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D2.3 – End Users' requirements report

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Executive Summary

The objective of this deliverable is to describe the methodology used for gathering end-users' requirements and it presents the list of said requirements. It builds on D2.1 (Users involvement plan) and it details how end-users have actively participated to the data-gathering process.

The deliverable describes the qualitative (cultural probes, diary) and quantitative (questionnaire) methodologies applied to understand users' needs regarding their wellbeing and user' preferences regarding the WellCo platform.

The document also presents the prioritization technique (MoSCoW method) adopted to define the final set of requirements.

The document contains, in the appendix, the tools used to gather data (diaries, template of cultural probes, questionnaire).

In summary, the deliverable provides a description of all the research actions that have been performed with end-users in WellCo (task 2.2) as far as requirement gathering is concerned and the outcome of the process in the form of a list of requirements.

Nota bene: the document presents functional and end-user requirements. Other requirements (i.e. technical, legal) will be gathered in other WP (task 3.1). Conflicting requirements, if any, will be discussed at consortium level (D3.1).

1 Introduction

The platform should consist of 3 applications:

- an application for the users (seniors - the main target population of the WellCo platform)
- an application for the informal caregivers,
- an application for the experts.

WellCo platform will be designed taking into account the users' needs and preferences. This deliverable describes how each target group has been involved in the process of requirement gathering and how this allowed to define the functionalities of each of them to maximize end-users' acceptability. An overview of the outcomes of the process are provided in chapter 7 (List of requirements) and 8 (Conclusions).

To ensure users requests to be fully considered, the process of end-users' requirements gathering has promoted significant involvement of potential early users of the WellCo platform. We have adopted an iterative mixed-method approach to gather and interpret data. We gathered unstructured data (i.e. via cultural probes), semi-structured data (i.e. via diary), and structured data (i.e. via questionnaire).

The adoption of cultural probes and diaries allowed end-users to act as "explorers" of their own environment and daily life. The diary provided a semi-structured tool to describe their daily activities and describe their network of care. The questionnaire allowed to gather information regarding the platform and the users' preferences.

The preliminary analysis has been used to refine the findings and investigate emerging dimensions through dedicated interviews while structured methodology has been used to prioritize and define the list of requirements.

The adoption of a mixed method approach served also the purpose to offer end-users' some tools for an active and "playful" engagement (i.e. cultural probes and diary) and stimulate their full participation to the requirements gathering process.

The summary of end-users participating in this process of end-users' requirements is summarized in the table 2.

2 Recruitment & involved participants

2.1 Recruitment

As planned in D2.1 "Engagement Plan and Risk Mitigation Protocol", the three sites involved in the user's research involved three slightly different populations:

- In Italy FBK involved seniors (elderlies >65 living in urban area) and their informal caregivers through an elderly center supervised by social workers of an intermediate organization (Cooperativa Kaleidoscopio). As experts FBK has enrolled social workers daily involved in the organization of activities of the elderly center.
- In Spain GSS involved seniors (elderlies >65 living in a rural environment, mainly living

alone, and their supported by caregivers) through an intermediate organization (Diputación Provincial de Ávila).

- In Denmark SDU invited a younger target group (people 55-65 years old living in urban area and their caregivers) using a digital mailbox called Digital Post. Recruitment was supplemented by sending letters directly to people.

As defined in Engagement Plan and Risk Mitigation Protocol (D2.1), partners and intermediate organizations recruited participants with a smartphone, a minimum computer literacy and a familiarity with instant messaging apps. Moreover, seniors with cognitive difficulties and blind or deaf people have been excluded since these conditions determine the inability to use WellCo system.

After a first contact with intermediate organizations and potential participants (second half of January 2018), in each country partners involved elderlies and caregivers in a kick off meeting aimed at:

- explaining the main aims of WellCo and, in particular, the main characteristics of WellCo platform;
- explaining the activities of the co-design phase (e.g. cultural probes and interviews);
- providing probes and diaries for information gathering (e.g. installing WhatsApp, explaining how use it to share information with partners).

