

AAL Joint Program



Connected Vitality, the Personal Telepresence Network (CVN)



D7.3 A document with the results of the Dutch field test at Sensire

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Due to an official project extension provided by the AAL that concerned all project partners, the initial delivery for the pilot operation in the Netherlands (month 28) was delayed following a later deployment of the pilot itself, so the results and analysis were done after the initial proposed date as described in this deliverable.

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1. Introduction

The following document deals with the results of the field studies that took place in the Netherlands at Sensire over a period of twelve weeks (29-1-2013 until 28-4-2013). The central goal of the field study was to evaluate the YoooM in a “natural” setting, offering potential end users the opportunity to try out the device at their homes. According to the proposal, the central focus was on “Care”, thus we were interested in participants’ experiences when using the YoooM to be in contact with their formal and informal care givers (e.g., family).

1.1. The Organization (EUOs)

Sensire is a care organization in the east of the Netherlands. In the working area live approximately 400.000 people. In this area the percentage of elderly people is a bit higher than in the rest of the Netherlands. About 20 %.

Sensire provides different kinds of care:

- 53.000 people a year in home care
- But also 8 locations for nursing homes / care homes
- and also provide help in household, Social assistances, dieticians, occupational therapy, etc.
- In the working area there are approximately 6 shops with home care products.
- Besides care for people who are in a way less able to take care of themselves Sensire also has care for children. Like maternity care at home and infant welfare centers.

Sensire is busy developing all kinds of ‘Care over distance’. E.g. every day approximately 1000 clients have contact with their professional carer via iPad.

A lot of the clients of Sensire fit in the following profile:

- 75 years or older.
- Living alone, because husband or wife have already passed away
- Less mobility because of disease or age
- Because of less mobility are feeling a bit isolated and want to have more contact with family and friends
- Have a very basic knowledge of technologies. Most of them only use the telephone or postcards to stay in touch with family and friends, besides having direct contact.

Most clients are visited at home by nurses and carers who provide care in the home of those elderly, but since July 2012 also a lot of clients of Sensire (at this moment 1100 clients) also have contact with the nurses from Sensire by iPad. Some of the care moments are done over distance (for example assistance by taking medicine, or looking at wounds, assisting with injecting Insulin, etc)

For some people an iPad is a bit to complicated and also we think that communicating through Facetime doesn’t really give a feeling of being together and doing things together. For some clients the YoooM will work better than an iPad and Facetime do.

2. Study design

The YoooM system was evaluated on basis of various values, defined in the concept of ViA [Fuchsberger et al. 2012], which is based on the theory of consumption values (TCV). The idea behind it is to focus on the user perspective, taking into account emotions and experiences, but also include technological aspects such as the usability of a system. Thus, ViA covers a wide range of factors of Usability (U), User Experiences (UX) and User Acceptance (UA) within one concept. According to the TCV we focused on the investigation of the interpersonal value (social presence, social connectedness, reciprocity), the functional value (reliability, usability, sociability, ease of use, usefulness) and the emotional value (fun/enjoyment, computer anxiety of the YoooM system). Moreover, the social context participants are embedded in was investigated (for a more detailed description of the study designs see D6.2).

Research Questions (PLUS)

According to the values, and the main focus “care”, the following central research questions were defined:

Interpersonal value

RQ1: To what extent do participants experience *social presence* when communicating via the YoooM device with their family and care giver(s)?

RQ1.1: To what extent does participants’ social presence change over time?

RQ2: To what extent do participants experience *social connectedness* when communicating via the YoooM device with their family and care giver(s)?

RQ3: What characterizes the communication in terms of reciprocity?

Functional Value

RQ4: How do participants evaluate the *usability* of the YoooM system (effectiveness, efficiency, satisfaction)?

RQ5: To what extent do participants experience the YoooM as *easy to use*?

RQ6: How do participants estimate the *usefulness* of the system in order to be in contact with their care giver?

RQ6.1: To what extent do participants experience to be supported in terms of care?

RQ6.2: Which different areas of home care are conducted via the YoooM system?

Emotional Value

RQ7: To what extent does the YoooM evoke *fun/enjoyment*?

RQ8: What did participants like/dislike when using the Meet format in order to be in contact with their family and care giver(s)?

RQ9: To what extent does the YoooM evoke *computer anxiety*?

Social Context

RQ10: What characterizes participants’ social network in general?

RQ11: How does the communication with the care giver look like?

RQ11.1: To what extent are participants satisfied with the communication with their care giver?

Methodological Approach (PLUS; EUOs)

Within the field trial a variety of different methods were applied, e.g., interviews, a diary and workshops. The following paragraph provides a brief overview on the approach. A detailed methodological description can be found in the internal concept for the field trials as well as D6.2.

At the beginning of the study, Sensire visited the participants in order to introduce and bring the YooM to them. Participants got information about procedures, e.g., what kind of materials they were asked to use, whom they can turn to in case they have questions. Although the participants were informed about the activities they could carry out via the YooM they were *not* introduced in detail about the handling and how the device worked. The usage of the YooM should be self-exploratory, and participants should independently get going with the device. Thus, we did not intervene in this process. All participants were asked to fill in the *pre-interviews*. The pre-interviews aimed at gathering information about participants' social background and their needs in terms of care.

