iCarer

D2.1 User Needs

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0.6	27/10/2014	Added final remarks from WP2 group	Kris Berckmans
1.0	12/12/2014	Created Final version, included language suggestions by NCC	Kris Berckmans / NCC

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1. Summary

This document examines the needs of informal caregivers and to what extent it is feasible that these needs can be met within the iCarer project.

Capturing the actual needs was done by brainstorm sessions with end user groups (e.g. social care support) and conducting interviews with informal caregivers in various care situations.

During the interview the user needs will be captured and possible iCarer services that where brainstormed in the early phase of the project are verified.

All captured needs and remarks on initial service descriptions are then aligned with the iCarer project by taking into account the informal caregiver's characteristics, the care situation, the technological and commercial feasibility, and to what extent solving the user need fits within the scope of the iCarer project.

Using a MOSCOW methodology we will summarize and select the user needs that will be covered by the iCarer project.

2. Methodology and workflow

This section describes the methodology and workflow used to capture user needs of informal caregivers and how the user needs that align with the iCarer project are selected.

2.1.   Overview
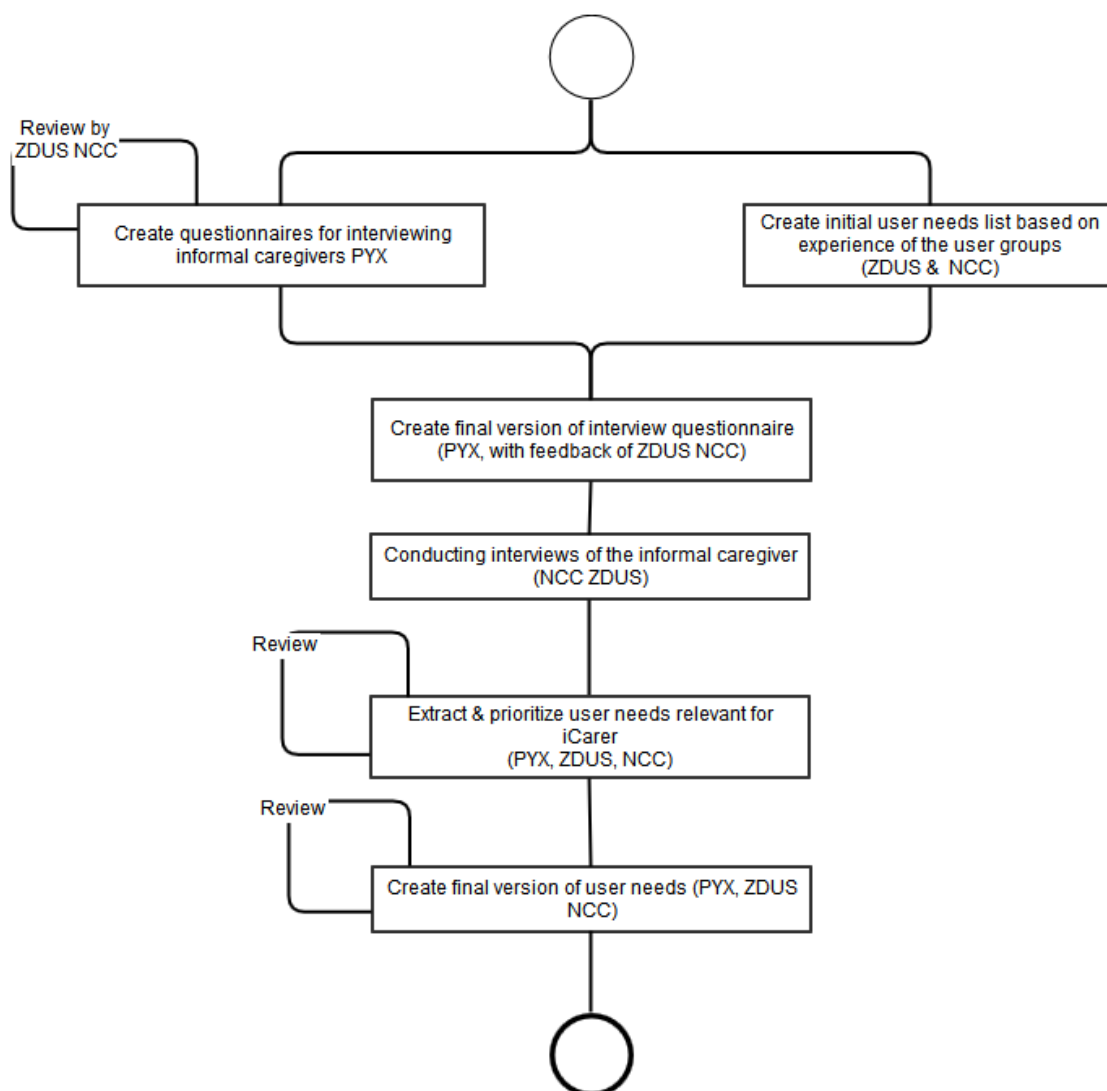
2.2.   User needs capturing from end user groups

The first phase in capturing user needs is done based on the experience of the end user groups within the iCarer project.