During February and the first half of March elderlies gathered data through Cultural Probes provided by partners and they were involved in individual interviews (see the next section). Partners reported individual interviews and summarized the main results of Cultural Probes, exchanging and discussing these data through several videoconferences. In particular, after a meeting with technical partners, the partners involved in T.2.2 decided to replace Focus Group (initially planned to integrate data gathered through cultural probes and interviews) with questionnaires. Questionnaires, delivered in the second half of March, were judged as more suitable than Focus Groups to define in details the preferences of end-user about WellCo platform.

2.2 End User involvement per country

The User Involvement Plan in D2.1 envisaged the involvement of at least 10 end users per site among which at least 5 seniors (total 30 participants and minimum 15 seniors) for the phase of requirements gathering, mock-up design and validation. This number was exceeded: FBK, GSS and SDU involved 34 participants in total (17 seniors, 8 informal caregivers and 9 experts).

As the table shows, the age of involved senior is quite low also in Spain and in Italy (where the target was elderlies >65). This data is probably explained by the criteria of inclusion and exclusion which has led the partners to choose in the most cases elderlies over 80 years.

	Denmark		Italy		Spain	
Participants	#	Age	#	Age	#	Age
Seniors	#1	59	#1	65	#1	77

	#2	62	#2	68	#2	82
	#3	62	#3	68	#3	76
	#4	65	#4	69	#4	79
	#5	62	#5	68	#5	66
	#6	64	#6	68		
	Denmark		Italy		Spain	
Participants	#	Age	#	Age	#	Age
Informal caregivers	#1	33	#1	66	#1	65
	#2	38	#2	67	#2	72
					#3	62
					#4	64
	Denmark		Italy		Spain	
Participants	#	Age	#	Age	#	Age
Experts	#1	33	#1	34	#1	57
	#2	55	#2	44	#2	40
	#3	40	#3	44		
			#4	44		
Total	11		12		11	

Table 1.- Participants per site, group and age

3 Methodology: Data gathering

To define requirements of WellCo system we gathered qualitative data using Cultural Probes, diaries, interviews and, at a later stage, integrating this data with and quantitative data gathered through a questionnaire.

3.1 Cultural Probes

Cultural Probes (or design probes) is a technique used to inspire ideas in a design process (Gaver, Dunne, Pacenti, 1999; Gaver et al., 2004); it serves as a means of gathering inspirational data about people's lives, values and thoughts. Usually, probes are small packages that include several tools (like diaries, pencils or cameras) along with evocative tasks, which are given to participants to allow them to record specific events, feelings or interactions.

The cultural probes methodology has been followed to gather information on the interests, reflections and daily life of the users, namely seniors, informal and formal caregivers. In WellCo, we used paper and digital based cultural probes (Iversen, Nielsen. 2003): the users were invited to take note of their daily life through diaries and WhatsApp.

Diaries were designed by CON specifically for a 7-days task (see Appendix 10.1): users where invited to respond to a set of questions or report the activities of the day. Diaries were conceived to gather wider representation about elderlies' well-being, since the task requires more time and reflection compared to a media message sent through an instant messaging application. Slightly different versions of diaries were created for patients, formal and informal caregivers. All diaries all had in common the following sections:

- Description of an ordinary day (with a graphic timeline);
- Description of the most important three activities for the senior's well-being;
- Future goal for improving/maintaining the senior's well-being;
- Struggles and obstacles for the senior's well-being;
- Photos of objects/peoples/places that motivate the senior in the improvement of their lifestyle;
- Description of social relations that support the senior in well-being improvement

The instant messaging application was instead employed to gather quick information regarding the daily life of the users. The instant messaging applications (WhatsApp) has built-in functionalities that we used a note-taking devices.

Users were invited to fully exploit the possibilities offered by the instant messaging application by sending text message, taking pictures or use multimedia features (video, audio note). In short, the choice of using the instant messaging application as a cultural probe had several advantages for research purposes. First and foremost, the functionalities provided a great flexibility in terms of the preferred media to describe their environment, express their needs, offer insights regarding their issues in wellbeing management. Secondly, it leveraged on a pre-existing experience in the use of the probes (all participants were familiar with the application). Thirdly, the probe (app on a smartphone) was already embedded in the daily routines of the participants and it did not cause any disruption. Fourth, it provided a fast access to researcher to the raw data produced and shared by participants. Finally, researchers could also send reminders to encourage users' participation, should that be needed.

