for the decrease is that users were not able to learn a suitably established usage of Anne and consequently gave up using her. A way to address this problem is to offer training and assistance by the carers during the initial phase of using Anne. Especially for participants in the early stage of dementia a careful monitoring of the use of Anne with telemetry data is helpful. It allows an early detection of potential obstacles and allows early intervention and support onsite. To assist this, weekly automatically generated reports were created.

In the following periods, the decrease is less steep and remains at the same level. Again, a detailed look at the telemetry data allows recognition of ongoing problems. Interventions at the beginning allow countermeasures before the end user is frustrated and stops using Anne.

The described user's journey indicated at the beginning of the section can illustrated in Figure 3. Here, the adjusted number[2] of events grouped into target and transition events are illustrated over the time. In the beginning, the users tries out and learn how to use Anne. This can be seen in the large number of transition events used for navigating. However, these events are only means to an end to get to a target event that is the user's actual intention. Over time, the users professionalize their usage. As a result, they need less transition events to realize their intentions, the target events. On the other hand, they use Anne more often, as illustrated in the increasing number of target events over time. The final step of the user's journey, the usage stop, is shown in the rather sharp decreasing number of target events at the end.

[2] An homogenisation adjustment is required as the population size varies over the different periods

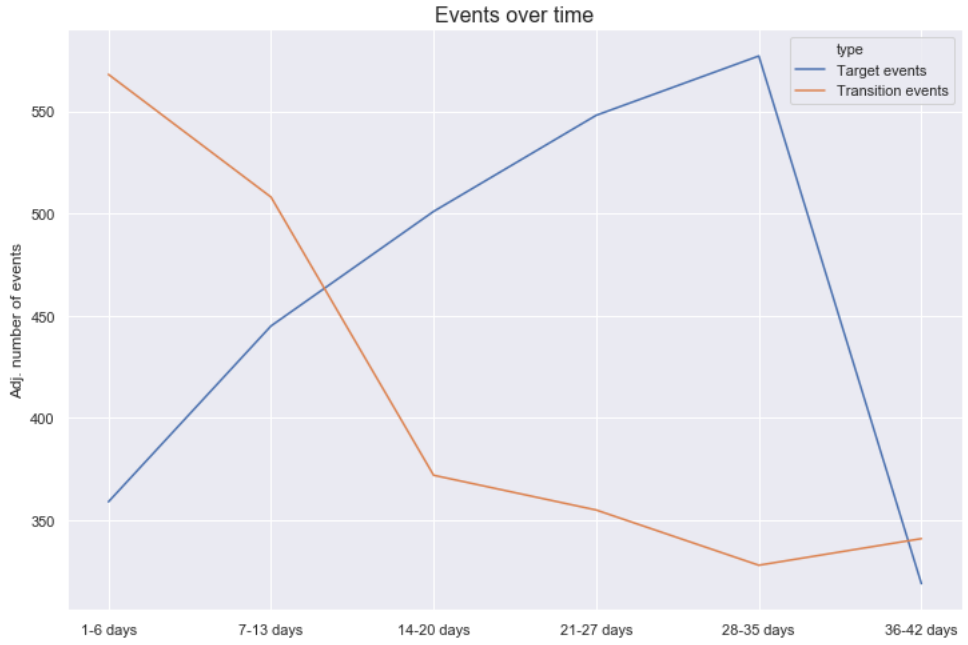


Figure 9: Events over time (on median)

One of Anne's most interesting functionalities is the speech interaction, that is a user can give commands to trigger actions of Anne, e. g. the command 'Play radio' triggers playing a radio in the device where Anne runs.

In Figure 8 are visualized the adjusted number[3] of successful speech interactions over time. There are a large number of successful speech interactions in the first two periods and then a subsequent steep decrease. Afterwards, the speech interactions stay at a low level. A possible interpretation and explanation is that users are able to orally interact with Anne by trying out this feature. The result is a large number of successful speech interaction in the beginning. However, they cannot professionalize or get used to the speech interaction on a regular basis causing a low number of successful speech interaction in the long run.

### 4.3.6 Channel analysis

A user can handle Anne by the device's touchscreen or voice. 111'684 target events are initiated by using the touchscreen compared to 2'545 using voice interaction. As we see, users strongly prefer touchscreen interactions. Especially, the games module does work with touch interventions only, because it does not make sense, to play a puzzle, card game or memory with assistance of voice commands. These games use a lot of touch events for playing. Another potential reason could be that users do not get used to interact by voice, as already indicated the preceding section.

The preferred target event triggered by voice is news (699 cases) followed by medication (312 cases). In case of the touchscreen, it is game (99 080 cases) followed by medication (6'781

[3] Similarly as before, a homogenisation adjustment is required as the population size varies over the different periods.

cases)[4]. News as a preferred target event triggered by voice is intuitive, because reading an article to somebody has a more interpersonal content than gaming.

As a next step, we investigate how many clicks on average[5] a user requires to proceed to a target event. As mentioned in the section 4.3.2, this number is a prime measure for usability. For reasons of plausibility, we restricted to click events that lie within 15 minutes before target events resp. in-between target events. Figure 4 illustrates that a major share of users, namely 38, require only one click on average to move to a target event. Only 16 users need clicks between two and four. Thus, users generally handle Anne well by touchscreen. The same question can be raised for target event types instead of users: Are there target event types that require more clicks than others do? Similarly as before, event types such as gaming or radio usually require only one click. The only exceptions are the event types calendar and call that require three clicks.

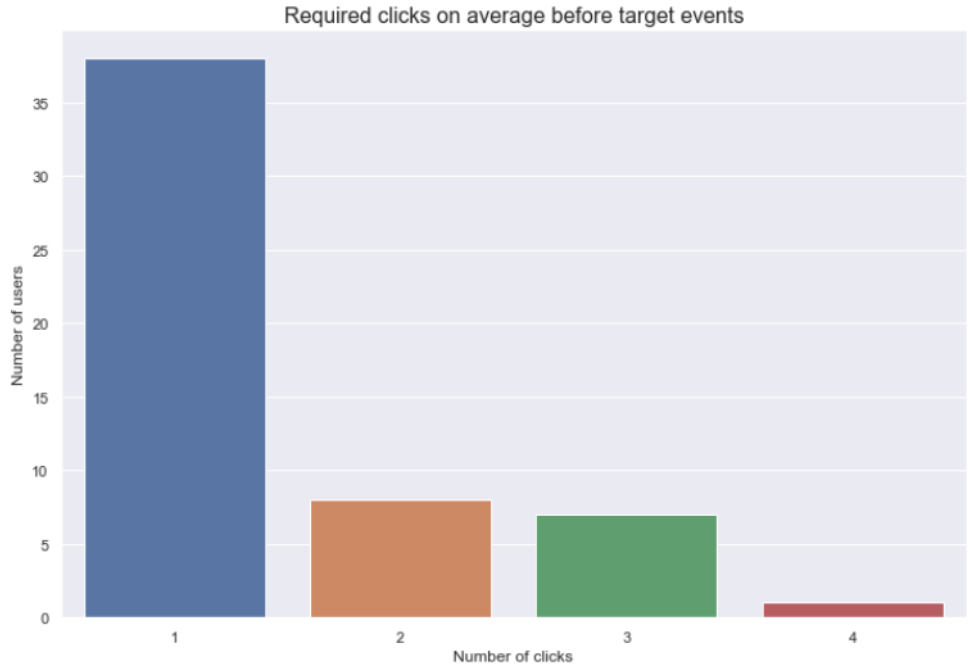


Figure 40: Required clicks on average before target events

### 4.3.7 Reminder feature

One of the prime features of Anne is that she reminds the user to take his medication. This feature is especially important because Anne's users have often a reduced retentiveness, e. g. due to dementia or advanced age. A typically expected user behaviour would be asking Anne about medication several times in a short time frame. We could identify four cases where medication events of users are comparatively tightly timed. In Figure 5[6], the four different users with their medication events are visualized over time. In case of user A, an initial medication

[4] Medication confirmation has to be done by touch only by intention. No speech interaction is possible.

[5] To be precise, the statistical measure median was used, because it is more robust against outliers than the ordinary average.

[6] Note that the visualizations have different scales on the x-axis.

event is followed by several medication events after about ten minutes. These are again followed by events after 25 minutes of the initial one. User B and C have a similar behaviour. They both have three medication events within about one hour. User D has somewhat a special behaviour. He has medication events almost every one or two minutes with some gaps in-between. It might be questionable that this pattern really reflects the actual user's intent and that it was rather triggered by a malfunction of the event logging mechanism. However, a malfunction that triggers events in this frequency and causing such clusters may also be seen as implausible. Hence, the interpretation remains inconclusive.

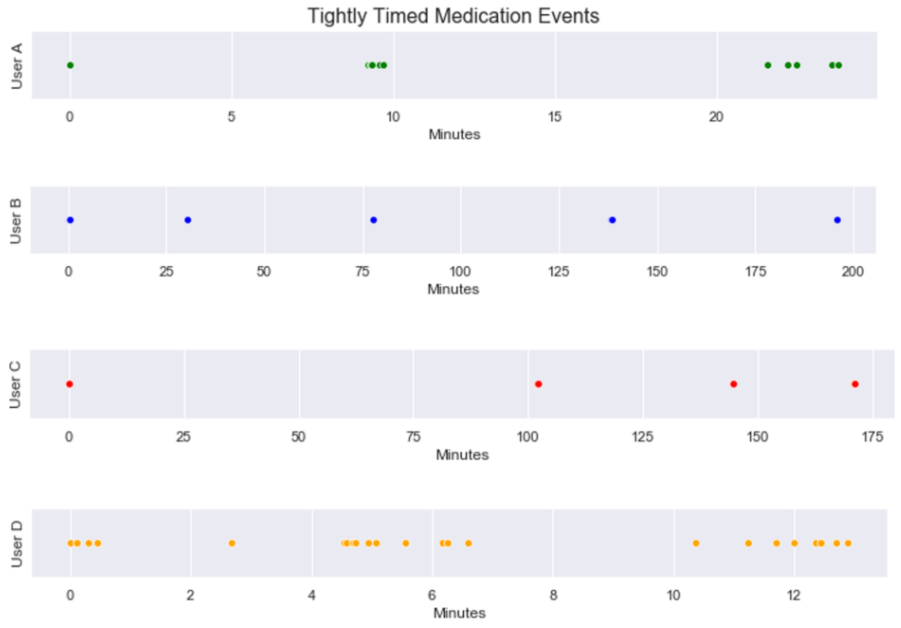


Figure 41: Tightly timed medication events of selected users

### 4.3.8 Country specific behaviours

Anne's users live in Italy, Netherlands and Luxembourg. As noted in a previous section, 20 users live in Italy resp. Luxembourg and 15 in the Netherlands. Thus, the number of users is rather comparable. We investigated country specific behaviours of users. The statement below are based on the number of event types and alike for each user followed up by an analysis on a country level.

Italy is the most active country from different point of views. For example, an Italian user has twice or triple as much target and transition events as users from other countries. This can be more specifically illustrated by considering the median of target resp. transition events of a user per country:

Italy: 740 target events / 2'426 transition events

Luxembourg: 143 target events / 1'127 transition events

Netherlands: 122 target events / 1'071 transition events

More intuitively, this means for example that a user living in Italy has typically 740 target events over the entire usage period. Netherlands is usually the least active country and Luxembourg is

in-between. The only exception is the number of active days where Luxembourg is the least active (17 days on median) and Netherlands (26 days on median) is in-between. Italy is still most active country with 33 days on median. The 2'630 activity ranking as Italy is the most active followed up by Luxembourg and then Netherlands is frequently found. Even more, Italy has twice or triple as much as activity than Luxembourg. Compared to Luxembourg, Netherlands has often half as much activity. The box plot in Figure 6 illustrates it intuitively and methodologically cleanly. In this figure, a large rank corresponds to a large number of target events of a user (on median).