Each end user organisation brainstorm, from their own perspective, what the needs and problems of informal caregivers are, when taking care of their older adult.

The impact of these problems/needs on the several topics was questioned during the session:

Impact on…

- … the quality of life of the informal caregiver outside their role as an informal caregiver

- … the health risks or issues that the informal caregiver faces due to their role as informal caregiver
- … the care load
- … relationship between informal caregiver and client

As a second topic, the end user groups discuss the possible services that are missing for informal caregivers at the moment.

2.3.   Creation of informal caregiver interview

In parallel of capturing user needs based on the experience of end user groups, an assessment for interviewing informal caregivers was created.

These interviews aim to determine needs of informal caregivers, get an insight on the external services they already use and aims to verify if the services proposed in iCarer align with their needs.

To achieve this, the interview is intended to get more information on:

- the characteristics of the informal caregiver
- the needs of the informal caregiver
- the care burden and quality of life
- the technological acceptance and skills
- the usage of care services and the barriers to use new services
- validation of the iCarer services described in the project proposal

The first version of the interview is created to cover all these topics. To score the quality of life and care burden the interview included two standardized assessments: "The World Health Organization Quality of Life" (WHOQOL) and "Zarit Burden Interview". This allowed for standardized revaluation of the informal caregivers during the project on these topics.

After try-out interviews by the end user groups, the interview was evaluated as being too long due to the amount of questions related to these standardized assessments. The interview was revised and shortened by only using the questions from the WHOQOL and Zarit burden that were relevant to the interview goals.

In order to capture as much information as possible from the informal caregivers, the interview must not only contain strict multiple choice or yes/no questions. Starting a talk / discussion between the informal caregiver and the interviewee will reveal more information on the opinion and needs of the informal caregiver. The revised version of the interview contained more open questions to accommodate this.

The final version of the interview consisted of the following parts and topics:

Part 1: Different health problems of the older adult lead to different care tasks for the informal caregiver. And different care tasks lead to different needs and uses of external services. Therefore the first part of this interview wants to gain an insight on the health problems of the older adult and the care tasks the informal caregiver is doing to help the older adult with these problems.

Characteristics

- Physical distance to older adult
- Relationship with older adult
- Age ranges of both the older adult and informal caregiver

Health situation of the older adult

- Recent health incidents
- Overview of health problems

Part 2: Questions the mental or physical burden the informal caregiver faces when taking care for the older adult.

- Burden of performing care tasks
- Restrictions to social life and self-care due to the caring role for the older adult
- Relationship with the older adult and social life

Part 3: Questions the current skills of the informal caregiver and questions if it would be possible for them to improve their skills or learn new skills that would lead to better care for the older adult.

- What skills would benefit the care or quality of life if the informal caregiver could acquire them?
- Acceptance to new IT equipment in their role as informal caregiver (for example: tablets, sensors)
- Current capabilities to use modern IT equipment

Part 4: Aims to get an overview on the help the informal caregiver receives in taking care for the older adult and the services they use.
(This can be from professional caregivers, or from external, non-medical, service providers)

Use of existing care services:

- Current usage of other services and support from other caregivers
- Need of other services or tools
- Barriers for acquiring new services

Part 5: The last part of the interview verifies to what extent the services defined in the iCarer proposal could be beneficial for the care of the older adult or the burden of the informal caregiver.

Commercial and service validation

- Discuss to what extent the iCarer services align with the needs of the informal caregiver
- Discuss the willingness to use paid services to aid in the care process
- Talk about the level of support that the informal caregiver expects (for example: training, response time)

All these aspects will give us a good overview on the tasks that decrease the quality of life of the informal caregiver, the usage of existing services and needs of the informal caregiver that are not sufficiently covered by existing services.

From these we can extract the user needs where the iCarer platform can provide services for.

Due to emotional or ethical constraints, not every informal caregiver was able to talk about all aspects of the interview.

2.4.   Conduction of interviews with informal caregivers

After creating the interview, each end user group conducted the interview with approximately 20 informal caregivers in various care situations.