After the units had been installed, participants started with the *six-week-field trial*. To gain information during the six weeks, participants were asked to use a *diary* to write down their experiences when using the device. The diary included open questions and structured questionnaires in order to assess users' experiences with respect to e.g., social presence or usability. All questionnaires were self-reporting questionnaires, consisting of items to be rated on a five-point-scale and participants were asked to indicate to what extent they agreed to the given statements. In order to gain a better overview on the findings, we only report if participants agreed, disagreed to the given statements or chose the category neither nor.

Additionally to the diary participants got a *calendar* where they could write down their appointments via the YooM (e.g., when they would meet in the Classroom or in the Club in order to play some games). It included also some notes that should remind them to carry out certain activities or to fill out a questionnaire in the diary. During the field trial, participants of the study were in regular contact with the people from the Medical Service Center of Sensire.

At the end of the trial, the units were de-installed and a *short interview* was carried out in order to discuss the materials that were used during the study and to gain information about participants' experiences.

Recruitment of participants (EUOs)

In the recruitments of participants first the nurses of homecare were contacted. They know their clients very well. They were told what kind of people could participate. They asked some of their clients and if they insisted the nurses gave the names and telephone numbers to the fieldtestleaders, who then made contact with the clients

Description of participants

Most of the participants fitted the Anna-profile.

They were all, at least in the beginning, very motivated. They understood the purpose of the project and wanted to be a part of trying out new things like the YooM.

In the fieldtest there were lots of technical problems, which was the reason that some participant were less motivated after a few weeks.

On January 29th the first two YooMs were installed at an elderly and her daughter in law. They had immediately several technical problems so it took about two weeks before the other YooMs were installed. In those two weeks the YooMs were tested a lot. After

installing the other YooMs the fieldtest officially started with week one. After a six week fieldtest it's decided that the fieldtest would be prolonged so their would be more time to report technical issues to the technical partners.
Of course the participants were asked if they agreed to prolong the fieldtest.

Technical Support (UCY, Presence)

The general description of the organization of the field test is presented in [1].
For the field test in Sensire, few changes were made due to the fact that PRE (second help desk and coordinator) is located in the same country as Sensire.
Therefore, PRE did a visit to Sensire HQ to troubleshoot a problem related to the internal internet connection available for the field test. During this visit the training course was given to the EUOs partners.
The technical support was organized a bit different. PRE coordinated and provided second help desk. The partners of Sensire provided the first help desk and reported directly to PRE any incidence during the field test.

3. Results (PLUS)

The following part of the document provides the central results of the field trial that was carried out in the Netherlands. More detailed information can be found within the internal reports. All participants were recruited to the profile of the Persona “Anna” that has been developed based on the data from the requirements analysis within WP1 (see D1.1), meeting the following characteristics: older than 70 years, (slightly) restricted in mobility, needs and/or receives help in terms of care, willingness to participate in social life, basic computer skills and interest in new communication technologies.

Overall, five older adults took part in the field trial in the Netherlands aged between 65 and 89 years (average age: 75.2 years). Two are male and three are female, two are married, and three widowed. Three participants are slightly restricted in mobility, two are restricted, whereas only one regularly needs help regarding activities of daily living. All of them indicated that they can go outside at least 3 or 4 times a week. One person indicated that s/he can never go outside and needs to use a mobility scooter, which makes it very difficult for him/her to go outside without the help from others. Three participants indicated to have basic computer skills, two only have small computer skills.

It has to be pointed out that the results of the field trial are mainly based on the data that was assessed within the interviews at the beginning and the end of the field trial. Due to the variety of technical problems, participants did not regularly use the diary, indicating that most of the time the YooM did not work and it was therefore hard for them to answer all the different questions included there.

3.1 Social Context

To gain more information about participants' social context in general, an interview at the beginning of the field trial was carried out to find out with whom they are in regular contact with, what kind of communication channels (e.g., technologies) they use in order to stay in contact and to what extent they experience being part of a group of people. Moreover, with a focus on the care aspect participants were interviewed how they normally stay in contact with their care giver and to what extent they are satisfied with the communication.

RQ10: What characterizes participants' social network in general?

All participants indicated to be in contact with their family, most of them with their friends (4) and two stated that they are in regular contact with their neighbors, with whom

they play games, go for a walk or just drink a cup of coffee and talk. All are normally in contact with the people face-to-face or use the telephone. One person indicated to be in contact via Internet and another person uses the iPad (facetime) to communicate over distance..

For almost all of them (4), technologies are important, because sometimes people are living far away. Thus technologies make it possible to be in contact with them. All participants have got friends or family that live in the near vicinity (5) and they all can visit them without any help needed.

Almost all of them (3) stated that they have somebody they can count on regarding activities of living. One person has got a housekeeper, two receive homecare from Sensire, one from his/her family. Two persons said that they are still quite independent regarding the activities of daily living and do not need any help from other people. All of them have got a close relationship to at least one person (e.g., children, friends). Moreover, they all have somebody they can count on in case of an emergency or somebody they can turn to if they have to take important decisions in their life. The majority of the participants (4) have somebody who relies on them for their help, e.g., family members or neighbors. One person indicated that his/her physical condition is not that good and so s/he cannot help anybody.