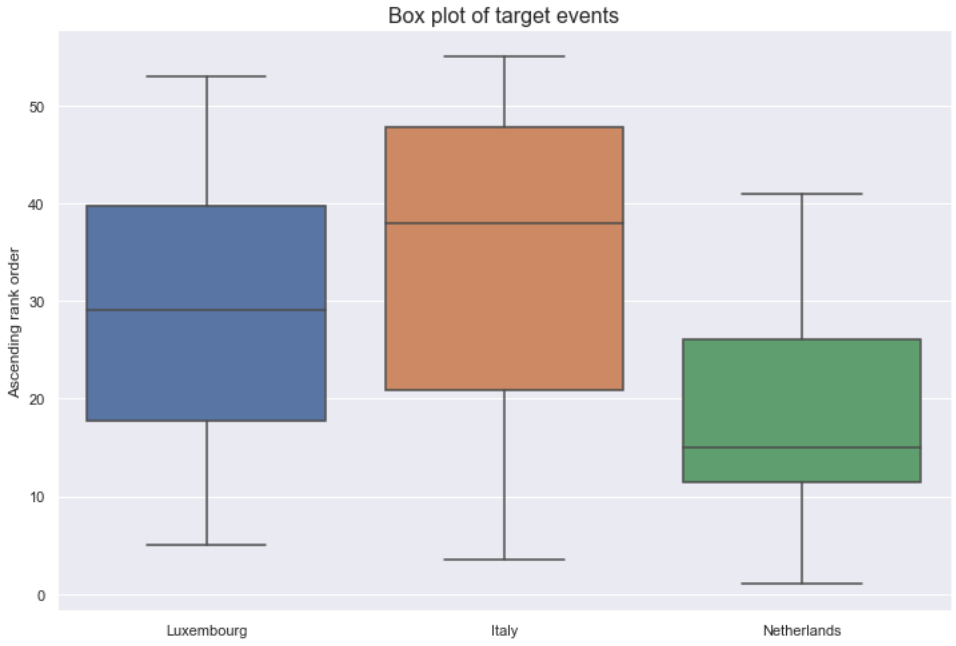


Figure 42: Box plot of target events for each country

Luxembourg leads in terms of successful speech interactions (20 on median per user) closely followed by Italy (17 on median per user) and then with more distance Netherlands (11 on median per user).

Anne's medication, news as well as game features are very frequently used in Italy as well as in Luxembourg and rather rarely in Netherlands. An exceptional feature that do not obey the activity ranking is radio. In case of the radio feature, Italy is still the most active (48 events on median) followed by Netherlands (28 events on median). However, Luxembourg does not practically use it (0 events on median)[7].

In summary, we detect the activity ranking given by Italy in the first place, Luxembourg in the second place and Netherlands in the third place. What could be the possible qualitative root causes? Possible answers could be different physical conditions, instruction courses and IT affinity in the different countries, as well technical reasons.

[7] We heard in the interviews, that the Luxembourg radio stations often were not playable on Anne. Possible reasons could be different technical encodings.

# 5 Outcomes and Conclusion

In D5.1 "Trial Concept", the consortium settled some failure/success criteria for the evaluations results. In this section, those criterions are reported in terms of achievement.

| Criterion | Parameters | Tool(s) | Standard | Achievement |
|---|---|---|---|---|
| ***Usability*** | Perceived usefulness<br>Perceived easiness of use<br>Satisfaction with the use | SUS score | High degree of system usability | Considering that Anne is a TRL 7 – System prototype demonstration in operational environment, it reached a very good result. It could reach excellent results in the next TRL stages with a starting point of 66.2. among older adults and 67.4 among formal/informal caregivers |
| ***Acceptability*** | Attitude and predisposition towards the system<br>Adaptability to the changing needs | The Almere model<br>Closeness scale | High degree of attitude towards the system<br>High degree of acceptability | Older users were less anxious about Anne during time and the intention to use Anne is not changing during time of interaction. Formal and informal caregivers confirm this positive perspective.<br>Closeness Scale results shows that older adults see Anne as an assistant (27,5%), companion (17,5%) or distractor (15%) |
| ***Promoting self-management and enhancing autonomy*** | Improving the QoL of the PwD | QOL-AD | Needs are satisfied<br>Improvement or stability | The score of QOL-AD did not improve significantly since the small length of the trial. To achieve a better result it is suggested to perform validation period of at least 3 months and use mid-term collection of data to measure the ongoing situation. |

| | | | | |
|---|---|---|---|---|
| ***Lifestyle management*** | Maintenance of cognitive ability | Interviews | Improvement of stability after the technological intervention | Users reported the preference for the game functionality and telemetry data confirmed this data. Even if no improvements in cognitive ability is reported or clinically measured, the use of gaming help people to stay cognitively active |
| ***Impact on informal caregiver*** | Psychological well-being and quality of life improvement<br>Social well-being | QOL-AD | Improvement | The score of QOL-AD did not improve significantly since the small length of the trial. To achieve a better result it is suggested to perform validation period of at least 3 months and use mid-term collection of data to measure the ongoing situation. |
| ***End user involvement in UCD*** | High degree of end users involved in the proposal | Number of involved users<br>Number of dropouts | 20 users per site<br>Less than 20% | The project involved 55 older adults, 13 formal and 14 informal caregivers.<br>Drop out less than 20% and replaced by the users in reserve list of potential participants constructed in each site |

Table 26 Failure/success criteria

A great challenge of the Living Well project was to provide a human-centred perspective that can be integrated in the main development cycles of the system. The active involvement of users was seen as the key strength to overcome the main barriers in applying technology for seniors. Effectively, the entire process of UCD performed during the life of the project guarantee the achievement of the main validation objectives as reported in D5.1 'Trial Concept':

1-To assess the **acceptance and usability** of the system and its usage over long term use by end users. We assessed these two main concepts through the SUS test, the Almere Model and the closeness scale.
2-To evaluate **functionality** of the system in collecting data. We demonstrated the functionality of the system reporting telemetry results.

3-To assess the **feasibility** of the users to operate the system including independent use at home, charging the tablet. We demonstrate this feasibility having no users that dropped out the trial during the weeks of use at home.
4-To evaluate changes in the **quality of life** experienced by the end-users and their informal caregivers. This last objective was challenging as in the most AAL funded project. In order to evaluate a change in the quality of life, you need quite some time. We did not collect significant data to asses an improvement in quality of life, because of an insufficient length of the trial period.

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## Appendix 1. Complementary visualisations of the telemetry data results

In this paragraph, we give complementary visualisations of the paragraph 4.3 Telemetry data results. The contexts and references of the visualisations are given in the aforementioned paragraph.