The interviewer poses the questions in such a way that it will trigger a talk or discussion with the interviewee instead of answering the questions without further explanation. The interviewer must clearly understand why the interviewee is giving the answer in order to understand the situations and actual needs of the informal caregiver or older adult.

Each interview is summarized afterwards so it can be used for extraction of the user needs and alignment with the iCarer project scope.

2.5. Extraction of user needs from informal caregiver interviews

Based on the summary of the interviews, the WP2 group organizes a brainstorm session to extract user needs that the informal carers described during their interview.

To compose the list we took many aspects into account to determine our view on the need including:

- The amount of informal caregivers indicating each need
- Impact on the life of the informal caregiver or the care quality
- Characteristics of informal caregiver
- Technological and commercial feasibility

2.6. Alignment of user needs to the iCarer project scope and prioritization of the user needs

As a next step in capturing the user needs, the full list of user needs from the end user groups brainstorm sessions and the interviews were combined and reviewed for feasibility within the iCarer project.

The needs that were reviewed for their potential impact were:

- Amount of potential users
- Impact on the older adult
- Reduction of burden
- Improvement of care

2.7. Service ideas based on the informal caregivers needs

After describing the user needs, the working group brainstormed about possibilities for new services that could fit within the user needs. These service ideas form guidance for defining the services that could be developed in iCarer.

3. Characteristics of informal caregivers

The needs of informal caregivers and older adult are substantially influenced by the relationship, age difference and living distance between those people.
Although it is hard to statistically break down the various situations into categories, we make a distinction between the following situations:

Distance	Relationship	Description
Living in same house	Spouse	Husband and wife type situations
Living in same house	Family (sometimes friend)	Applicable to a couple of broad groups - children/young adults with learning or behavioral problems living with their parents/parent and maybe siblings; or an older person living with their younger family - i.e. someone living in the 'granny annex' of their son or daughter's home.
Lives nearby	Family	Family, often children, living within a reasonable distance from the older adult, so that regular visits and regular contact with professional caregivers and services are possible This is often an addition to any of the other informal carers (so someone may have a husband caring for them in the home but also a family member coming round a few times a week). e.g. An older adult person living alone who can manage day to day tasks but has a health concern and they have a child or children living within visiting distance who look after them.
Lives nearby	Friends	Usually a neighbour or someone who can regularly visit in the absence of family or in addition to family The friendship between the carer and the person may only exist because of the person's condition. For example - a neighbour may see someone struggling with shopping and begin to help them with tasks and in so doing they become the main carer. Most of the time these people have only occasional contact with professional caregivers
Lives away - difficult to visit	Friends and family	The closest thing the person has to an informal carer is someone who lives too far away to have much of an impact but is still involved and concerned for their loved one.
Nearby	Formal care staff only	Someone has no family or close friends and a care plan is in place for a care agency to make daily visits, the carers often take on 'informal' care duties too that might otherwise be taken on by family or friends. For example - dropping in unpaid on the person for a cup of tea or giving them a telephone call in the evening

Nearby	Voluntary carer for multiple older adult	Member of a voluntary carers organisation. This person is visiting multiple older adults, who often live alone and don't have support from other care nearby.

Other characteristics of the informal caregivers that influence the possible use of the iCarer services are:

- To what extent does the informal caregiver identify themselves as a person with an informal caregiver relationship towards the older adult.
- Acceptance of being monitored by sensors or making use of technology
- Being realistic about their own capabilities and willing to learn and improve
- Communication skills and the will to collaborate with professional services and carers
- Emotional stability towards the health and care situations

The above characteristics are also questioned during the informal caregiver interviews.

4. User needs based on brainstorm sessions by end user groups

After individual analysis, the end user groups discussed their list of user needs with the WP2 working group to create a joined list of user needs that can be aligned with the outcomes of the informal caregiver interview. The following needs where extracted from these sessions:

4.1.   Needs of the older adult

Communication with informal caregiver and social network

Elderly persons often lack the skills or tools to stay in touch with friends and family, especially when they want to stay in touch with younger people who use more recent communication tools (e.g. skype, facebook,...).
A very simple user friendly platform to communicate with modern communication platforms, in a way that is well known to the older adult - e.g. fully voice operated, just like a phone - would greatly improve the social isolation many older adults live in today.

Access to local news information

People that are not able to go outside the house often miss the involvement and knowledge of what's happening in their neighbourhood.
Access to local news items would benefit their feeling of being lonely.