During the kick off meeting with participants, elderlies and caregivers were invited to send 5 messages per day (minimum) be them texts, pictures, videos, audio to a dedicated number. To

avoid messages unrelated to the scope of the project, participants were instructed to focus (and thus share information) on the areas of interest for the WellCo project. In detail, users were asked to report on:

- Macro area (physical activity, nutrition, entertainment, health status, peer interactions and health).
- Brief description of activity (where and what)
- Emotions (also emoticons were accepted)
- Potentialities of the WellCo platform in this particular situation

Instant messaging application was also used to:

- Provide information to users (if needed)
- Remind them to share their thoughts and experiences
- Ask for clarifications

3.2 Individual interviews

The individual interviews served the purpose to discuss in details the outcomes of the cultural probes with particular regard to the routines, needs and challenges of end-users. The semi-structured interviews topic guide, developed by CON and FBK, included a set of questions regarding the daily life, the goals and the perspectives of the seniors. The topic guide of interviews (different for seniors and caregivers) were defined to better understand the topics emerged during cultural probes phase and were conceived to stimulate narratives around them (see Appendix 9.2 and 9.3). The interviewer could thus go back and forth between the interview guide and the probes (diaries and instant messaging systems messages), so to stimulate the conversation around the themes emerged in the previous phase (for example: "Can you shortly explain what you have written on diary (day 2) and via WhatsApp about the activities you like?"; "What do you do to manage and track your own wellbeing?"). Interviews could therefore outline several details regarding participants' perceptions, representation and practices, as well as the improvement and the maintenance of well-being in elderlies.
For both seniors and caregivers, the following areas were investigated:

- Daily activity and Wellbeing (Day 1 and 2). Examples of questions:
- Present and future goals aimed at improving your Wellbeing (day 3 and 4)
- Challenges and obstacles for health improvement (day 5)
- Lifestyle changes and self-tracking
- Motivating objects and people (day 6 and 7)
- Network and health improvement.

3.3 Questionnaire

The probes and interviews provided a good insight into the daily lives of the seniors and their challenges. In order to get their view on the design of the WellCo platform, as main users, and additional questionnaire was developed going into more detail about for example, possible devices used, as well as data gathering. Depending on the country, questionnaires have been collected with CATI – Computer Assisted Telephone Interviews (Spain and Denmark) or PAPI - Pencil and Paper Interview (Italy) methodologies.

All seniors (N=17) that participated to the in-depth interviews have been also required to respond to a questionnaire. GSS chose also to involve 5 caregivers, because 5 elderlies involved

in the region suffered by several health issues, had limited autonomy, and had continuous interactions with their caregivers. Consequently, in order to develop a platform usable and attractive also for caregivers of seniors with relevant health issues, it has been decided to supplement elderlies' responses with the ones of caregivers.

The questionnaire allowed to obtain precise responses to direct questions, and to integrate the data emerged from previous phases. Some of these questions were proposed by the technical partners who wished to have responses to specific questions (e.g. how the avatar should look like). The questionnaire (in Appendix 10.4) proposed both multiple choice and short answer questions on the following areas:

- **Personal information and preferences**: information regarding the basic sociodemographic profile of the respondent, the activities performed, the health concerns, and the acquaintance with technological devices and platforms.
- **Avatar and virtual coach**: preferences regarding the visual aspect of the avatar (e.g. gender, morphology), the style of the dialogues and the type of interaction.
- **Devices**: preferences on the type of wearable devices that the user would (or would not) be willing to connect to the system.
- **Motivation**: how the user would like to connect with other users in order to feel motivated to change behaviours.
- **Data gathering**: information on data gathering preferences (e.g. video, audio) type of data that the user would be willing to share with the others, and privacy preferences.
- **WellCo evaluation**: additional desirable functionalities and perceived importance of certain aspects of the system.