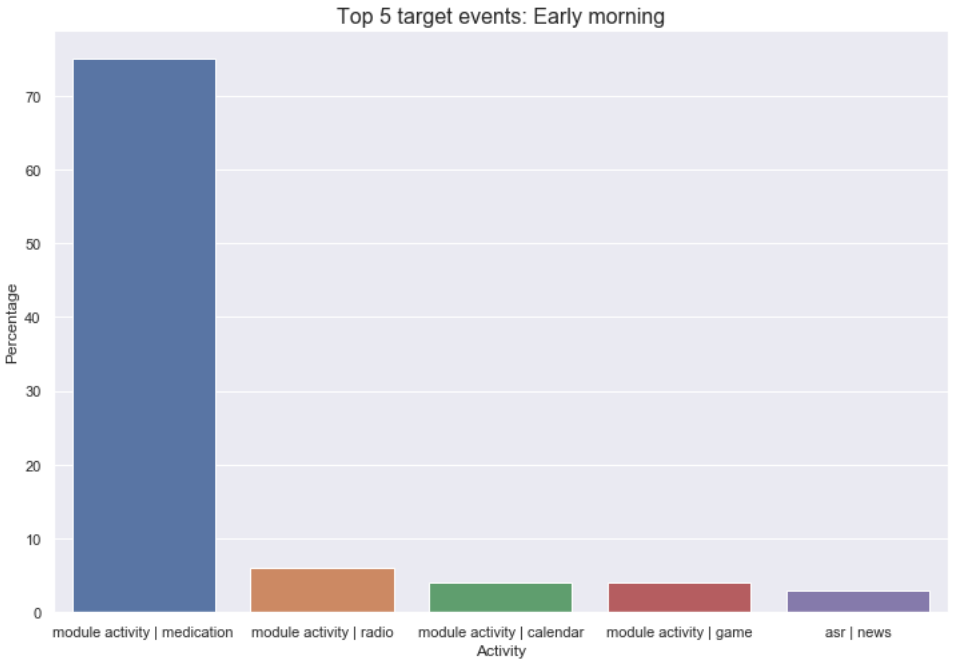



**Figure 0-1: Top target events in Early Morning**

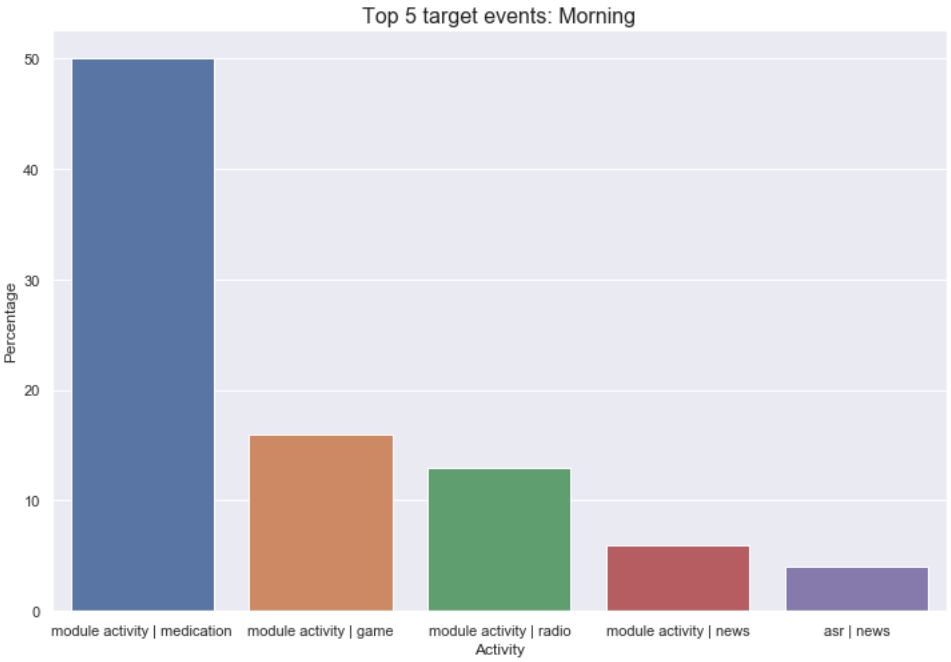



**Figure 0-2: Top target events in Morning**

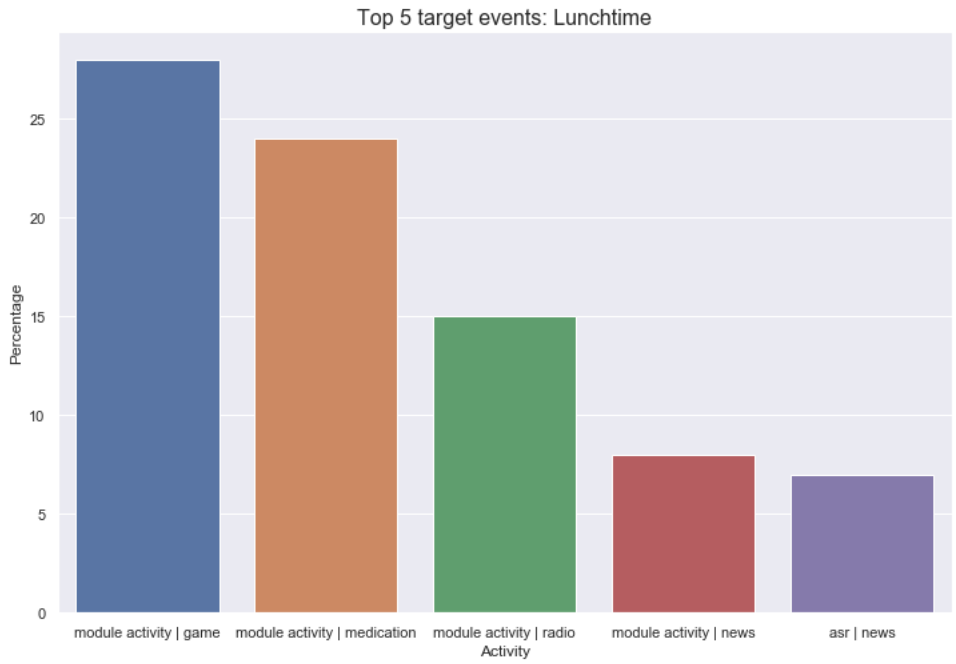



**Figure 0-3: Top target events in Lunchtime**

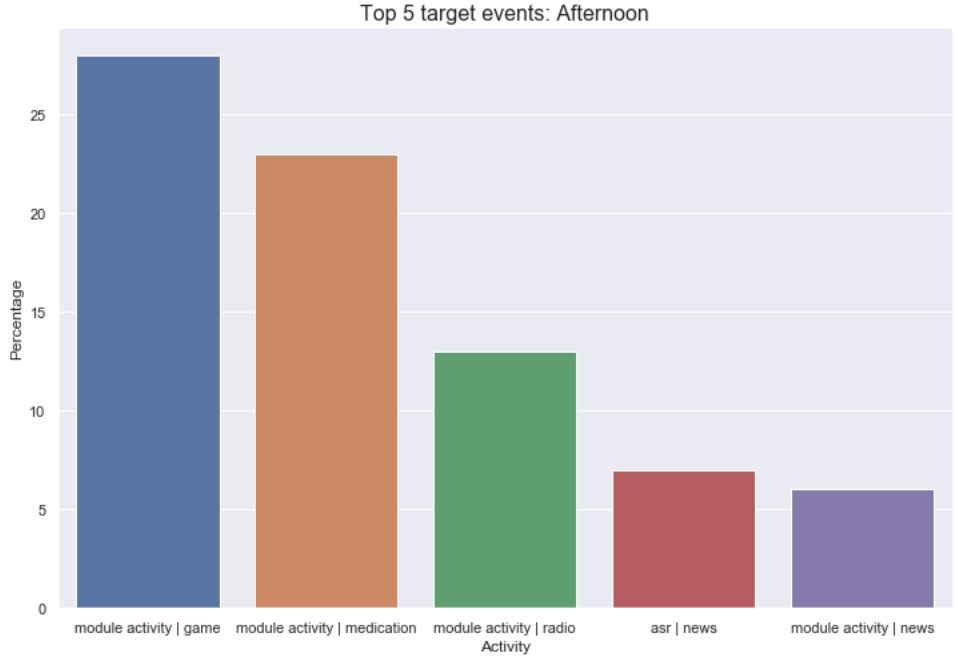



**Figure 0-4: Top target events in Afternoon**

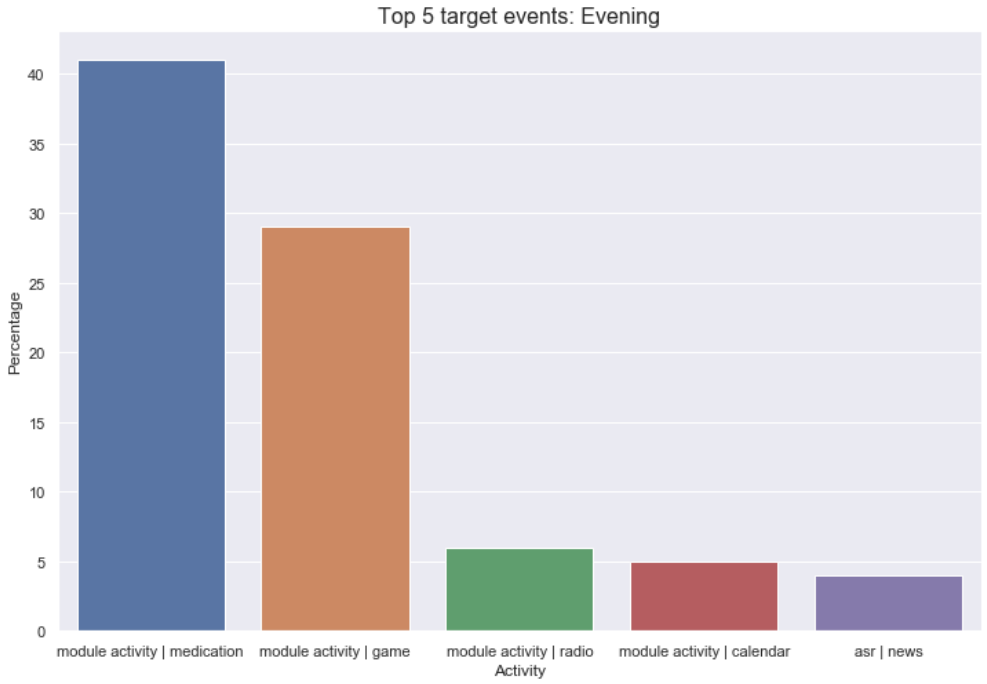



**Figure 0-5: Top target events in Evening**

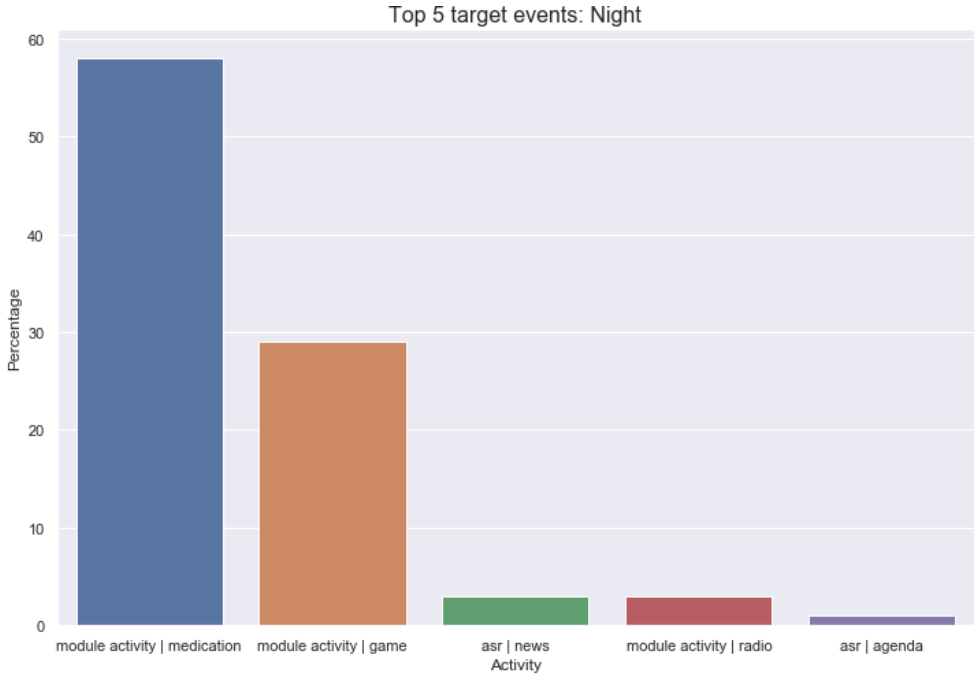



**Figure 0-6. Top target events in Night**

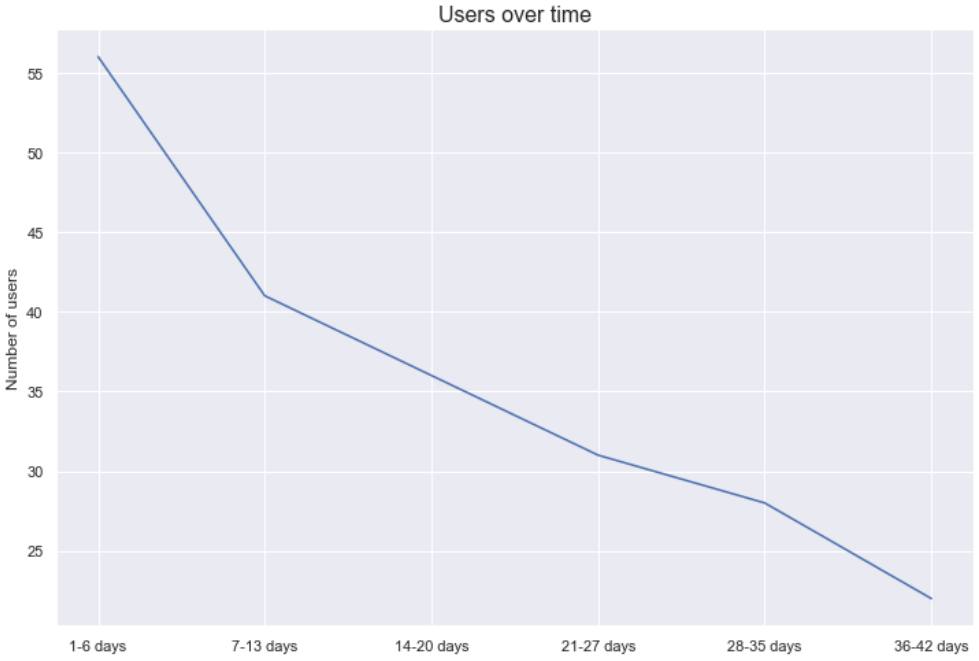



**Figure 0-7: Users over time**

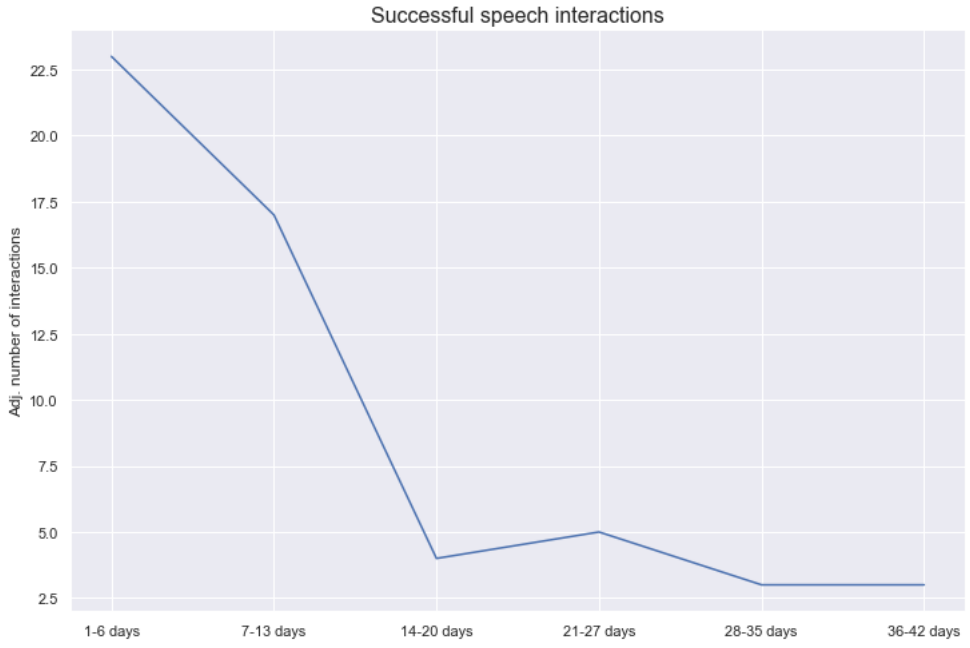



**Figure 0-8: Successful speech interactions**

**BASELINE PROTOCOL**

**(Older Adults)**

**Subject Identification Code**_____

**Country:** ☐ **1 The Netherland** ☐ **2 Luxembourg** ☐ **3 Italy**

Date of Interview:_____/_____/_____

**Day Month Year**

Name of Interviewer:_____

## Socio-Demo Data

**1.** Date of birth (dd /mm /yyyy) _____/_____/_____

**2.** Sex M ☐ 1 F ☐ 2

**3.** Please specify what your marital status is at present

| | |
|---|---|
| Married | ☐ 1 |
| Full time relationship | ☐ 2 |
| Separated | ☐ 3 |
| Divorced | ☐ 4 |
| Single | ☐ 5 |
| Widowed | ☐ 6 |