Alarm in case of incident (e.g. falling)

When something unexpected happens, easy access to help is needed.
It would be good if these incidents can be detected automatically by an alarm solution which is integrated with other tools and external services in order to give everyone involved in care, an overview of the situation as complete and fast as possible.

Reminder when the older adult has forgotten steps in treatment (e.g. medication intake)

Treatment of some health problems requires that the older adult and/or caregiver follow a certain schema.
A system that tracks treatment accuracy and helps reminding both the older adult and caregivers of these actions can improve care.

Tips for better treatment (e.g. wound care), overall health (e.g. nutritional tips) or safety (e.g. fall prevention)

An adaptive system that gives useful personalised tips for treatment, overall health and safety can improve care, overall health and well being.

Overview of "care plan" (which caregiver will be visiting and when)

Older adult that receives care of many people often lack an overview on the timing of all care aspects.
A "care plan" can give the older adult more information about this.

Personal health and care overview dashboard

A "care diary" / "health and care status" dashboard can improve the need of many older adults to gain an overview on their health changes and the care they received recently.

4.2.   Needs of the informal caregiver

Remote communication with older adult person

The informal caregivers and older adult often use other communication tools (e.g. young person who uses skype and instant messaging, email vs the older adult who only uses a phone)
A system that leverages these differences can improve the remote communication between older adult and informal caregiver.

Planning tool to co-ordinate care tasks, visits of professional caregivers and external service providers

Managing own care tasks and the tasks and visits of external services and professional caregivers that take care of the older adult can be overwhelming for some informal caregivers.
An easy to use planning tool for care tasks can make this more easy for the informal caregiver

Virtual "social care support" manager

Many older adults and informal caregivers often miss financial or care support provided by the governments social care program due to high administrative burden or lack of knowledge about the availability of the support.
Access to a personalised overview of relevant support and easy handling of all administrative tasks to receive this support could greatly reduce the burden of the informal caregiver to gain access to the support.

Detection of errors in treatment (e.g. diet or medication conflicts/interactions)

When many carers treat the older adult patient, sometimes changes in one treatment can influence other treatments in a negative way.
Some informal caregivers may not always treat their older adult correctly because the lack of skills or being stubborn about treatments, despite the advice of a professional carer.
A system that warns about these situations by performing a multi-disciplinary check if all treatments align with each other and give warnings in case of conflicts can improve care and collaboration between all caregivers.

Tracking of measurements of all caregivers involved and changes in care needs

When the state of the older adult is being monitored, all caregivers must receive this measurements in a way that it is easy to interpret for everyone involved.

Tracking of own health situation

Many informal caregivers would care more about their own health if they had a system that can track their own health situation and gives an overview of the impact of the care for the older adult.

Tracking of financial aspects of the care

Some informal caregivers don't have a clear overview on financial expenses for treating their older adult.

This might lead to unexpected poverty situations or insufficient financial means when the older adult comes in an even more declining health situation.

If there is a system that could warn the informal caregiver for this, these situations could be avoided.

Older adult health overview dashboard

Informal caregivers have a good insight on certain problems of the older adult but don't have an overview on the overall health of the older adult.
Also the long term development of the overall health is something that would help to keep track of the impact of certain treatments on the overall health.

Education tool to learn new skills and improve existing skills

Informal caregivers often care for an older adult based on their own previous experience and skills, not from professional education or care experience.

Care for the older adults could improve greatly if the informal caregiver receives sufficient feedback and education on how they should perform their care tasks.

5. User needs extracted from interviews with informal caregivers

After analysing the informal caregiver interviews, the following user needs where extracted

Assessment, follow up, and early intervention

Many informal caregivers indicate that the situation of the older adult or the preparation of the care that has to be given today would have been been better if the health problems had been detected earlier.

Many older adults experience a slow deterioration in health over time. Often the caregivers close to the older adult don't notice these small steps immediately. The care they must provide slowly increases and often end up in a situation where the burden becomes so high that it negatively impacts both the care for the older adult and the health of the informal caregiver.

Many medical problems (e.g. diabetes and dementia) also go through various phases that all require different treatment and support. The transition in care is often only triggered by sudden health incidents or excessive burden on the caregivers.

A tool that would assess the overall medical condition and closely tracks the various phases in the health issues of the older adult can warn the caregivers of any developments in the older adult's medical condition or care needs. . Both treatment and care services can adapt to these changes in an earlier stage. This will lead to better treatment, less health incidents and preparation time to reorganise care when needed.

Remote tracking, monitoring and alarm

Many informal caregivers feel pressured to be near the older adult 24/7 as they worry about the current state of the older adult when they are not near.
A system that constantly monitors the older adult can reduce the worries of many informal caregivers. It gives them the opportunity to reduce the need to be physically in the same house or room and to increase their opportunities for leisure, career or getting enough sleep.