Two persons out of five participants indicated that they experience to have a lot of contacts but sometimes wish to have more contact to others. All of them feel part of a group of people having the same interests (e.g., hobby group or sports club), with whom they are all in contact face-to-face or via telephone. Only one participant indicated to do some voluntary work.

All participants indicated to feel part of a social network of friends.

RQ11: How does the communication with the care giver look like and how satisfied are participants regarding the communication with the care giver?

Only two participants regularly receive help in term of care and both of them indicated that they normally stay in contact face-to-face, via telephone (land line) or via video call (using the iPad). They were talking about everyday things and also about health aspects. Both participants who receive care are satisfied with the communication and experience that they have a tight relationship and good contact.

3.2 Interpersonal Value

RQ1: To what extent do participants experience social presence when communicating via the YoooM device with their family and care giver(s)?

In order to assess participants' experience of social presence when communicating via the YoooM device a questionnaire was used that consists of ten items to be rated on a five point likert scale, asking participants to indicate to what extent they agreed to the given statements. Social presence was assessed at the beginning of the field trial in week 1 and at the end of the field trial in week 6.

Additionally to the information that was gathered through the diary, participants were interviewed after the six week field trial and were asked if they had an experience of actually talking to a person face-to-face and if they experienced closeness in comparison to other communication technologies they have used so far such as the mobile phone, the iPad, etc.

Due to a variety of technical problems especially at the beginning of the field trials within the first week, only three participants indicated information about their experience of social presence within the diary, whereas only two filled in all items. Two persons did not indicate any information about social presence, pointing out that the YoooM did not work properly, making it hard for them to report about their experiences. In the last week of the

field trial again only three participants indicated their experience of social presence when communicating over distance.

The interview revealed that especially the variety of non-verbal cues contributed to their experience of social presence. One person indicated that it there, because of the big screen making it possible to that one can see the other person almost full-sized. Another participant pointed out that it gives the impression of physical contact, which was indicated as important when people are alone. Moreover, another statement was that it feels like if the other person is on the other side of the table, because of the big screen, making it possible to see the communication partner almost life-sized. One participant pointed out that it is not a real contact but gives a little bit the impression as if one is actually sitting in front of another person, although s/he also pointed out that when communicating via an iPad this could also provoke such a feeling although this device is smaller. In his/her opinion an experience of talking to a person face-to-face is supported by the video; that one can see the communication partner doing things. One comment of a participant was more critical, indicating that in his/her opinion the Yooom provides no added value in comparison to an iPad.

With respect to the experience of closeness, all participants except of one indicated that one gets the feeling that the communication partner is close, because one gets the impression that the person is sitting on the other side of the table. Only one person pointed out that it is not really different than talking via an iPad, indicating that s/he experiences like this because of the variety of technical problems that occurred during the field trial and the fact that the Yooom did not work properly.

RQ2: To what extent do participants experience social connectedness when communicating via the Yooom with their family and care giver(s)?

Social connectedness when communicating via the Yooom device could not be assessed because none of the participants used the provided post-its to indicate their level of closeness/connectedness when using different communication technologies. Also within the post-interviews no information could be gathered.

RQ3: What characterizes the communication in terms of reciprocity?

Data logging was used during the six week field trial to assess to what extent participants were active via the Yooom (with whom, how long, etc.). Unfortunately, due to the variety of technical problems, the logging data does not provide any information about reciprocity (in the Netherlands as well as in Spain).

Summing up, due to the sparse data we cannot draw any general conclusions regarding the interpersonal value for he participants of the field trial because there is only sparse data with respect of social presence and we could not gain any data about social connectedness and reciprocity.

3.3 Functional Value

The functional value, the perceived utility of achieving a specific task or a practical goal was evaluated by means of usability, ease of use and usefulness.

RQ4: How do participants evaluate the usability of the Yooom system (effectiveness, efficiency, satisfaction)?

This research question is answered by analyzing the SUS-questionnaire that was filled out by the participants in the first as well as sixth week of the field study. As already mentioned in the beginning, normally, an overall SUS score would be calculated but due to the small amount of data the items are analyzed separately.

In the first week only two participants filled out the questionnaire because all other participants had technical problems when communicating via the Yooom and thus, could not use the device. Participants only indicated their agreement/disagreement to six out of ten items.

Both participants agreed that they would like to use the YooM frequently. They disagreed that the device is unnecessarily complex. Only one participant stated his/her agreement that the YooM is *easy to use*. They neither agreed nor disagreed that they would need support to be able to use the YooM, that the functions are *well integrated* and that there are *inconsistencies*. Both participants indicated their agreement that most people would learn to use the YooM *very quickly*. Again only one participant indicated his/her agreement/disagreement to the last three items. This person disagreed that the YooM is very cumbersome to use, agreed to feel confident using the device and disagreed that one has to learn a lot of things before one could get going with the YooM.