**4.** Can you indicate which of the following you have attended?

| | |
|---|---|
| No education | ☐ 1 |
| Primary education | ☐ 2 |
| Secondary education | ☐ 3 |
| Tertiary education (University or further education level) | ☐ 4 |

**MINI MENTAL STATE EXAMINATION (MMSE)**

| | |
|---|---|
| **1. ORIENTATION (Maximum score 10)**<br><br>Ask "What is today's date?" Then ask specifically for parts omitted; eg. "Can you also tell me what season it is?" | Date (eg. January 21) ☐ 1<br>Year ☐ 1<br>Month ☐ 1<br>Day (eg. Monday) ☐ 1<br><br>Season ☐ 1<br>Hospital/Clinic ☐ 1<br>Floor ☐ 1<br>City ☐ 1<br>County ☐ 1<br>State ☐ 1<br>**____/10** |
| **2. REGISTRATION (Maximum score 3)**<br><br>Ask the subject if you may test his/her memory. Then say "ball", "flag", "tree", clearly and slowly, about one second for each. After you have said all 3 words, ask subject to repeat them. This first repetition determines the score (0-3) but keep saying them (up to 6 trials) until the subject can repeat all 3 words, if (s)he does not eventually learn all three, recall cannot be meaningfully tested. Record number of trials. | "ball" ☐ 1<br>"flag" ☐ 1<br>"tree" ☐ 1<br><br>**NUMBER OF TRIALS: ____/3** |
| **3. ATTENTION AND CALCULATION (Maximum score 5)** | |
| **A. Counting Backwards Test**<br><br>Ask the subject to begin at 100 and count backwards by 7. Stop after 5 subtractions (93, 86, 79, 72, 65). Score one point for each correct number.<br><br>**B. Spelling Backwards Test** | "93" ☐ 1<br>"86" ☐ 1<br>"79" ☐ 1<br>"72" ☐ 1<br>"65" ☐ 1<br><br>**____/5** |

| | |
|---|---|
| If the subject cannot or will not perform this task, ask him/her to spell the word "world" backwards (D,L,R,O,W). The score is one point for each correctly placed letter eg. DLROW = 5, DLORW = 3.<br>Record how the subject spelled "world" backwards. | D ☐ 1<br>L ☐ 1<br>R ☐ 1<br>O ☐ 1<br>W ☐ 1<br>**____/5** |
| **C. Final Score**<br>Compare the scores of the Counting Backwards and Spelling Backwards tests. Write the greater of the two socres in the box labeled FINAL SCORE at right, and use it in deriving the TOTAL SCORE. | **FINAL SCORE**_____ (Max of 5 or Greater of the two Scores) |
| **4. RECALL (Maximum score 3)**<br>Asks the subject to recall the three words you previously asked him/her to remember (learned in Registration) | "ball" ☐ 1<br>"flag" ☐ 1<br>"tree" ☐ 1<br>**____/3** |
| **5. LANGUAGE (Maximum score 9)** | |
| **Naming:** Show the subject a wrist watch and ask "What is this?" Repeat for pencil. Score one point for each item named correctly.<br>**Repetition:** Ask the subject to repeat "No ifs, ands, or buts". Score one point for correct repetition. | Watch ☐ 1<br>Pencil ☐ 1<br>Repetition ☐ 1<br>**____/3** **/3** |
| **3-Stage Command**: Give the subject a piece of blank paper and say, "Take the paper in your right hand, fold it in half and put it on the floor". Score one point for each action performed correctly. | Takes in right hand ☐ 1<br>Folds in half ☐ 1<br>Put on floor ☐ 1<br>**____/3** |

| | |
|---|---|
| ***For the next 3 tasks use the space & diagrams overleaf***<br><br>**Reading:** On a blank piece of paper, print the sentence "Close your eyes" in letters large enough for the subject to see clearly. Ask subject to read it and do what it says.<br>Score correct only if he/she actually closes his/her eyes. | Closes ☐ 1<br>**____/1** |
| **Writing:** Give the subject a blank piece of paper, ask him/her to write a sentence. It is to be written spontaneously. It must contain a subject and verb and make sense. Correct grammar and punctuation are not necessary. | Writes sentence ☐ 1<br>**____/1** |
| **Copying:** On a clean piece of paper, draw intersecting pentagons, each side about 1 inch, and ask subject to copy it exactly as it is. All 10 angles must be present and two must intersect to score 1 point. Tremor and rotation are ignored. | Draw pentagons ☐ 1<br>**____/1** |
| **SCORE: Add number of correct responses (Maximum score total 30)** | Total Score: ____<br>/30 |
| 23-30 = Normal / 19-23 = Borderline / <19 = Impaired | Up to Grade 8 Level |

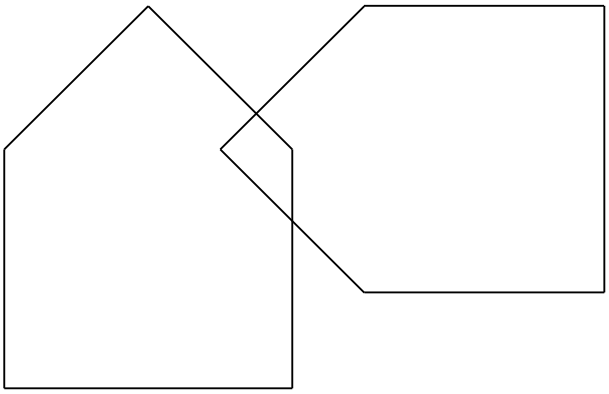
**CLOSE YOUR EYES**

**Write a sentence here:**

_____

_____

_____



## Health Status

### SF-12 (acute form)

*«This survey asks for your views about your health. This information will help keep track of how you feel and how well you are able to do your usual activities. Please answer carefully every question. Some questions may look like others, but each one is different »*

**(FOR THE INTERVIEWER:** Pay attention that the subject answer to all questions, otherwise the test is not valid and the total score cannot be calculated.)

1. «In general, would you say your health is:»

| Excellent | Very good | Good | Fair | Poor |
|---|---|---|---|---|
| ☐ 5 | ☐ 4 | ☐ 3 | ☐ 2 | ☐ 1 |

«The following questions are about activities you might do during a typical day. Does your health now limit you in these activities? If so, how much?»

| | Yes, limited a lot | Yes, limited a little | No, not limited at all |
|---|---|---|---|
| 2. Moderate activities, such as moving a table, pushing a vacuum cleaner, bowling, or playing golf | ☐ 1 | ☐ 2 | ☐ 3 |
| 3. Climbing several flights of stairs | ☐ 1 | ☐ 2 | ☐ 3 |

«During the past week, have you had any of the following problems with your work or other regular daily activities as a result of your physical health?»

| | Yes | No |
|---|---|---|
| 4. Accomplished less than you would like | ☐ 1 | ☐ 0 |
| 5. Were limited in the kind of work or other activities | ☐ 1 | ☐ 0 |

«During the past week, have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems (such as feeling depressed or anxious)?»

| | Yes | No |
|---|---|---|
| 6. Accomplished less than you would like | ☐ 1 | ☐ 0 |
| 7. Did work or other activities less carefully than usual | ☐ 1 | ☐ 0 |

8. «During the past week, how much did pain interfere with your normal work (including both work outside the home and housework)?»

| Not at all | A little bit | Moderately | Quite a bit | Extremely |
|---|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 |

«These questions are about how you feel and how things have been with you during the past week. For each question, please give the one answer that comes closest to the way you have been feeling.»

«How much of the time during the past week...»

| | All of the time | Most of the time | A good bit of the time | Some of the time | A little of the time | None of the time |
|---|---|---|---|---|---|---|

| | | | | | | |
|---|---|---|---|---|---|---|
| 9. Have you felt calm and peaceful? | ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 | ☐ 6 |
| 10. Did you have a lot of energy? | ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 | ☐ 6 |
| 11. Have you felt downhearted and blue? | ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 | ☐ 6 |

12. «During the past week, how much of the time has your physical health or emotional problems interfered with your social activities (like visiting friends, relatives, etc.)?»

| All of the time | Most of the time | A good bit of the time | Some of the time | A little of the time |
|---|---|---|---|---|
| ☐ 1 | ☐ 2 | ☐ 3 | ☐ 4 | ☐ 5 |

Instructions for Interviewers

The QOL-AD is administered in interview format to individuals with dementia, following the instructions below. The interview is carried out with the subject and/or an informant.The subject should be interviewed alone.

Hand the form to the participant, so that he or she may look at it as you give the following instructions (instructions should closely follow the wording given in bold type):

I want to ask you some questions about your quality of life and have you rate different aspects of your life using one of four words: poor, fair, good, or excellent.

Point to each word (poor, fair, good, and excellent) on the form as you say it.

When you think about your life, there are different aspects, like your physical health, energy, family, money, and others. I'm going to ask you to rate each of these areas.We want to find out how you feel about your current situation in each area.

**If you're not sure about what a question means, you can ask me about it. If you have difficulty rating any item, just give it your best guess.**

It is usually apparent whether an individual understands the questions, and most individuals who are able to communicate and respond to simple questions can understand the measure. If the participant answers all questions the same, or says something that indicates a lack of understanding, the interviewer is encouraged to clarify the question. However, under no circumstances should the interviewer suggest a specific response.

Each of the four possible responses should be presented, and the participant should pick one of the four.

If a participant is unable to choose a response to a particular item or items, this should be noted in the comments. If the participant is unable to comprehend and/or respond to two or more items, the testing may be discontinued, and this should be noted in the comments.

As you read the items listed below, ask the participant to circle her/his response. If the participant has difficulty circling the word, you may ask her/him to point to the word or say the word, and you may circle it for him or her.You should let the participant hold his or her own copy of the measure, and follow along as you read each item.

1. First of all, how do you feel about your physical health? Would you say it's poor, fair, good, or excellent? Circle whichever word you think best describes your physical health right now.
2. How do you feel about your energy level? Do you think it is poor, fair, good, or excellent? If the participant says that some days are better than others, ask him or her to rate how she/he has been feeling most of the time lately.
3. How has your mood been lately? Have your spirits been good, or have you been feeling down? Would you rate your mood as poor, fair, good, or excellent?
4. How about your living situation? How do you feel about the place you live now? Would you say it's poor, fair, good, or excellent?
5. How about your memory? Would you say it is poor, fair, good, or excellent?
6. How about your family and your relationship with family members? Would you describe it as poor, fair, good, or excellent? If the respondent says they have no family, ask about brothers, sisters, children, nieces, nephews.
7. How do you feel about your marriage? How is your relationship with (spouse's name). Do you feel it's poor, fair, good, or excellent? Some participants will be single, widowed, or divorced.When this is the case, ask how they feel about the person with whom they have the

closest relationship, whether it's a family member or friend. If there is a family caregiver, ask about their relationship with this person. It there is no one appropriate, or the participant is unsure, score the item as missing.

8. How would you describe your current relationship with your friends? Would you say it's poor, fair, good, or excellent? If the respondent answers that they have no friends, or all their friends have died, probe further. Do you have anyone you enjoy being with besides your family? Would you call that person a friend? If the respondent still says they have no friends, ask how do you feel about having no friends—poor, fair, good, or excellent?
9. How do you feel about yourself—when you think of your whole self, and all the different things about you, would you say it's poor, fair, good, or excellent?
10. How do you feel about your ability to do things like chores around the house or other things you need to do? Would you say it's poor, fair, good, or excellent?
11. How about your ability to do things for fun, that you enjoy? Would you say it's poor, fair, good, or excellent?
12. How do you feel about your current situation with money, your financial situation? Do you feel it's poor, fair, good, or excellent? If the respondent hesitates, explain that you don't want to know what their situation is (as in amount of money), just how they feel about it.
13. How would you describe your life as a whole.When you think about your life as a whole, everything together, how do you feel about your life? Would you say it's poor, fair, good, or excellent?