Such a system has to

- be as unintrusive as possible
- require no actions of the older adult to make it work
- have sufficient battery life
- enable remote communication between the older adult and any other caregiver
- provide a way to assure the informal caregiver that the older adult is okay 24/7 regardless where the informal caregiver or older adultis
- assure that correct care is provided if informal caregiver is not able to do so

Reminder and Assistance tool for people with dementia or other cognitive problems

Older Adults with physical health problems are often treated in hospitals or receive care from professional caregivers because special medical tools or specialised therapy is needed.

Many older adults who are physically OK but suffer from dementia or decline in cognitive capabilities are in many cases cared for by informal caregivers.
In early stages this leads to forgetting how to manage or perform simple daily living activities.
Severe cognitive problems will leave the informal caregiver unable to know the feelings or needs of the older adult and frequent wandering and refusal of care by the older adult.

Often the informal caregiver must monitor and track the older adult 24/7 to prevent them from wandering and to support them with performing most of their daily living activities.

A tool that can:

- remind the older adult of tasks that he or she is still physically able to do and guide them in performing these tasks. This would reduce the amount of care tasks for the informal caregiver.
- give the older adult a simple communication portal that will give them the opportunity to express their needs and feelings with others
- detect wandering and alert the older adult to prevent them from doing so

Collaboration and communication tool between all caregivers

Many informal caregivers experience a lack in communication and collaboration between all people involved the older adult's care.
This leads to duplicate or missing treatments, unbalanced or conflicts in treatments or care and lack of information about the older adult's overall condition.

Care and treatment of older adults will greatly be improved through a collaboration platform that all caregivers will use to capture and gain insight in the following information:

- Care Plan detailing all caregivers who are visiting the older adult
- Logbook of noticed changes in health situation and summary of given care
- Discussion and follow up about health incidents
- Advice on contacting additional caregivers for certain (new) issues
- Possibility to call for temporary help in case of care overload or incidents

System to learn new skills to gain insight in the health problems and the links between them

Older Adults often suffer from multiple health problems that are linked together or of which the treatment of one problem influences the treatment given for another health issue.

Professional caregivers often know about these links and adapt the treatment accordingly.
But informal caregivers often lack the information on the health issues and treatment and the link between them.

A system that teaches the informal caregiver about the health problems, and the linkage between them will greatly increase the care quality and reduce the severity of health incidents.

Sleep and stress management

Many informal caregivers have trouble sleeping due to excessive 24/7 care tasks, stress or worries about the situation.
Keeping good track of an informal caregiver's sleep patterns and stress levels will enable a tool to give advice to the informal caregiver on how they can improve their sleeping pattern and cope with stress or worries.

This will increase the health and quality of life of the informal caregiver which will in turn lead to better care capabilities of the informal caregiver.

6. Analysis of the Health situation

The prioritisation of the user needs and services is influenced by the amount of people having certain health issues. Therefore the interview also questioned these main health issues the older adult or informal caregivers have. If some of these issues occur with many people, supporting those people with these kinds of problems will have an impact on more users using the iCarer platform. The main health issues (of the older adult) that multiple informal caregivers indicated during the interview were:

Dementia or Alzheimer's Disease

People with cognitive impairments like dementia or Alzheimer's disease can put a large care load and burden on their informal caregivers. The following main issues result in a lot of burden when taking care of people who have dementia related health problems:

Permanent attention for the older adult required: The informal caregiver feels constant pressure to never leave the person they are caring for alone. They are afraid and stressed that the older adult will do something dangerous when they are not around.

Reduced communication possibilities: When the cared person has a severe cognitive problem, it becomes difficult for the informal caregiver to get a clear view on the needs of the older adult which changes the relationship between the older adult and informal caregiver significantly. Especially when they are spouse or family, losing the close relationship and seeing communication with the older adult degrade, is very stressfull for many informal caregivers.

Sleep problems

Many informal caregivers suffer from insomnia or other sleep related problems. This influences their health and quality of life to a great extent. The informal caregivers often indicated the following reasons for the insomnia:

Stress and worrying at night: often because of care problems, health situation, or not enough possibilities for leisure and non care related activities.

Nightly care tasks: Many older adults require care at night which disturbs the sleeping pattern of both the older adult and the informal caregiver. This is often ADL related (e.g. toilet visits) or congnition related (e.g. wandering, bad dreams).