In the sixth week, three participants filled out the SUS-questionnaire (two participants still had big technical problems). One participant agreed that s/he would use the YooM frequently, one participant disagreed and one participant neither agreed nor disagreed. Two disagreed that the YooM is unnecessarily complex one participant agreed. They all agreed that the YooM is easy to use. Although there were a lot of technical problems, two participants disagreed that they would need support of a technical person in order to be able to use the device; one person neither agreed nor disagreed. Two participants agreed that the functions are well integrated, one indicated neither nor and also two agreed that there is too much inconsistency (one participant neither agreed nor disagreed to the given statement). All three participants agreed that most people would learn to use the YooM quickly and that they feel very confident when using the YooM. Two participants disagreed that the device is very cumbersome to use, one participant indicated neither nor. Finally, two participants disagreed that they would need to learn a lot before they could get going with the YooM and one participant neither agreed nor disagreed to the given statement.

RQ5: To what extent do participants experience the YooM as easy to use?

Ease of use was again evaluated by means of a questionnaire that was included in the diary in week 2 and week 6, asking them to indicate their agreement/disagreement to six given statements.

Unfortunately, not all of the participants answered the questions, neither in week 2 nor in week 6. Four participants indicated that it was easy for them to learn how to operate the YooM (missing: 1), four participants agreed to the statement I find the YooM easy to use (missing: 1). Three participants agreed to the statement that the interaction was clear and understandable, one participant neither agreed nor disagreed (missing: 1). Three participants said that it was easy to become skillful at using the YooM (missing: 2). Only one participant indicated that s/he finds the YooM flexible to interact with, one disagreed to the statement and one participant neither agreed nor disagreed (missing: 2). Finally one participant said that s/he found it easy to get the YooM to do what s/he wants it to do, one participant disagreed to the statement and another participant neither agreed nor disagreed (missing: 2).

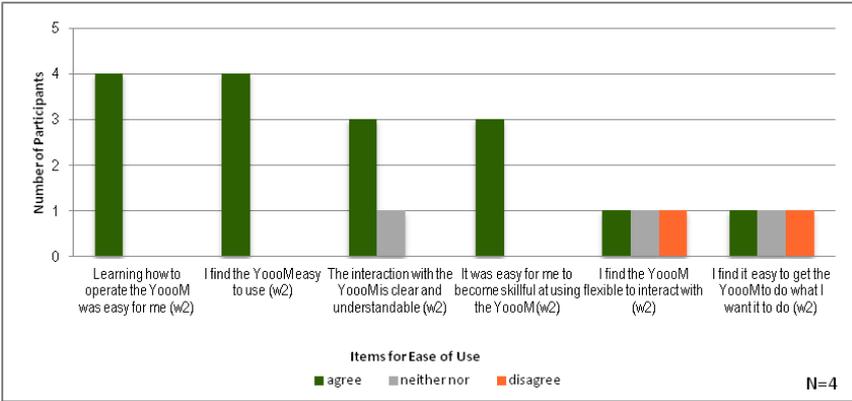


Figure 1: Items for Ease of Use – degree of agreement (week 2)

In week 6 at the end of the field trial, only three participants stated their agreement/disagreement to the given statements. As indicated in [Figure 2](#), all three participants agreed that it *was easy to learn how to use the YooM* and to use the YooM, that the interaction was clear and understandable, that it was easy to become skillful at using the YooM and that the YooM is flexible to interact with. With respect to the statement “I find it easy to get the YooM to do what I want it to do” two participants agreed and one participant stated that s/he neither agreed nor disagreed to the given statement.

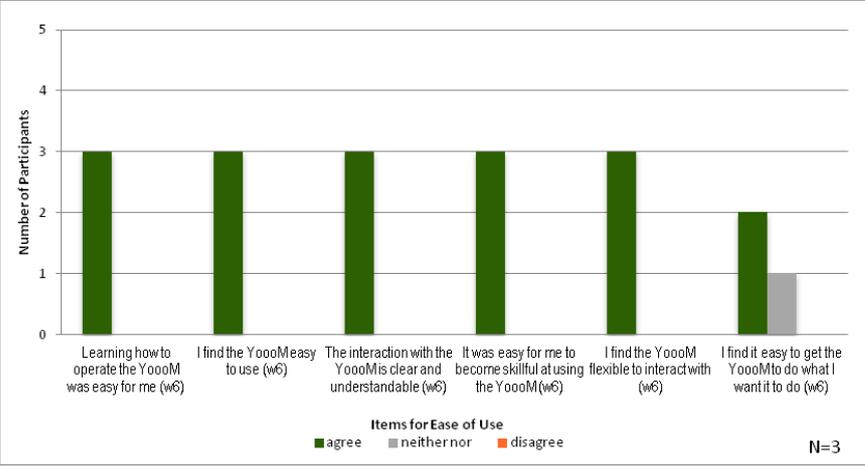


Figure 2: Items for Ease of Use – degree of agreement (week 6)

Comparing the data from week 2 and week 6 we could identify differences with respect to the item I find the YooM flexible to interact with. Whereas in week two only one participant indicated that s/he finds it flexible to interact with, at the end of the field trial three participants agreed to the given statement.

Summing up, participants of the field trial in the Netherlands experienced it was easy to learn how to operate the YooM and found it easy to use. Nevertheless, not all experienced that it was flexible to interact with and do not think that it was easy to actually get the YooM to do what they want it to do.