Scoring instructions for QOL-AD:

Points are assigned to each item as follows: poor = 1, fair = 2, good = 3, excellent = 4. The total score is the sum of all 13 items.

| *UWMC/ADPR/QOL*<br>*Aging and Dementia: Quality of Life in AD*<br>**Quality of Life: AD**<br>(Participant Version) | | | | | Score (for clinician's use only) |
|---|---|---|---|---|---|
| ID Number ☐☐☐☐☐☐ | | Assessment Number ☐☐ | | Interview Date ☐☐ ☐☐ ☐☐<br>Month Day Year | |
| **Instructions:** Interviewer administer according to standard instructions. Circle your responses. | | | | | |
| 1. Physical health | Poor | Fair | Good | Excellent | |
| 2 Energy | Poor | Fair | Good | Excellent | |
| 3. Mood | Poor | Fair | Good | Excellent | |
| 4. Living situation | Poor | Fair | Good | Excellent | |
| 5. Memory | Poor | Fair | Good | Excellent | |
| 6. Family | Poor | Fair | Good | Excellent | |
| 7. Marriage | Poor | Fair | Good | Excellent | |
| 8. Friends | Poor | Fair | Good | Excellent | |
| 9. Self as a whole | Poor | Fair | Good | Excellent | |
| 10. Ability to do chores around the house | Poor | Fair | Good | Excellent | |
| 11. Ability to thing for fun do s | Poor | Fair | Good | Excellent | |
| 12. Money | Poor | Fair | Good | Excellent | |
| 13. Life as a whole | Poor | Fair | Good | Excellent | |
| Comments: | | | | | Total |

Score Summary Sheet

Informant's score of subject's QOL (maximum 52)_____
Subject's own QOL rating (maximum 52)_____

**Acceptance test**

**Almere Model**

| Question | Totally disagree | Disagree | Don't know | Agree | Totally agree |
|---|---|---|---|---|---|
| When using Anne, I am afraid to make mistakes with it | 1 | 2 | 3 | 4 | 5 |
| When using Anne, I am afraid to break something | 1 | 2 | 3 | 4 | 5 |
| I find Anne scary | 1 | 2 | 3 | 4 | 5 |
| I find Anne intimidating | 1 | 2 | 3 | 4 | 5 |
| It is a good idea to use Anne | 1 | 2 | 3 | 4 | 5 |
| Anne makes life more interesting | 1 | 2 | 3 | 4 | 5 |
| It's good to make use of Anne | 1 | 2 | 3 | 4 | 5 |
| I have everything I need to use Anne | 1 | 2 | 3 | 4 | 5 |
| I know enough of Anne to make good use of it | 1 | 2 | 3 | 4 | 5 |
| I think I will use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| I'm certain to use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| I plan to use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| Anne is adapted to my needs | 1 | 2 | 3 | 4 | 5 |
| Anne does what I need her to do at any particular moment | 1 | 2 | 3 | 4 | 5 |
| Anne helps me when I consider it to be necesarry | 1 | 2 | 3 | 4 | 5 |
| I enjoy talking to Anne | 1 | 2 | 3 | 4 | 5 |
| I enjoy doing things with Anne | 1 | 2 | 3 | 4 | 5 |
| I find Anne enjoyable | 1 | 2 | 3 | 4 | 5 |
| I find Anne fascinating | 1 | 2 | 3 | 4 | 5 |
| I find Anne boring | 1 | 2 | 3 | 4 | 5 |
| I find it difficult to know how to use Anne | 1 | 2 | 3 | 4 | 5 |
| I find Anne easy to use | 1 | 2 | 3 | 4 | 5 |
| I can use Anne without any help | 1 | 2 | 3 | 4 | 5 |
| I can only use Anne when there is someone around to help me | 1 | 2 | 3 | 4 | 5 |
| I can only use Anne when I have a good manual | 1 | 2 | 3 | 4 | 5 |
| Anne is a pleasant conversational partner | 1 | 2 | 3 | 4 | 5 |
| I find Anne pleasant to interact with | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| I feel Anne understands me | 1 | 2 | 3 | 4 | 5 |
| I find Anne nice | 1 | 2 | 3 | 4 | 5 |
| I find Anne useful to me | 1 | 2 | 3 | 4 | 5 |
| It is convenient for me to have Anne | 1 | 2 | 3 | 4 | 5 |
| Anne can help me with many things | 1 | 2 | 3 | 4 | 5 |
| When interacting with Anne I felt like was talking to a real person | 1 | 2 | 3 | 4 | 5 |
| It sometimes feels as if Anne is really looking at me | 1 | 2 | 3 | 4 | 5 |
| I imagine Anne to be a living creature | 1 | 2 | 3 | 4 | 5 |
| I often think Anne is not a real person | 1 | 2 | 3 | 4 | 5 |
| Sometimes Anne seems to have real feelings | 1 | 2 | 3 | 4 | 5 |
| I trust Anne if she gives me advice | 1 | 2 | 3 | 4 | 5 |
| I follow the advice Anne gives me | 1 | 2 | 3 | 4 | 5 |

**EVALUATION PROTOCOL**

**(Older Adults)**

**Subject Identification Code_____**

**Country:** ☐ **1 The Netherland**

☐ **2 Luxembourg**

☐ **3 Italy**

Date of Interview:_____/_____/_____

**Day Month Year**

Name of Interviewer:_____

Instructions for Interviewers

The QOL-AD is administered in interview format to individuals with dementia, following the instructions below. The interview is carried out with the subject and/or an informant.The subject should be interviewed alone.

Hand the form to the participant, so that he or she may look at it as you give the following instructions (instructions should closely follow the wording given in bold type):

I want to ask you some questions about your quality of life and have you rate different aspects of your life using one of four words: poor, fair, good, or excellent.

Point to each word (poor, fair, good, and excellent) on the form as you say it.

When you think about your life, there are different aspects, like your physical health, energy, family, money, and others. I'm going to ask you to rate each of these areas.We want to find out how you feel about your current situation in each area.

**If you're not sure about what a question means, you can ask me about it. If you have difficulty rating any item, just give it your best guess.**

It is usually apparent whether an individual understands the questions, and most individuals who are able to communicate and respond to simple questions can understand the measure. If the participant answers all questions the same, or says something that indicates a lack of understanding, the interviewer is encouraged to clarify the question. However, under no circumstances should the interviewer suggest a specific response.

Each of the four possible responses should be presented, and the participant should pick one of the four.

If a participant is unable to choose a response to a particular item or items, this should be noted in the comments. If the participant is unable to comprehend and/or respond to two or more items, the testing may be discontinued, and this should be noted in the comments.

As you read the items listed below, ask the participant to circle her/his response. If the participant has difficulty circling the word, you may ask her/him to point to the word or say the word, and you may circle it for him or her.You should let the participant hold his or her own copy of the measure, and follow along as you read each item.

1. First of all, how do you feel about your physical health? Would you say it's poor, fair, good, or excellent? Circle whichever word you think best describes your physical health right now.
2. How do you feel about your energy level? Do you think it is poor, fair, good, or excellent? If the participant says that some days are better than others, ask him or her to rate how she/he has been feeling most of the time lately.
3. How has your mood been lately? Have your spirits been good, or have you been feeling down? Would you rate your mood as poor, fair, good, or excellent?
4. How about your living situation? How do you feel about the place you live now? Would you say it's poor, fair, good, or excellent?
5. How about your memory? Would you say it is poor, fair, good, or excellent?
6. How about your family and your relationship with family members? Would you describe it as poor, fair, good, or excellent? If the respondent says they have no family, ask about brothers, sisters, children, nieces, nephews.
7. How do you feel about your marriage? How is your relationship with (spouse's name). Do you feel it's poor, fair, good, or excellent? Some participants will be single, widowed, or divorced.When this is the case, ask how they feel about the person with whom they have the

closest relationship, whether it's a family member or friend. If there is a family caregiver, ask about their relationship with this person. It there is no one appropriate, or the participant is unsure, score the item as missing.

8. How would you describe your current relationship with your friends? Would you say it's poor, fair, good, or excellent? If the respondent answers that they have no friends, or all their friends have died, probe further. Do you have anyone you enjoy being with besides your family? Would you call that person a friend? If the respondent still says they have no friends, ask how do you feel about having no friends—poor, fair, good, or excellent?
9. How do you feel about yourself—when you think of your whole self, and all the different things about you, would you say it's poor, fair, good, or excellent?
10. How do you feel about your ability to do things like chores around the house or other things you need to do? Would you say it's poor, fair, good, or excellent?
11. How about your ability to do things for fun, that you enjoy? Would you say it's poor, fair, good, or excellent?
12. How do you feel about your current situation with money, your financial situation? Do you feel it's poor, fair, good, or excellent? If the respondent hesitates, explain that you don't want to know what their situation is (as in amount of money), just how they feel about it.
13. How would you describe your life as a whole.When you think about your life as a whole, everything together, how do you feel about your life? Would you say it's poor, fair, good, or excellent?

Scoring instructions for QOL-AD:

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| *UWMC/ADPR/QOL*<br>*Aging and Dementia: Quality of Life in AD*<br>**Quality of Life: AD**<br>(Participant Version) | | | | | Score (for clinician's use only) |
|---|---|---|---|---|---|
| ID Number<br>☐☐☐☐☐☐ | Assessment Number<br>☐☐ | | Interview Date<br>☐☐ ☐☐ ☐☐<br>Month Day Year | | |
| **Instructions:** Interviewer administer according to standard instructions. Circle your responses. | | | | | |
| 1. Physical health | Poor | Fair | Good | Excellent | |
| 2 Energy | Poor | Fair | Good | Excellent | |
| 3. Mood | Poor | Fair | Good | Excellent | |
| 4. Living situation | Poor | Fair | Good | Excellent | |
| 5. Memory | Poor | Fair | Good | Excellent | |
| 6. Family | Poor | Fair | Good | Excellent | |
| 7. Marriage | Poor | Fair | Good | Excellent | |
| 8. Friends | Poor | Fair | Good | Excellent | |
| 9. Self as a whole | Poor | Fair | Good | Excellent | |
| 10. Ability to do chores around the house | Poor | Fair | Good | Excellent | |
| 11. Ability to thing for fun do s | Poor | Fair | Good | Excellent | |
| 12. Money | Poor | Fair | Good | Excellent | |
| 13. Life as a whole | Poor | Fair | Good | Excellent | |
| Comments: | | | | | Total |

Score Summary Sheet

Informant's score of subject's QOL (maximum 52)_____
Subject's own QOL rating (maximum 52)_____