Imbalance between the sleep patterns of the older adult and the informal caregiver: In some situations, the older adult can't sleep very well at night, because he orshe had a significant amount of sleep or rest during the day. When the informal caregiver is living with the older adult and has to do his/her job, chores and take care for the older adult during the day, the older adult might prevent the informal carer from sleeping enough..

Problems performing ADL activities

Many older adults have difficulties performing their activities of daily living (ADL).

These kind of problems can be tiring for the informal carer: The older adult needs care every day and many ADL difficulties require lifting or other actions that require good physical fitness from the informal caregiver. When the informal caregiver is also of higher age, this can be very tiring and cause additional health problems for the informal caregiver.

7. Differential impact of care tasks and burden on quality of life and overall health of the informal caregiver

Many informal caregivers are struggling to find a balance between the care tasks and the burden that comes along with it, and their own lives.They experience difficulty combining their jobs, leisure activities, and taking care of their own health with their role as an informal caregiver.

Despite the difficuly to combine all these tasks, many informal caregivers refuse to admit that the load on them is too high and that they are in need of more help.

Professional carers can play an important role perventing the informal caregiver from declining physically or mentally in a way that will prevent them from taking care of the older adult any longer. The professional carer can provide the right support when it's needed without being too intrusive in the care relationship between the informal caregiver and the older adult.

Hide or minimize their own health issues

Even if their own health situation declines as a result of the care load, some informal caregivers will not accept the fact that their own health is suffering from the care they give to the older adult. They will not call in extra help from other carers or professional care for their own health issues.

Care load increases slowly over time

Often the health situation of an older adult declines very slowly over time. This is much less noticeable than a sudden health incident. Therefore the people surrounding the older adult don't immediately notice the declineolder adult. This can lead to either an increase in care load or a decline in sufficient care for the older adult, without anyone noticing it or taking a step to call for extra help.Professional carers who regularly review the health situation of both the older adult and informal caregiver, and keep an overview on the care provided by the informal caregiver, will be able to detect the need for extra care before it is too late.

8. Skills and technology use

During the interviews we also questioned the informal caregivers about their skills for taking care of the older adult and their technological acceptance.

Skills

Most informal caregivers indicated that they are confident about their current skills for taking good care of the older adult. Although this was never checked by a professional caregiver.

We saw two main opinions when the informal caregivers where questioned about their willingness to learn new skills:

The first, largest, group of informal caregivers are aware that they can still learn new skills to be able to improve the older adult's care. They are willing to learn more about the health issues the person they are caring for has and are eager to get in touch with other informal caregivers who are taking care of someone with similar problems. This group was also willing to receive tips for reducing care load while maintaining the same level of care (e.g. lifting techniques, communication with people with dementia).

A second group of informal caregivers are not open to learn new skills. They are often very confident about their capabilities as an informal caregiver, even when professional caregivers give remarks on the way they provide care.

Technology use and acceptance

The use of technology by the informal caregivers differs a lot and is related to the age of both the older adult and the informal caregiver. The older they are, the less likely they will use or accept a lot of IT equipement in their daily lives or when taking care of the older adult.

Though the iCarer project can focus on those who are familiar or willing to learn new IT tools to support the care for the older adult, some important aspects need to be taken into account when designing the iCarer user interfaces and platform:

- The tools must have a low learning curve
- The sensors and tools that monitor a person must be as unobstructive as possible
- Battery life must be sufficient and charging should be easy. In many cases, people leave the device unused after batteries have run out.
- Use a user interface that is easy to understand:
    - o Daily digests, choose type of information
    - o No raw sensor data
    - o Textual summaries of the situation
- Forum for carers was considered a good idea. But it needs to be "light and simple", not preachy or serious
- Different levels of interaction, based on the capabilities, is beneficial (e.g. in case of dementia)
- Keep the usage of codes and scores for professional caregivers

Risks that might cause the iCarer services not to be used correctly are:

- Users might be suspicious of it
- Pride: not willing to accept help
- Fear of technology
- Might get installed and not used the way it should be

9. Alignment of user needs with iCarer project

The user needs extracted from the informal caregiver interviews and end user group brainstorm sessions were reviewed for there impact on the older adult and informal caregiver, and there feasibility within the iCarer project.