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RQ6: How do participants estimate the usefulness of the system in order to be in contact with their care giver?

Within the diary, participants were asked to indicate their agreement to three given statements in week 2 and week 6 of the field study. In week 2 two participants pointed out that it was beneficial for them to use the YooM, one participant disagreed to the statement (missing: 2). Two participants agreed that they think the YooM could assist them in conducting activities with other people, two participants neither agreed nor disagreed to the given statement (missing: 1). Two participants agreed that they think the YooM is useful, one disagreed and one stated to neither agree nor disagree (missing: 1) (see [Figure 3](#)).

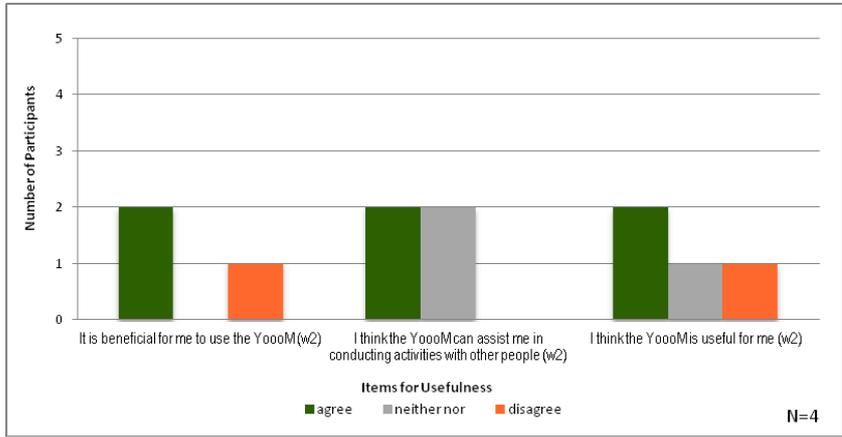


Figure 3: Items for Usefulness – degree of agreement (week 2)

At the end of the field study in week 6, three participants stated that it is beneficial for them to use the YooM (missing: 2), but only one said that s/he thinks the YooM can assist him/her in conducting activities with other people, whereas two stated to neither agree nor disagree to the given statement (missing: 2). Again only one participant said that s/he thinks the YooM is useful, one disagreed and one neither agreed nor disagreed (missing 2) (see [Figure 4](#)).

Overall a smaller number of participants agreed to the given statements in week 6 than initially in week 2, indicating that a smaller number of participants experienced the YooM as useful.

Summing up, we could not gain a consistent picture regarding the functional value for the participants of the field trial. On the one hand most of participants find it easy to use but on the other hand less than half of the participants agreed that it is useful and that the YooM could assist them in conducting activities with other people. Furthermore, not even half of the participants think that it was easy to become skillful at using the YooM.

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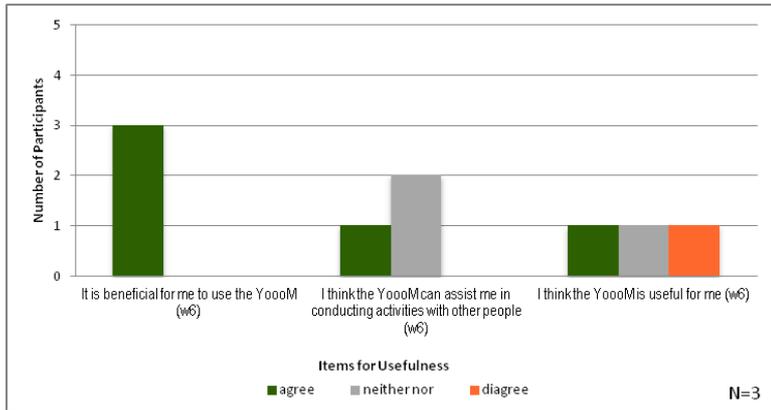


Figure 4: Items for Usefulness – degree of agreement (week 6)

3.4 Emotional Value

The emotional value was assessed by three theoretical constructs: fun/enjoyment, likes/dislikes and computer anxiety.

RQ7: To what extent does the YoooM evoke fun/enjoyment?

Fun and enjoyment was assessed within the diary (week 1,3,5), asking participants to indicate their degree of fun/enjoyment on a “Smiley Scale” (ranging from 1-5 – 1=did not enjoy at all, 5=totally enjoy). Besides they were asked within the post-interview to indicate what they especially enjoyed when using the device.

The **data from the diary** was very sparse and we just could gain a few insights about participants’ fun/enjoyment and likes and dislikes especially with respect to the communication with the care giver because only two participants indicated that they regularly receive care.

In **week 1** only one person indicated how much s/he enjoyed communicating with the family and chose the happiest smiley. All other persons did not indicate any information. Another person indicated information about likes and dislikes and stated that s/he likes having contact with the grandchildren, playing games and having a nice conversation but also pointed out that s/he did not like that there were so many errors. With respect to the communication with the care giver nobody indicated information about fun/enjoyment. One person stated that s/he likes that it was possible to have a nice chat with the care giver via the Meet format.

In **week 3** only one participant indicated information about fun/enjoyment when communicating with the family, choosing the happiest smiley. Nobody stated any information regarding likes or dislikes. With respect to the communication with the care giver there is no information regarding fun/enjoyment. Only one participant stated that it was fun to play Bingo with the care giver but pointed out that s/he did not like that there were a lot of technical problems.