**Acceptance test**

**Almere Model**

| Question | Totally disagree | Disagree | Don't know | Agree | Totally agree |
|---|---|---|---|---|---|
| When using Anne, I am afraid to make mistakes with it | 1 | 2 | 3 | 4 | 5 |
| When using Anne, I am afraid to break something | 1 | 2 | 3 | 4 | 5 |
| I find Anne scary | 1 | 2 | 3 | 4 | 5 |
| I find Anne intimidating | 1 | 2 | 3 | 4 | 5 |
| It is a good idea to use Anne | 1 | 2 | 3 | 4 | 5 |
| Anne makes life more interesting | 1 | 2 | 3 | 4 | 5 |
| It's good to make use of Anne | 1 | 2 | 3 | 4 | 5 |
| I have everything I need to use Anne | 1 | 2 | 3 | 4 | 5 |
| I know enough of Anne to make good use of it | 1 | 2 | 3 | 4 | 5 |
| I think I will use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| I'm certain to use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| I plan to use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| Anne is adapted to my needs | 1 | 2 | 3 | 4 | 5 |
| Anne does what I need her to do at any particular moment | 1 | 2 | 3 | 4 | 5 |
| Anne helps me when I consider it to be necesarry | 1 | 2 | 3 | 4 | 5 |
| I enjoy talking to Anne | 1 | 2 | 3 | 4 | 5 |
| I enjoy doing things with Anne | 1 | 2 | 3 | 4 | 5 |
| I find Anne enjoyable | 1 | 2 | 3 | 4 | 5 |
| I find Anne fascinating | 1 | 2 | 3 | 4 | 5 |
| I find Anne boring | 1 | 2 | 3 | 4 | 5 |
| I find it difficult to know how to use Anne | 1 | 2 | 3 | 4 | 5 |
| I find Anne easy to use | 1 | 2 | 3 | 4 | 5 |
| I can use Anne without any help | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| I can only use Anne when there is someone around to help me | 1 | 2 | 3 | 4 | 5 |
| I can only use Anne when I have a good manual | 1 | 2 | 3 | 4 | 5 |
| Anne is a pleasant conversational partner | 1 | 2 | 3 | 4 | 5 |
| I find Anne pleasant to interact with | 1 | 2 | 3 | 4 | 5 |
| I feel Anne understands me | 1 | 2 | 3 | 4 | 5 |
| I find Anne nice | 1 | 2 | 3 | 4 | 5 |
| I find Anne useful to me | 1 | 2 | 3 | 4 | 5 |
| It is convenient for me to have Anne | 1 | 2 | 3 | 4 | 5 |
| Anne can help me with many things | 1 | 2 | 3 | 4 | 5 |
| When interacting with Anne I felt like was talking to a real person | 1 | 2 | 3 | 4 | 5 |
| It sometimes feels as if Anne is really looking at me | 1 | 2 | 3 | 4 | 5 |
| I imagine Anne to be a living creature | 1 | 2 | 3 | 4 | 5 |
| I often think Anne is not a real person | 1 | 2 | 3 | 4 | 5 |
| Sometimes Anne  seems to have real feelings | 1 | 2 | 3 | 4 | 5 |
| I trust Anne if she gives me advice | 1 | 2 | 3 | 4 | 5 |
| I follow the advice Anne gives me | 1 | 2 | 3 | 4 | 5 |

**Usability test**

**SYSTEM USABILITY SCALE (SUS)**

| | Strongly disagree | | | | Strongly agree |
|---|---|---|---|---|---|
| 1. I think that I would like to use this system frequently | 1 | 2 | 3 | 4 | 5 |
| 2. I found the system unnecessarily complex | 1 | 2 | 3 | 4 | 5 |
| 3. I thought the system was easy to use | 1 | 2 | 3 | 4 | 5 |
| 4. I think that I would need the support of a technical person to be able to use this system | 1 | 2 | 3 | 4 | 5 |
| 5. I found the various functions in this system were well integrated | 1 | 2 | 3 | 4 | 5 |
| 6. I thought there was too much inconsistency in this system | 1 | 2 | 3 | 4 | 5 |
| 7. I would imagine that most people would learn to use this system very quickly | 1 | 2 | 3 | 4 | 5 |
| 8. I found the system very cumbersome to use | 1 | 2 | 3 | 4 | 5 |

9. I felt very confident using the system

10. I needed to learn a lot of things before I could get going with this system

## Closeness scale

Please ask the user the following questions and write down the comments:

1. What role do you attribute to Anne? And why?

| |
|---|
| Role:<br><br>Why: |

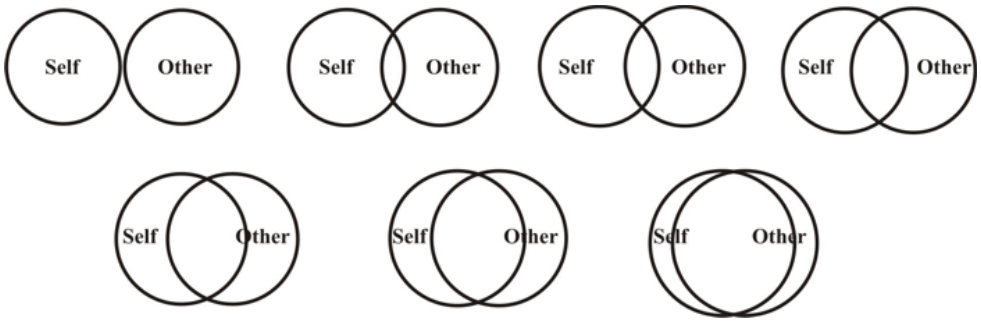
2. What does this mean to you.

| |
|---|
| |

3. Does this apply in a certain need and if yes, how?

| |
|---|
| |

4. Please circle the picture below which best describe your (of user) relationship with Anne (Virtual agent)


Self
Other
Self
Other
Self
Other
Self
Other
Self
Other
Self
Other
Self
Other

**Appendix 3 Protocol for formal/informal caregivers**

**BASELINE PROTOCOL**

**(Formal/informal Caregiver)**

**Subject Identification Code_____**

**Country:** ☐ **1 The Netherland**

☐ **2 Luxembourg**

☐ **3 Italy**

Date of Interview:_____/_____/_____

**Day Month Year**

Name of Interviewer:_____

## Socio-Demo Data

**5.** Date of birth (dd /mm /yyyy) _____/_____/_____

**6.** Sex M ☐ 1 F ☐ 2

**7.** Please specify what your marital status is at present

| | |
|---|---|
| Married | ☐ 1 |
| Full time relationship | ☐ 2 |
| Separated | ☐ 3 |
| Divorced | ☐ 4 |
| Single | ☐ 5 |
| Widowed | ☐ 6 |

**8.** Can you indicate which of the following you have attended?

| | |
|---|---|
| No education | ☐ 1 |
| Primary education | ☐ 2 |
| Secondary education | ☐ 3 |
| Tertiary education (University or further education level) | ☐ 4 |

## Burden

### Caregiver Burden Inventory (Novak and Guest, 1989)

The Case Manager will administer the inventory by reading the statement and marking the responses.

Choose the number that best represents how often the statement describes your feelings.

**0 - Never**
**1 - Rarely**
**2 - Sometimes**
**3 - Quite Frequently 4 - Nearly Always**

**Client Name_Caregiver Name___Date__**

| Time Dependency Items | |
|---|---|
| He/she needs my help to perform many daily tasks | ⓪①②③④ |
| He/she is dependent on me | ⓪①②③④ |
| I have to watch him/her constantly | ⓪①②③④ |
| I have to help him/her with many basic functions | ⓪①②③④ |
| I don't have a minute's break from his/her chores | ⓪①②③④ |
| **Development Items** | |
| I feel that I am missing out on life | ⓪①②③④ |
| I wish I could escape from this situation | ⓪①②③④ |
| My social life has suffered | ⓪①②③④ |
| I feel emotionally drained due to caring for him/her | ⓪①②③④ |
| I expected that things would be different at this point in my life | ⓪①②③④ |
| **Physical Health Items** | |
| I'm not getting enough sleep | ⓪①②③④ |
| My health has suffered | ⓪①②③④ |
| Care giving has made me physically sick | ⓪①②③④ |
| I'm physically tired | ⓪①②③④ |

| Emotional Health Items | |
|---|---|
| I feel embarrassed over his/her behavior | □□□□□ |
| I feel ashamed of him/her | □□□□□ |
| I resent him/her | □□□□□ |
| I feel uncomfortable when I have friends over | □□□□□ |
| I feel angry about my interactions with him/her | □□□□□ |

| Social Relationships Items | |
|---|---|
| I don't get along with other family members as well as I used to | □□□□□ |
| My care giving efforts aren't appreciated by others in my family | □□□□□ |
| I've had problems with my marriage (or other significant relationship) | □□□□□ |
| I don't get along as well as I used to with others | □□□□□ |

| | |
|---|---|
| I feel resentful of other relatives who could but do not help | ☐☐☐☐☐ |

| |
|---|
| **Total Score:** |

**Scores near or above 36 indicates a greater need for respite and other services.**

It is important to seriously look at any item on the burden scale where the answer was scored as a 3 or 4 ('quite frequently' or 'nearly always'). If you have a 3 or 4 as an answer, give careful thought about why the caregiver scored so high on the question and see if you can find away to reduce the stress

**Comments:**_____

**Quality of Lfe**

**QoL-AD**

Instructions for Interviewers

The QOL-AD is administered in interview format to individuals with dementia, following the instructions below. The interview is carried out with the subject and/or an informant.The subject should be interviewed alone.

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14. First of all, how do you feel about your physical health? Would you say it's poor, fair, good, or excellent? Circle whichever word you think best describes your physical health right now.
15. How do you feel about your energy level? Do you think it is poor, fair, good, or excellent? If the participant says that some days are better than others, ask him or her to rate how she/he has been feeling most of the time lately.
16. How has your mood been lately? Have your spirits been good, or have you been feeling down? Would you rate your mood as poor, fair, good, or excellent?
17. How about your living situation? How do you feel about the place you live now? Would you say it's poor, fair, good, or excellent?
18. How about your memory? Would you say it is poor, fair, good, or excellent?
19. How about your family and your relationship with family members? Would you describe it as poor, fair, good, or excellent? If the respondent says they have no family, ask about brothers, sisters, children, nieces, nephews.

20. How do you feel about your marriage? How is your relationship with (spouse's name). Do you feel it's poor, fair, good, or excellent? Some participants will be single, widowed, or divorced.When this is the case, ask how they feel about the person with whom they have the closest relationship, whether it's a family member or friend. If there is a family caregiver, ask about their relationship with this person. It there is no one appropriate, or the participant is unsure, score the item as missing.
21. How would you describe your current relationship with your friends? Would you say it's poor, fair, good, or excellent? If the respondent answers that they have no friends, or all their friends have died, probe further. Do you have anyone you enjoy being with besides your family? Would you call that person a friend? If the respondent still says they have no friends, ask how do you feel about having no friends—poor, fair, good, or excellent?
22. How do you feel about yourself—when you think of your whole self, and all the different things about you, would you say it's poor, fair, good, or excellent?
23. How do you feel about your ability to do things like chores around the house or other things you need to do? Would you say it's poor, fair, good, or excellent?
24. How about your ability to do things for fun, that you enjoy? Would you say it's poor, fair, good, or excellent?
25. How do you feel about your current situation with money, your financial situation? Do you feel it's poor, fair, good, or excellent? If the respondent hesitates, explain that you don't want to know what their situation is (as in amount of money), just how they feel about it.
26. How would you describe your life as a whole.When you think about your life as a whole, everything together, how do you feel about your life? Would you say it's poor, fair, good, or excellent?

Scoring instructions for QOL-AD:

Points are assigned to each item as follows: poor = 1, fair = 2, good = 3, excellent = 4. The total score is the sum of all 13 items.