User Need	End user	Amount of potential users (very few, few, substantial, many, a lot)	Impact on the older adult	Reduction of burden	Improvement of care	Fits within these iCarer services + module
Access to local news information	Older Adult	Very few	Low	Very low	No	?
Communication between older adult and their social contacts	Older Adult & friends	Very few	Small	Very low	No	Elderly app: "communication module"
Alarm "button" in case of emergency	Older Adult	Many	Low	High (Less worries)	High (faster incident response)	Elderly app + remote monitoring
Reminder on forgotten care tasks	Older Adult	Few	High (better self reliance)	Moderate	Low	Elderly app
Tips for better treatment or safety	Informal Carer	Substantial amount	Low	Low	High (better care and less incidents)	E-learning + virtual caregiver

Overview on care plan	Older Adult	Many	Moderate	No	No	Elderly app + virtual caregiver
Overview on personal health situation	Older Adult (simple) & informal carer (advanced)	Few	Low	No	Low	Elderly app + virtual caregiver
Management of "social care" support	Informal carer	Few	No	Moderate (easy access to support)	Moderate (better support)	Virtual caregiver
Remote communication and checking out	Older Adult & informal carer	Many	High (useful but intrusive)	Very high	Very high (better monitoring)	Elderly app + remote monitoring
Learn new skills and information about health problems	Informal carer	A lot	No	Low (more confidence)	Very high (better care)	E-learning + virtual caregiver
Tracking financial aspects of care	Informal carer	Few	Low	Low	No	?
Detection in treatment errors	All caregivers	Substantial amount	Low	Low	High (less incidents)	Virtual caregiver
Tracking of all care parameters	All caregivers	Many	Moderate	Moderate	Very high (more knowledge about the older adult s situation)	Virtual caregiver
Care coordination, planning and logging	All caregivers	A lot	No	Very high	High (care actions fit situation of the older adult)	Virtual caregiver

Assessment of older adult and close follow up on the changes of the health situation of the older adult.	All caregivers	A lot	Low	Moderate	Very high (anticipate on new care steps and early detection of problems)	Virtual caregiver
Be able to rest assure that the older adult is okay when the informal carer is not near the older adult. Tracking and monitoring, receive alarms in case of incident	All caregivers	A lot	Low	Very high (less worries)	Moderate (faster response on incidents)	Virtual caregiver
Remind the older adult to do daily living tasks and guide them with it. For people with cognitive problems (e.g. dementia)	Older Adult	Substantial amount	High (better self-reliance)	Moderate (reduce number of tasks if older adult is able to do some with guidance)	Low	Elderly app
Support in collaborating and communicating with other caregivers	All caregivers	Many	No	Very high	High	Virtual caregiver
Information about health problem and insight on the relation between multiple problems	Informal carer	Many	Low	Moderate (less stress in balancing treatment of multiple problems)	Very High (better balance in treatment)	E-learning + virtual caregiver
Sleep and stress management	Informal carer	Many	Low	Very high (less worries, better confidence and view life)	Very high (better care capabilities of informal caregiver)	Virtual caregiver

10. Analysis of the Daily Living Tasks

Based on a list of daily living tasks, we brainstormed about possible user needs and services that are related to a certain task. This may lead to additional user needs or service ideas.

Possible services related toActivities of daily living:

ADLtask category	Applies to Informal Caregiver (IC) / Older adult (OA)	Tasks	iCarer service opportunities	Possible technological needs
Eating and drinking	IC	• Meal preparation • Help feeding • Monitor and change nutritional intake	• Alerting and communication portal with dietician or meal preparation service • Measuring and tracking the nutritional and medication intake • Provide nutritional advice • Detect conflicts in diet (e.g. sugar for a diabetes person) or malnutrition (e.g. dehydration)	• Sensors for monitoring cooking / medication appliances • Track nutritional intake • Medication prompts and confirmations • Nutritional advice and interactions
Continence	OA / IC	• Replace incontinence pad Monitor quantity / consistency	• Tracking incontinence pad usage • Measuring and/or tracking quantity • Detect influence of nutrition on continence. Give tips about it.	• Bathroom usage sensor • Enuresis sensor

Body Posture	OA / IC	• Arrange and prepare equipment or adaptations (lifting, special chair,...) • Assist changes in body posture • Treatment of skin problems • Checking state of skin	• Measure body movement and position • Analyse skin problems and show development of skin problems • Provide advice on treatment of skin problems • Arrangements and communication with service providers for equipment or adaptations • Communication tools for impaired patient (voice)	• Body position and movement sensor • Graphical imaging technology for detecting skin wound severity
Mobility	OA	• Arrange and prepare movement tools (wheel chair, prosthesis, walkers,...) • Assistance with the actual motion control or movement • Skin care when low or no movement abilities	• Tips on correct lifting techniques to lessen the physical impact for informal caregiver • Tips on home arrangement, accessibility, fall prevention • Arrangements and communication with service providers (ex. Make reservations for aid tools or order meal preparation services) • Reduce need for mobility by interacting with home delivery services • Communication tools for impaired patient (voice)	• Fall detection • Body movement sensor