In **week 5**, almost at the end of the field trial, three participants indicated information about fun/enjoyment when communicating with the family, choosing the happiest smiley. One person said that it as very nice to have contact if the system worked and pointed out that s/he did not like that there were so much technical problems.

Regarding the communication with the care giver one person chose the happiest smiley. The other person who received care did not indicate any information. Besides, within the post interview at the end of the field trial participants were asked to indicate how much they enjoyed communicating and interacting via the YoooM. Four out of five participants pointed out that they really enjoyed playing games, but that there were also a lot of problems: one person for example pointed out that s/he enjoyed playing Ludo and could imagine that it would have been much more fun to play it together with other people but that it was not working. Another participant pointed out that s/he liked playing the games because it was possible to play against others but also pointed out that the YoooM did not work properly and that it often took a while until one could make contact with another person to play the game. One person said that s/he appreciated the opportunity of playing games and said that s/he thinks that this is especially important for people who are alone and do not have that much contact as it is a kind of distraction and fun to see the game player’s reactions. Another person who was playing games with his/her grandchild pointed out that it was fun to see that the child was really “in the game” and s/he enjoyed that it was possible to talk with each other while playing the game. Finally, one person stated that s/he really enjoyed the communication and

interaction via the YooM but had not that much contact with others due to the variety of technical problems that occurred all the time.

Summing up, participants enjoyed communicating and interacting via the YooM and especially pointed out that it was fun to interact with others via the YooM, e.g., by playing games. Nevertheless, the technical problems that occurred during the trial spoiled their experience.

Only two participants explicitly pointed out an example with respect to the different formats Meet and Club. Regarding the Meet format one participant said that it was fun to see and talk to more than one person via the YooM (the screen is big enough enabling two persons to sit in front of the YooM). Regarding the Club one participant explained that s/he found it nice to see the communication partner's reaction when playing a game and that especially the grandchildren enjoyed playing games via the YooM.

RQ8: What did the participants like/dislike when using the Meet format in order to be in contact with their family and care givers?

Within the interview at the end of the six-week field trial participants were asked to indicate what they like or dislike when being in contact with their care giver and/or their family.

Regarding the communication with the family all participants pointed out that they especially liked that one could see each other during the communication. One person pointed out that it was fun to see for example one's grandchildren playing and that one can actually see how somebody is doing. Another person pointed out that although enjoying communicating via the Meet format s/he would prefer the iPad for communication (this person is in regular contact with the care organization via the iPad; the care organizations provides a program which is similar to face time and makes it easier for their clients to get in contact with their care giver).

All participants indicated that they did not like that there were a lot of technical problems, which made it sometimes really hard to make contact with each other. Problems concerned the sound and video quality and problems to establish a connection.

Asking participants what they missed when communicating via the YooM one person said that s/he missed that the device was working properly and another person said that she would wish that the device would be more like a normal computer.

Regarding the communication with the care giver only one person said that (if the technology was working) s/he enjoyed to see the care giver on such a big screen. Besides, participants were asked to indicate if they could imagine to be in contact with the care giver via the YooM. Only two persons answered this question. One said that s/he would only like to be in contact via the YooM if the device would work properly and that for now s/he prefers the iPad for communication. The other person stated that s/he does not like to be in contact via the device as his/her family lives in the neighborhood and that s/he prefers personal contact.

RQ9: To what extent does the YooM evoke computer anxiety?

Computer anxiety was assessed by means of three items at the beginning of the field trial in week 2 and at the end of the field trial in week 6. With respect to the data that was assessed within week 2, all participants (missing: 1) agreed that the YooM does not scare them, at all (missing: 2) said that the YooM does not make them feel uncomfortable. Three participants stated that working with the YooM does not make them nervous (missing: 1) and one person stated that it makes him/her nervous.

In week 6 all participants pointed out that the YooM does not make them nervous (missing: 2), all said that the YooM does not make them feel uncomfortable (missing: 2). With respect to the item "The YooM does not scare me at all" two participants agreed to the statements and one participant indicated to neither agree nor disagree (missing: 2).

In general, we can conclude does not evoke computer anxiety among the participating people in the field trial.

Regarding the emotional value we can point out that the YooM arose positive as well as negative emotions. Positive, because a variety of participants experienced fun and enjoyed playing games with either the family or the care giver. But a lot of negative experiences arose because of the variety of technical problems that occurred throughout the six week field trial. That was also the reason why participants hardly worked with the diary. For three participants the YooM did not arose any anxiety. Two participants did not indicate any information.

4. Technical support results (PRE)

In the following section we provide the results of the field test related to the technical support.

First we provide a general overview of the technical conditions of Sensire.

Then, we present the technical problems observed during the field test at Sensire and the way they were tackled. The problems are organized in three sections: Solved issues, Instabilities, Open issues, and Suggestions.

Finally, we present the conclusions derived from the field test from a technical perspective.

4.1 General overview

Sensire is located in the city of Doetinchem , which is located in the region of Achterhoek in the eastern of the Netherlands.