*UWMC/ADPR/QOL*
*Aging and Dementia: Quality of Life in AD*

**Quality of Life: AD**
(Family Version)

Score (for clinician's use only)

ID Number ☐☐☐☐☐☐

Assessment Number ☐☐

Interview Date ☐☐ ☐☐ ☐☐
Month Day Year

**Instructions:** Please rate your relative's current situation, as you see it. Circle your responses.

| | | | | | |
|---|---|---|---|---|---|
| 1. Physical health | Poor | Fair | Good | Excellent | |
| 2 Energy | Poor | Fair | Good | Excellent | |
| 3. Mood | Poor | Fair | Good | Excellent | |
| 4. Living situation | Poor | Fair | Good | Excellent | |
| 5. Memory | Poor | Fair | Good | Excellent | |
| 6. Family | Poor | Fair | Good | Excellent | |
| 7. Marriage | Poor | Fair | Good | Excellent | |
| 8. Friends | Poor | Fair | Good | Excellent | |
| 9. Self as a whole | Poor | Fair | Good | Excellent | |
| 10. Ability to do chores around the house | Poor | Fair | Good | Excellent | |
| 11. Ability to do for fun things | Poor | Fair | Good | Excellent | |
| 12. Money | Poor | Fair | Good | Excellent | |
| 13. Life as a whole | Poor | Fair | Good | Excellent | |

Comments: _____

Total

Score Summary Sheet

Informant's score of subject's QOL (maximum 52)_____
Subject's own QOL rating (maximum 52)_____

□□□□□□ □□ □□ □□ □□

**Acceptance test**

**Almere Model**

| | Perspective Formal caregiver | | | | |
|---|---|---|---|---|---|
| Question | Totally disagree | Disagree | Don't know | Agree | Totally agree |
| When using Anne, I am afraid to make mistakes with it | 1 | 2 | 3 | 4 | 5 |
| When using Anne, I am afraid to break something | 1 | 2 | 3 | 4 | 5 |
| I find Anne scary | 1 | 2 | 3 | 4 | 5 |
| I find Anne intimidating | 1 | 2 | 3 | 4 | 5 |
| It is a good idea to use Anne | 1 | 2 | 3 | 4 | 5 |
| Anne makes life more interesting | 1 | 2 | 3 | 4 | 5 |
| It's good to make use of Anne | 1 | 2 | 3 | 4 | 5 |
| I have everything I need to use Anne | 1 | 2 | 3 | 4 | 5 |
| I know enough of Anne to make good use of it | 1 | 2 | 3 | 4 | 5 |
| I think I will use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| I'm certain to use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| I plan to use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| Anne is adapted to my needs | 1 | 2 | 3 | 4 | 5 |
| Anne does what I need her to do at any particular moment | 1 | 2 | 3 | 4 | 5 |
| Anne helps me when I consider it to be necesarry | 1 | 2 | 3 | 4 | 5 |
| I enjoy talking to Anne | 1 | 2 | 3 | 4 | 5 |
| I enjoy doing things with Anne | 1 | 2 | 3 | 4 | 5 |
| I find Anne enjoyable | 1 | 2 | 3 | 4 | 5 |
| I find Anne fascinating | 1 | 2 | 3 | 4 | 5 |
| I find Anne boring | 1 | 2 | 3 | 4 | 5 |
| I find it difficult to know how to use Anne | 1 | 2 | 3 | 4 | 5 |
| I find Anne easy to use | 1 | 2 | 3 | 4 | 5 |
| I can use Anne without any help | 1 | 2 | 3 | 4 | 5 |
| I can only use Anne when there is someone around to help me | 1 | 2 | 3 | 4 | 5 |
| I can only use Anne when I have a good manual | 1 | 2 | 3 | 4 | 5 |
| Anne is a pleasant conversational partner | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| I find Anne pleasant to interact with | 1 | 2 | 3 | 4 | 5 |
| I feel Anne understands me | 1 | 2 | 3 | 4 | 5 |
| I find Anne nice | 1 | 2 | 3 | 4 | 5 |
| I find Anne useful to me | 1 | 2 | 3 | 4 | 5 |
| It is convenient for me to have Anne | 1 | 2 | 3 | 4 | 5 |
| Anne can help me with many things | 1 | 2 | 3 | 4 | 5 |
| I think my employer and the informal caregiver would like me to use Anne | 1 | 2 | 3 | 4 | 5 |
| I think it would give a good impression to my employers, my colleagues and the formal caregivers if i should use Anne | 1 | 2 | 3 | 4 | 5 |
| I think that the End-user would want to use Anne because they think that I would like them to use her | 1 | 2 | 3 | 4 | 5 |
| I think the End-user would want to use Anne to impress me, her family and friends and the formal Caregivers who attend to her | 1 | 2 | 3 | 4 | 5 |
| When interacting with Anne I felt like was talking to a real person | 1 | 2 | 3 | 4 | 5 |
| It sometimes feels as if Anne is really looking at me | 1 | 2 | 3 | 4 | 5 |
| I imagine Anne to be a living creature | 1 | 2 | 3 | 4 | 5 |
| I often think Anne is not a real person | 1 | 2 | 3 | 4 | 5 |
| Sometimes Anne seems to have real feelings | 1 | 2 | 3 | 4 | 5 |
| I trust Anne if she gives me advice | 1 | 2 | 3 | 4 | 5 |
| I follow the advice Anne gives me | 1 | 2 | 3 | 4 | 5 |

| | Perspective Informal caregiver | | | | |
|---|---|---|---|---|---|
| Question | Totally disagree | Disagree | Don't know | Agree | Totally agree |
| When using Anne, I am afraid to make mistakes with it | 1 | 2 | 3 | 4 | 5 |
| When using Anne, I am afraid to break something | 1 | 2 | 3 | 4 | 5 |
| I find Anne scary | 1 | 2 | 3 | 4 | 5 |
| I find Anne intimidating | 1 | 2 | 3 | 4 | 5 |
| It is a good idea to use Anne | 1 | 2 | 3 | 4 | 5 |
| Anne makes life more interesting | 1 | 2 | 3 | 4 | 5 |
| It's good to make use of Anne | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| I have everything I need to use Anne | 1 | 2 | 3 | 4 | 5 |
| I know enough of Anne to make good use of it | 1 | 2 | 3 | 4 | 5 |
| I think I will use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| I'm certain to use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| I plan to use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| Anne is adapted to my needs | 1 | 2 | 3 | 4 | 5 |
| Anne does what I need her to do at any particular moment | 1 | 2 | 3 | 4 | 5 |
| Anne helps me when I consider it to be necesarry | 1 | 2 | 3 | 4 | 5 |
| I enjoy talking to Anne | 1 | 2 | 3 | 4 | 5 |
| I enjoy doing things with Anne | 1 | 2 | 3 | 4 | 5 |
| I find Anne enjoyable | 1 | 2 | 3 | 4 | 5 |
| I find Anne fascinating | 1 | 2 | 3 | 4 | 5 |
| I find Anne boring | 1 | 2 | 3 | 4 | 5 |
| I find it difficult to know how to use Anne | 1 | 2 | 3 | 4 | 5 |
| I find Anne easy to use | 1 | 2 | 3 | 4 | 5 |
| I can use Anne without any help | 1 | 2 | 3 | 4 | 5 |
| I can only use Anne when there is someone around to help me | 1 | 2 | 3 | 4 | 5 |
| I can only use Anne when I have a good manual | 1 | 2 | 3 | 4 | 5 |
| Anne is a pleasant conversational partner | 1 | 2 | 3 | 4 | 5 |
| I find Anne pleasant to interact with | 1 | 2 | 3 | 4 | 5 |
| I feel Anne understands me | 1 | 2 | 3 | 4 | 5 |
| I find Anne nice | 1 | 2 | 3 | 4 | 5 |
| I find Anne useful to me | 1 | 2 | 3 | 4 | 5 |
| It is convenient for me to have Anne | 1 | 2 | 3 | 4 | 5 |
| Anne can help me with many things | 1 | 2 | 3 | 4 | 5 |
| When interacting with Anne I felt like was talking to a real person | 1 | 2 | 3 | 4 | 5 |
| It sometimes feels as if Anne is really looking at me | 1 | 2 | 3 | 4 | 5 |
| I imagine Anne to be a living creature | 1 | 2 | 3 | 4 | 5 |
| I often think Anne is not a real person | 1 | 2 | 3 | 4 | 5 |
| Sometimes Anne seems to have real feelings | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| I trust Anne if she gives me advice | 1 | 2 | 3 | 4 | 5 |
| I follow the advice Anne gives me | 1 | 2 | 3 | 4 | 5 |

**EVALUATION PROTOCOL**

**(Formal/Informal Caregiver)**

**Subject Identification Code_____**

**Country:** ☐ **1 The Netherland**

☐ **2 Luxembourg**

☐ **3 Italy**

Date of Interview:_____/_____/_____

**Day Month Year**

Name of Interviewer:_____

**Quality of Lfe QoL-AD**

Instructions for Interviewers

The QOL-AD is administered in interview format to individuals with dementia, following the instructions below. The interview is carried out with the subject and/or an informant.The subject should be interviewed alone.

Hand the form to the participant, so that he or she may look at it as you give the following instructions (instructions should closely follow the wording given in bold type):

I want to ask you some questions about your quality of life and have you rate different aspects of your life using one of four words: poor, fair, good, or excellent.

Point to each word (poor, fair, good, and excellent) on the form as you say it.

When you think about your life, there are different aspects, like your physical health, energy, family, money, and others. I'm going to ask you to rate each of these areas.We want to find out how you feel about your current situation in each area.

**If you're not sure about what a question means, you can ask me about it. If you have difficulty rating any item, just give it your best guess.**

It is usually apparent whether an individual understands the questions, and most individuals who are able to communicate and respond to simple questions can understand the measure. If the participant answers all questions the same, or says something that indicates a lack of understanding, the interviewer is encouraged to clarify the question. However, under no circumstances should the interviewer suggest a specific response.

Each of the four possible responses should be presented, and the participant should pick one of the four.

If a participant is unable to choose a response to a particular item or items, this should be noted in the comments. If the participant is unable to comprehend and/or respond to two or more items, the testing may be discontinued, and this should be noted in the comments.

As you read the items listed below, ask the participant to circle her/his response. If the participant has difficulty circling the word, you may ask her/him to point to the word or say the word, and you may circle it for him or her.You should let the participant hold his or her own copy of the measure, and follow along as you read each item.

14. First of all, how do you feel about your physical health? Would you say it's poor, fair, good, or excellent? Circle whichever word you think best describes your physical health right now.
15. How do you feel about your energy level? Do you think it is poor, fair, good, or excellent? If the participant says that some days are better than others, ask him or her to rate how she/he has been feeling most of the time lately.
16. How has your mood been lately? Have your spirits been good, or have you been feeling down? Would you rate your mood as poor, fair, good, or excellent?
17. How about your living situation? How do you feel about the place you live now? Would you say it's poor, fair, good, or excellent?
18. How about your memory? Would you say it is poor, fair, good, or excellent?
19. How about your family and your relationship with family members? Would you describe it as poor, fair, good, or excellent? If the respondent says they have no family, ask about brothers, sisters, children, nieces, nephews.
20. How do you feel about your marriage? How is your relationship with (spouse's name). Do you feel it's poor, fair, good, or excellent? Some participants will be single, widowed, or divorced.When this is the case, ask how they feel about the person with whom they have the

closest relationship, whether it's a family member or friend. If there is a family caregiver, ask about their relationship with this person. It there is no one appropriate, or the participant is unsure, score the item as missing.

21. How would you describe your current relationship with your friends? Would you say it's poor, fair, good, or excellent? If the respondent answers that they have no friends, or all their friends have died, probe further. Do you have anyone you enjoy being with besides your family? Would you call that person a friend? If the respondent still says they have no friends, ask how do you feel about having no friends—poor, fair, good, or excellent?
22. How do you feel about yourself—when you think of your whole self, and all the different things about you, would you say it's poor, fair, good, or excellent?
23. How do you feel about your ability to do things like chores around the house or other things you need to do? Would you say it's poor, fair, good, or excellent?
24. How about your ability to do things for fun, that you enjoy? Would you say it's poor, fair, good, or excellent?
25. How do you feel about your current situation with money, your financial situation? Do you feel it's poor, fair, good, or excellent? If the respondent hesitates, explain that you don't want to know what their situation is (as in amount of money), just how they feel about it.
26. How would you describe your life as a whole.When you think about your life as a whole, everything together, how do you feel about your life? Would you say it's poor, fair, good, or excellent?