Day / Night pattern	OA / IC	• Prepare and maintain sleeping environment • Provide tips to get to sleep • Check if still in good sleeping state	• Track sleeping state, alert when something is wrong • Contact with professional caregiver in case of emergency • Track changes in sleep quality and nightly "incidents" • Tips on improving sleep quality	• Bed occupation and movements sensor • Sleep phase tracking device
Clothing - getting dressed / undressed	OA	• Washing / ironing • Help changing clothes • Check on state of clothing (still clean, warm enough)	• Track changes in ability to get dressed and undressed • Arrangements and communication with laundry services • Clothing tips based on weather conditions	• weather service
Body temperature	IC	• Check on body temperature • Ensure that the older adults environment is heated or cooled in realtion to the older adults temperature feeling • Acquire needed equipment to monitor actual temperature • Ensure emergency service when incident occurs	• Alerting system in case of incident • 24h monitoring • Give warnings based on weather conditions	• body temperature sensor • weather service
Personal hygiene	IC	• Plan and arrange external help with personal hygiene • Monitor sufficient hygiene • Aid older adult with personal hygiene	• Track tasks performed by all caregivers involved. Alert when older adult is treated less lately	• Bathroom sensor • Water usage sensor

	IC			
Avoidance of danger		• Detecting actions of the older adult that might cause danger to their well being • Modify the older adult environment so that is safe (Accessibility , fall prevention) • Acquire tools or aids to avoid dangerous situations • Communicate with other caregivers about dangers • Give warnings to older adult about dangers	• Assess environment for possible dangers that are not noticed yet • Alert others of dangers • Warn for dangers imposed by changes in health situation • Provide action plan to improve dangerous situations • Alerting when the older adult is in danger	• Dangerous situation detection • Fall detection • Movement sensors
Communication	IC	• Understand the communication signals the older adult gives	• Use tablet device as communication tool • Track communication capabilities • Provide tips on communicating with persons with the health problems of the older adult	• Integration with common communication tools
Contact with others	IC	• Help the older adult in use of tools (e.g. phone) to communicate with others • Arrange contact, transport for face to face contact	• Track communication amount • Plan regular contact with others	

Sense of rules and values	•	- Explain new or changed rules to older adult - Encourage older adult to accept the rules - Negotiate with others over the causes why the older adult doesn't follow the rules	Give tips to informal caregiver about how to make older adult better accept certain rules
Daily activities	•	- Assist with older adults daily activities - Make arrangements with external service providers (e.g. laundry, ironing)	- Track the changes in ability to take part in daily activities - Help with planning and communicating with external service providers - Detect new problems when performing daily activities
Recreational activities	•	- Show activities calendar - Accompany or assist the older adult for care during activities - Stimulate the older adultto participate in activities	- Track and suggest the need for more participation in activities - Help planning the participation in events
Learning abilities	•	- Recognise missing skills and areas for skill improvement - Acquire new skills or improve existing skills	- Detect need for new skills - Provide instructions on new needed skills after changes in health situation - E Learning

Encourage the awareness of behavioural boundaries and limitations.		• Explain what is expected of the older adult and any changes that have been put in place to manage their care. • Encourage the older adult to accept the changes and acknowledge the boundaries that have been put in place. • Discuss with the older adult and others involved in their care why they have difficulty accepting the boundaries put in place.	• Offer advice to informal caregiver about how to encourage the older adult to adhere to the boundaries put in place	

11. User's needs prioritised

The following table shows the several users needs captured in the D2.1 process and classified by the MOSCOW method. These priorities are defined during face to face meeting.

Id.	User Need	MOSCOW Scale
1	Learn new skills and information about health problems	*Must*
2	Care coordination, planning and logging	*Must*
3	Assessment of the older adult and close follow up on developments in the older adult's health or care needs	*Must*
4	Support in collaborating and communicating with other caregivers	*Must*
5	Sleep and stress management	*Must*
6	Assess and track evolution in alarm button pressing	*Should*
7	Tips for better treatment or safety	*Should*
8	Be able to rest assure that the older adult is OK when not near the older adult. Tracking and monitoring to receive alarms in case of incident. Be able to communicate remotely with the informal carer	*Should*
9	Access to local services	*Could*
10	Reminder on forgotten daily life activities	*Could*
11	Overview on care plan	*Could*
12	Overview on personal health situation	*Could*
13	Remind the older adult to do daily living tasks and guide with it. For people with cognitive problems	*Could*