According to Akamai State of the Internet Report, the average connection speed in the Netherlands is about 10Mbps in 2013. The adoption of broadband connections (>4 Mbps) is of 75% in 2013. [2]

However, in the region of Achterhoek quarter of households has access only to DSL for broadband, according to an article of telcompaper [3]. While plans to roll-out fiber glass in the region are still undergoing.

For the field test, it was a challenge for EUOs to find end-users which fit the ‘persona’ profile and still match the network requirements defined by the technical partners. In Table 1 we present the Internet speed of the end-users in the field test as well as the user-machine association and the location of the units.

| Unit | YooM User | Location | Download speed (Mbps) | Upload speed (Mbps) |
|------|-----------|----------------------------|-----------------------|---------------------|
| Y3 | autotest9 | end-user home: Bianca | 7.83 | 0.92 |
| Y10 | autotest7 | end-user home: Kirsty | 59.04 | 5.98 |
| Y11 | autotest8 | end-user home: Mw. Wissink | 5.28 | 0.86 |

| | | | | |
|-----|-----------|----------------------------------|-------|------|
| Y13 | autotest4 | end-user home: Justin | 5.01 | 2.49 |
| Y14 | autotest2 | end-user home: Mw. Weelink | 23.31 | 1.53 |
| Y15 | autotest6 | end-user home: fam. Lammers | 8.48 | 0.84 |
| Y18 | autotest1 | end-user home: MwKolkman | 24.62 | 1.48 |
| Y19 | autotest3 | Sensire facilities. ZorgCentrale | 10.28 | 0.56 |
| Y20 | autotest5 | end-user home: Joop | 29.25 | 2.78 |

Table 1 User-machine association and Internet speed at Sensire field test

The general figures of the field test in terms of network speed are shown in Table XX.

| | Average | Median |
|----------------|---------|--------|
| UpLoad Speed | 1.937 | 1.48 |
| DownLoad Speed | 19.233 | 10.28 |

Even though, the average and the median are high above the required connection speed of 1Mbps upload and 5Mbps download, there were connections with very low UL and DL speed for a good quality of experience.

4.2 Observed problems

In Appendix I, we have included all the results of the issues and details of the field test. In the following sub-section we present a summary of the results organized in three categories: hardware, software and network.

Solved issues

- Hardware:
 - **Problem:** The most frequent problem observed was bad initialization of the cameras in some units. The root cause is a damage in the camera cables of some units, which could have been caused during transportation and packaging of the units.

Solution: In the meet format it was possible to solve this problem by software. In club and teach format it was not possible to fix it, in this case the user had to leave the club and join again, which most of the times worked.
 - **Problem:** The USB hub of Y14 failed after some time, which caused problems with the speakers connected to this unit.

Solution: The problem was solved by using another port of the USB hub.

- Software:
 - **Problem:** The web-based technologies in the CVN system provided some practical issues related to Windows permissions being asked every time an update in the software was done. The more recurrent issue was related to clearing the cache and security measures of Adobe Flash after clearing the cache.
Solutions: These issues were solved via remote assistance by PRE.
 - **Problem:** Some bugs were detected in the software during the field test. Most of them were related to specific combinations happening during the field test, which were not present in the environment where the software was developed and tested.
Solution: These issues were solved by the technical partners.
 - **Problem:** Windows configuration. At the beginning of the field test some issues were reported, which were mostly caused by errors or lack of configuration of the system, previous to installation.
Solution: Solved via remote assistance by PRE.
- Network:
 - **Problem:** Most of the problems observed during the field test were related to the network conditions existent in the end-users home. Overall the problem can be narrow down to:
 - § Some internet connections at elderly end-users did not meet the requirements that technical partners had defined. Adjustment in the system was necessary to cope with these changes.
 - § Network conditions in the field test (end-users home), were too different from the ones in the developing/testing environment. Problems caused by packet loss, high latency, network security of ISP providers, overall network congestion and others were observed during the field test.

The problems caused: audio-video was not synchronized in club, TCP connections to the servers were broken without any notice to the system, and some bugs were encountered due to the different network conditions.

Solution: In general, the technical team had to adjust the software to cope with the difference in network conditions compared with the lab environment.
 - § The audio-video synchronization was fixed by reducing video quality. The delay between audio and video was reduced from up to 5 seconds to less than 1 second. The video quality suffered a dramatic reduction but this was acceptable, as the audio quality is more important for a good communication.
 - § The TCP connections between clients and servers being broken were solved by adding ping messages at specific intervals. This avoided the long idle periods which caused the TCP port to be closed.

§ Y10 had too low network conditions (1.96 Mbps DL and 0.19 Mbps) at the beginning of the field test. Therefore, this unit was moved to another location, with other user, as it was not possible to have a proper conversation with the available connection.

Instabilities

- Hardware:
 - The most frequent source of instability observed was bad initialization of the cameras in some units. Root cause and solution has been discussed above.
- Software:
 - Bugs in the system were the most common way of instability during the field test. Most of them were related to specific combinations happening during the field test related to network conditions. The root cause and solutions have been discussed above.
- Network:
 - As discussed above, most of the problems observed during the field test were related to the network conditions existent in the end-users home. The instabilities remained for the GameServer as they were related to games initialization problems caused by high latency of connections. They were fixed for the field test in Spain.
 - In meet some video quality instabilities were detected from time to time, which showed some blue stains in the video. They were related to the video codec utilized in meet. However, the meet format was able to recover from this issue and remove the stains after some time.