Scoring instructions for QOL-AD:

Points are assigned to each item as follows: poor = 1, fair = 2, good = 3, excellent = 4. The total score is the sum of all 13 items.

| *UWMC/ADPR/QOL*<br>*Aging and Dementia: Quality of Life in AD*<br>**Quality of Life: AD**<br>(Family Version) | | | | | Score (for clinician's use only) |
|---|---|---|---|---|---|
| ID Number<br>☐☐☐☐☐☐ | | Assessment Number<br>☐☐ | | Interview Date<br>☐☐ ☐☐ ☐☐<br>Month Day Year | |
| **Instructions:** Please rate your relative's current situation, as you see it. Circle your responses. | | | | | |
| 1. Physical health | Poor | Fair | Good | Excellent | |
| 2 Energy | Poor | Fair | Good | Excellent | |
| 3. Mood | Poor | Fair | Good | Excellent | |
| 4. Living situation | Poor | Fair | Good | Excellent | |
| 5. Memory | Poor | Fair | Good | Excellent | |
| 6. Family | Poor | Fair | Good | Excellent | |
| 7. Marriage | Poor | Fair | Good | Excellent | |
| 8. Friends | Poor | Fair | Good | Excellent | |
| 9. Self as a whole | Poor | Fair | Good | Excellent | |
| 10. Ability to do chores around the house | Poor | Fair | Good | Excellent | |
| 11. Ability to do for fun things | Poor | Fair | Good | Excellent | |
| 12. Money | Poor | Fair | Good | Excellent | |
| 13. Life as a whole | Poor | Fair | Good | Excellent | |
| Comments: | | | | | Total |

Score Summary Sheet

Informant's score of subject's QOL (maximum 52)_____
Subject's own QOL rating (maximum 52)_____

□□□□□□ □□ □□ □□ □□

**Acceptance test**

**Almere Model**

| | Perspective Formal caregiver | | | | |
|---|---|---|---|---|---|
| Question | Totally disagree | Disagree | Don't know | Agree | Totally agree |
| When using Anne, I am afraid to make mistakes with it | 1 | 2 | 3 | 4 | 5 |
| When using Anne, I am afraid to break something | 1 | 2 | 3 | 4 | 5 |
| I find Anne scary | 1 | 2 | 3 | 4 | 5 |
| I find Anne intimidating | 1 | 2 | 3 | 4 | 5 |
| It is a good idea to use Anne | 1 | 2 | 3 | 4 | 5 |
| Anne makes life more interesting | 1 | 2 | 3 | 4 | 5 |
| It's good to make use of Anne | 1 | 2 | 3 | 4 | 5 |
| I have everything I need to use Anne | 1 | 2 | 3 | 4 | 5 |
| I know enough of Anne to make good use of it | 1 | 2 | 3 | 4 | 5 |
| I think I will use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| I'm certain to use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| I plan to use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| Anne is adapted to my needs | 1 | 2 | 3 | 4 | 5 |
| Anne does what I need her to do at any particular moment | 1 | 2 | 3 | 4 | 5 |
| Anne helps me when I consider it to be necesarry | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| I enjoy talking to Anne | 1 | 2 | 3 | 4 | 5 |
| I enjoy doing things with Anne | 1 | 2 | 3 | 4 | 5 |
| I find Anne enjoyable | 1 | 2 | 3 | 4 | 5 |
| I find Anne fascinating | 1 | 2 | 3 | 4 | 5 |
| I find Anne boring | 1 | 2 | 3 | 4 | 5 |
| I find it difficult to know how to use Anne | 1 | 2 | 3 | 4 | 5 |
| I find Anne easy to use | 1 | 2 | 3 | 4 | 5 |
| I can use Anne without any help | 1 | 2 | 3 | 4 | 5 |
| I can only use Anne when there is someone around to help me | 1 | 2 | 3 | 4 | 5 |
| I can only use Anne when I have a good manual | 1 | 2 | 3 | 4 | 5 |
| Anne is a pleasant conversational partner | 1 | 2 | 3 | 4 | 5 |
| I find Anne pleasant to interact with | 1 | 2 | 3 | 4 | 5 |
| I feel Anne understands me | 1 | 2 | 3 | 4 | 5 |
| I find Anne nice | 1 | 2 | 3 | 4 | 5 |
| I find Anne useful to me | 1 | 2 | 3 | 4 | 5 |
| It is convenient for me to have Anne | 1 | 2 | 3 | 4 | 5 |
| Anne can help me with many things | 1 | 2 | 3 | 4 | 5 |
| I think my employer and the informal caregiver would like me to use Anne | 1 | 2 | 3 | 4 | 5 |
| I think it would give a good impression to my employers, my colleagues and the formal caregivers if i should use Anne | 1 | 2 | 3 | 4 | 5 |
| I think that the End-user would want to use Anne because they think that I would like them to use her | 1 | 2 | 3 | 4 | 5 |
| I think the End-user would want to use Anne to impress me, her family and friends and the formal Caregivers who attend to her | 1 | 2 | 3 | 4 | 5 |
| When interacting with Anne I felt like was talking to a real person | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| It sometimes feels as if Anne is really looking at me | 1 | 2 | 3 | 4 | 5 |
| I imagine Anne to be a living creature | 1 | 2 | 3 | 4 | 5 |
| I often think Anne is not a real person | 1 | 2 | 3 | 4 | 5 |
| Sometimes Anne seems to have real feelings | 1 | 2 | 3 | 4 | 5 |
| I trust Anne if she gives me advice | 1 | 2 | 3 | 4 | 5 |
| I follow the advice Anne gives me | 1 | 2 | 3 | 4 | 5 |

| | Perspective Informal caregiver | | | | |
|---|---|---|---|---|---|
| Question | Totally disagree | Disagree | Don't know | Agree | Totally agree |
| When using Anne, I am afraid to make mistakes with it | 1 | 2 | 3 | 4 | 5 |
| When using Anne, I am afraid to break something | 1 | 2 | 3 | 4 | 5 |
| I find Anne scary | 1 | 2 | 3 | 4 | 5 |
| I find Anne intimidating | 1 | 2 | 3 | 4 | 5 |
| It is a good idea to use Anne | 1 | 2 | 3 | 4 | 5 |
| Anne makes life more interesting | 1 | 2 | 3 | 4 | 5 |
| It's good to make use of Anne | 1 | 2 | 3 | 4 | 5 |
| I have everything I need to use Anne | 1 | 2 | 3 | 4 | 5 |
| I know enough of Anne to make good use of it | 1 | 2 | 3 | 4 | 5 |
| I think I will use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| I'm certain to use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| I plan to use Anne during the next few days | 1 | 2 | 3 | 4 | 5 |
| Anne is adapted to my needs | 1 | 2 | 3 | 4 | 5 |
| Anne does what I need her to do at any particular moment | 1 | 2 | 3 | 4 | 5 |
| Anne helps me when I consider it to be necesarry | 1 | 2 | 3 | 4 | 5 |
| I enjoy talking to Anne | 1 | 2 | 3 | 4 | 5 |

| | | | | | |
|---|---|---|---|---|---|
| I enjoy doing things with Anne | 1 | 2 | 3 | 4 | 5 |
| I find Anne enjoyable | 1 | 2 | 3 | 4 | 5 |
| I find Anne fascinating | 1 | 2 | 3 | 4 | 5 |
| I find Anne boring | 1 | 2 | 3 | 4 | 5 |
| I find it difficult to know how to use Anne | 1 | 2 | 3 | 4 | 5 |
| I find Anne easy to use | 1 | 2 | 3 | 4 | 5 |
| I can use Anne without any help | 1 | 2 | 3 | 4 | 5 |
| I can only use Anne when there is someone around to help me | 1 | 2 | 3 | 4 | 5 |
| I can only use Anne when I have a good manual | 1 | 2 | 3 | 4 | 5 |
| Anne is a pleasant conversational partner | 1 | 2 | 3 | 4 | 5 |
| I find Anne pleasant to interact with | 1 | 2 | 3 | 4 | 5 |
| I feel Anne understands me | 1 | 2 | 3 | 4 | 5 |
| I find Anne nice | 1 | 2 | 3 | 4 | 5 |
| I find Anne useful to me | 1 | 2 | 3 | 4 | 5 |
| It is convenient for me to have Anne | 1 | 2 | 3 | 4 | 5 |
| Anne can help me with many things | 1 | 2 | 3 | 4 | 5 |
| When interacting with Anne I felt like was talking to a real person | 1 | 2 | 3 | 4 | 5 |
| It sometimes feels as if Anne is really looking at me | 1 | 2 | 3 | 4 | 5 |
| I imagine Anne to be a living creature | 1 | 2 | 3 | 4 | 5 |
| I often think Anne is not a real person | 1 | 2 | 3 | 4 | 5 |
| Sometimes Anne  seems to have real feelings | 1 | 2 | 3 | 4 | 5 |
| I trust Anne if she gives me advice | 1 | 2 | 3 | 4 | 5 |
| I follow the advice Anne gives me | 1 | 2 | 3 | 4 | 5 |

## Usability test

### SYSTEM USABILITY SCALE (SUS)



| Strongly disagree | | | | Strongly agree |
|---|---|---|---|---|
| | | | | |

1. I think that I would like to use this system frequently


2. I found the system unnecessarily complex


3. I thought the system was easy to use



4. I think that I would need the support of a technical person to be able to use this system


5. I found the various functions in this system were well integrated


6. I thought there was too much inconsistency in this system


7. I would imagine that most people would learn to use this system very quickly



8. I found the system very cumbersome to use

9. I felt very confident using the system

10. I needed to learn a lot of things before I could get going with this system

## Demand and Cost Information

Please rate the following statements with points from 1 (weak, does not matter for me) to 5 (strong, I strongly agree).

| **Above all, I'm/would be willing to pay for Anne, because:** | 1 | 2 | 3 | 4 | 5 |
|---|---|---|---|---|---|
| • I can save time with her in our daily life. | | | | | |
| • Thanks to Anne, I can do things more efficiently | | | | | |
| • Thanks to Anne, I feel less stressed | | | | | |
| • With her, I can be more like family again and not a carer | | | | | |
| • I have more time for myself with her / she frees me up more time for myself. | | | | | |
| • she/the use of her makes the person I care for happier (than without her). | | | | | |
| • With Anne, I think the person I care for feels more in control of her/his own life | | | | | |
| • With Anne, I think the person I care for feels saver/more secure | | | | | |
| • With Anne, I think the person I care for feels more independent and he/she can stay longer at home | | | | | |
| • I have more control over the whole situation with Anne | | | | | |
| • I feel safer with Anne | | | | | |
| • Anne brought us closer together (better relationship, more contact, more comprehension) | | | | | |

- I am aware of how much other senior tablets cost around in the market:

| No | More or less | Yes |
|---|---|---|

- For a monthly fee (basic package including Internet browser, time and date, calendar and reminder function) of _____ I would like to buy and use Anne.
  For the following features, I would also be willing to pay the additional amount of X euros each:

| **Feature** | **Euro** |
|---|---|
| News (reader) | |
| Medication Reminder | |
| Agenda | |
| Radio/Music | |
| Video Call | |
| Games | |
| My Media: Photo album | |

**Please read carefully the following offers and choose afterwards <u>one</u> of them:**

(Please remember, these are just hypothetical questions without any subsequent serious consequences. Right now you get the highest possible level of security regarding your personal data.)

- Here we want to test: Are the customers (= relatives, etc.) willing to pay for **datasecurity**? How much do the relatives etc. really care about the datasecurity of their affected persons?

| |
|---|
| 20 Euro |
| Basic Anne |
| Software System runs on Google |

| |
|---|
| 40 Euro |
| Basic Anne |
| Private Software System of Living well with Anne |

- Here we want to test: which decision do people make **when they know/got informed about their datasecurity**?

| | | |
|---|---|---|
| 20 Euro | 40 Euro | 60 Euro |
| Basic Anne | Basic Anne | Basic Anne |
| Software system runs on google | Private Software system of Living well with Anne | Private Software system of Living well with Anne |
| Datasecurity: low. Google gets the fully permission to use your data and they can do with it whatever they want (for example use for their own marketresearch and advertisement or for selling them to other parties). | Datasecurity: Adequate. Your data gets safely stored by Living well with Anne, who has the permission to sell your data in <u>anonymous</u> form to others. | Datasecurity: very high. No third party will have access or information about your data. Your data don't get sold to others. |

- Here we want to test: Are they willing to pay for **no advertisement**?

| | | |
|---|---|---|
| 20 Euro | 40 Euro | 60 Euro |
| Basic Anne | Basic Anne | Basic Anne |
| You get general advertising on your Anne. | You get personalized advertising on your Anne. | You get absolutely no advertising on your Anne. |

I would like to order Anne bindingly for the price of 75 Euro per month (excl. Tablet) (please tick):

- Yes please, for 3 months

- Yes please, for 1 year
- No thank you. → If No, what's the reason?