Open issues

- Sound problems were experienced with BBB in club and teach. The problems were addressed by UCY but in the amount of time of the field test, it was not possible to fix it completely. Users with low internet connection (DL speed lower than 1Mbps) still experienced problems with halting and chopping sound during the field test.
- Due to high network traffic in the field test, which caused high latency and high packet loss, the GameServer experienced problems when initializing games and in club:explorer format. These issues were solved for the field test of Spain, but not for Sensire.
- In the BBB system, used for audio and video of club and teach, it was not possible to detect when the camera was not properly initialized (due to the hardware problem discussed above). As a result, the user had to leave and re-join the clubs/classrooms to fix this problem.
- The success rate to make a connection with the meet format in the first attempt was medium in the beginning of the field test, due to the problems caused by network conditions. Multiple solutions were implemented by PRE to increase the

success rate, which at the end of the field test was increased. However, it was still necessary to implement a recovery mechanism for handling errors to ensure that a connection will succeed always in the first attempt (to the eyes of the end-user).

This implementation was available until Spain, not in Sensire.

Suggestions

- For future version, we received advice from the EUOs and end-users for improvement:
 - The position of the lower screen provides a better presence feeling, however derives in some usability and functional issues such as:
 - § Difficulty to operate when it is placed at a higher than normal height table because the user has to be standing.
 - § Difficulty to view the screen, because of the angle position, when it is operated in tables higher than normal height. This cause the user to stand in order to see properly the screen.
 - § Usability problems with the buttons in the lower edge of the lower screen: sometimes the end-user will click by mistake the lower buttons without noticing, which created confusion. Even though the user was able to understand how to return to the previous screen, it was confusing during the first times of operation of the system.

4.3 Conclusions

The YooM device provides social presence to the end-users in online communication. And even though the system provided an easy to use interface, an important challenge to be tackled is the stability and robustness of the system which had a big impact in the required technical support.

During the field test in Sensire multiple technical issues appeared, due to different network conditions, such as packet loss, packet delay and network congestion, compared to the lab environments. These challenges are faced by any internet applications because of the inherent dynamic behavior of the Internet. The problems faced in Sensire can be solved by performing structured testing during software development and especially during deployment. Even though the technical team performed multiple structured tests (module testing, integration tests, stress tests) during the development of the software, it was required to perform tests in the deployment scenario, before the final end-user experienced the CVN system. This was achieved in the field test in Spain where we were able to provide a robust and stable system due to the extensive testing performed in Sensire and Arvika.

As a result, the technical support for this field test was very important to record and follow up open issues in the system. We were able to set-up and coordinate an efficient and responsive support for the EUOs, who were in contact with end-users recording and solving the issues that appeared during the usage of the system. The support from technical partners as well as EUOs partners was crucial to improve the system, which results in a successful field test in Spain.

5. Conclusion (PLUS, EUOs)

Summing up, although there were a lot of technical issues throughout the trial, participants experienced social presence and enjoyed that they could see additional non-verbal cues when communicating via the device, e.g., gestures. Accordingly, the interaction arose as well positive as negative emotions. On the one hand participants experienced fun and enjoyed that they could see their communication partner almost life-sized. On the other hand they were annoyed by the variety of technical problems. Nevertheless, we see potential that the YooM supports communication and interaction over distance as it fosters social presence.

Lessons learned during the field studies (EUOs) – strengths and pitfalls

The pilot of YooM devices at Sensire went a bit different than expected.

In the beginning of the fieldtest of course the first focus was on experiencing if the YooM device give people the feeling of being close to each other.

Unfortunately after a few weeks we had to make the conclusion that there were a lot of errors so we decided (and communicated to our participants) that the focus of the fieldtest would also be to detect technical errors, like sound and software issues.

By doing this we hoped that the technical partners of the CVN-project could solve those issues which would lead to a better fieldtest in ASSDA, Spain.

And happily this was the case.

Besides a specific list of (solved) errors, we also have a list of strengths and pitfalls that came out of the fieldtest.

Strengths

- the participants like to have a possibility to do things together like playing games
- the participants like the Meetformat because you see some in almost life-size.
- the participants find the YooM very simple to use. It's very intuitive.

Pitfalls

- the participants didn't like it that the YooM is so big although they realize that the life-size in the Meet is a result of this.
- switching between the different formats (Meet, Club and Classroom) should be possible without losing contact.
- a list of missed calls would be nice
- a sort of agenda would be nice: E.g. coming Wednesday at 5 p.m. I would like to play Ludo.

6. References

- [1] CVN deliverables D6.2. A process guideline document for the field tests
- [2] Akamai State of the Internet Report. August 2013.
<http://www.akamai.com/stateoftheinternet/>
- [3] Telecompaper website. August 2013. Gelderland to help finance fibre roll-out in Achterhoek. <http://www.telecompaper.com/news/gelderland-to-help-finance-fibre-roll-out-in-achterhoek--959396>