4 Methodology: Data analysis

Through Cultural Probes, interviews and questionnaires, each partner gathered data about seniors' life and the ways through which they maintain and/or improve their well-being (see table 2). The qualitative and quantitative data have been analyzed with different techniques explained in the following sections.

Type	Italy		Spain		Denmark		Total	
	Senior	Caregiv	Senior	Caregiv.	Senior	Caregiv	Senior	Caregiv
WhatsApp Mess.	122	81	193	205	188	94	503	380
Diary	6	6	5	6	6	5	17	17
In-depth Interview	6	6	5	6	6	5	17	17
Questionnaire	6	0	5	0	6	0	17	0

Table 2.- Full Participation in the end-users' requirements gathering

4.1 Template analysis

Data were gathered from FBK, GSS and SDU in their national contexts. FBK and CON, with the help of other partners, contructed a system of categories and subcategories aimed at comparing and analysing qualitative data (WhatsApp, diaries and interviews).

For the analysis we followed the template analysis method (King, 1998, 2004, 2012). As King argues "the essence of template analysis is that the researcher produces a list of codes ('template') representing themes identified in their textual data. Some of these will usually be defined a priori, but they will be modified and added to as the researcher reads and interprets the texts" (King, 2004: pp 268). In WellCo a preliminary template for analysis was defined drawing on the proposal and the discussion with all partners. The work on the text guided the analysis and led to refinement of the labels and the creation of new ones.

Teleconferences among partners allowed to refine the template. At the end of the process we obtained a template of categories hierarchically ordered, with groups of similar sub-categories clustered together to produce more general categories. Broad higher-order codes can give a good overview of the general direction of the data, while detailed lower-order codes allow for subtle distinctions to be made, both within and between national contexts.

The final categories were defined as follow:

- **Daily activity and well-being**. In this category we gathered data concerning the activities carried on by elderlies and their caregivers in order to guarantee the well-being of the former. Sub-categories:
  - Physical activities;
  - Nutrition;
  - Social activities;
  - Cultural and cognitive activities;
  - Health and personal care activities.
- **Goals to achieve improvements in well-being.** In this category we gathered data concerning the future goals represented by elderlies and caregivers as important for maintaining/improving seniors' well-being. Sub-categories:
  - Physical goals;
  - Nutritional goals;
  - Social goals;
  - Cultural and cognitive goals;
  - Health and personal care goal.
- **Obstacles and challenges to improve well-being.** In this category we gathered data concerning the obstacles detected by elderlies and caregivers in the maintenance/improvement of seniors' well-being. Sub-categories:
  - Physical barriers;
  - Social barriers;
  - Economical barriers;
  - Motivation for improvement;
- **Daily strategies for avoiding obstacles.** In this category we gathered data concerning the strategies enacted to avoid the obstacles encountered by elderlies and the caregivers in the maintenance/improvement of seniors' well-being. Sub-categories:
  - People and roles;
  - Interaction and activities with experts;

- Interaction and activities with informal caregivers;
- Interaction and activities with other people.

- **Daily use of ICT.** In order to support the definition of WellCo System Requirements, we gathered data concerning the IT skills of patients and caregivers. Sub-categories:
  - IT/Skills Computer literacy;
- **Pointers towards improving well-being.** In this category we gathered data concerning suggestions provided by elderlies and caregivers for constructed future interventions for senior's well-being. Sub-categories:
  - Aspects important to improve their wellbeing;
  - Self-tracking activities that might improve well-being;
  - Desidered insight into own well-being.

The main reason to define the template for analysis with such granularity is to be found in the need to provide each partner with a standardized tool for data analysis. The limited time to perform the requirement gathering suggested the impracticality of translating each data collected (diaries, probes, interviews) in three different countries in a fourth language (English) so to allow one partner to perform the analysis. Moreover, this would have led to an intrinsic loss of informtion due to the translation process. The structured template, instead, ensured that each partner could perform the analysis of the data collected at their site and the sharing of such data in the form of a Co-Design reports. These reports are a summary of all the user research performed within this phase of the project. For each participant involved, each national site provided a short descriptive account of the main finding structured according to the template.

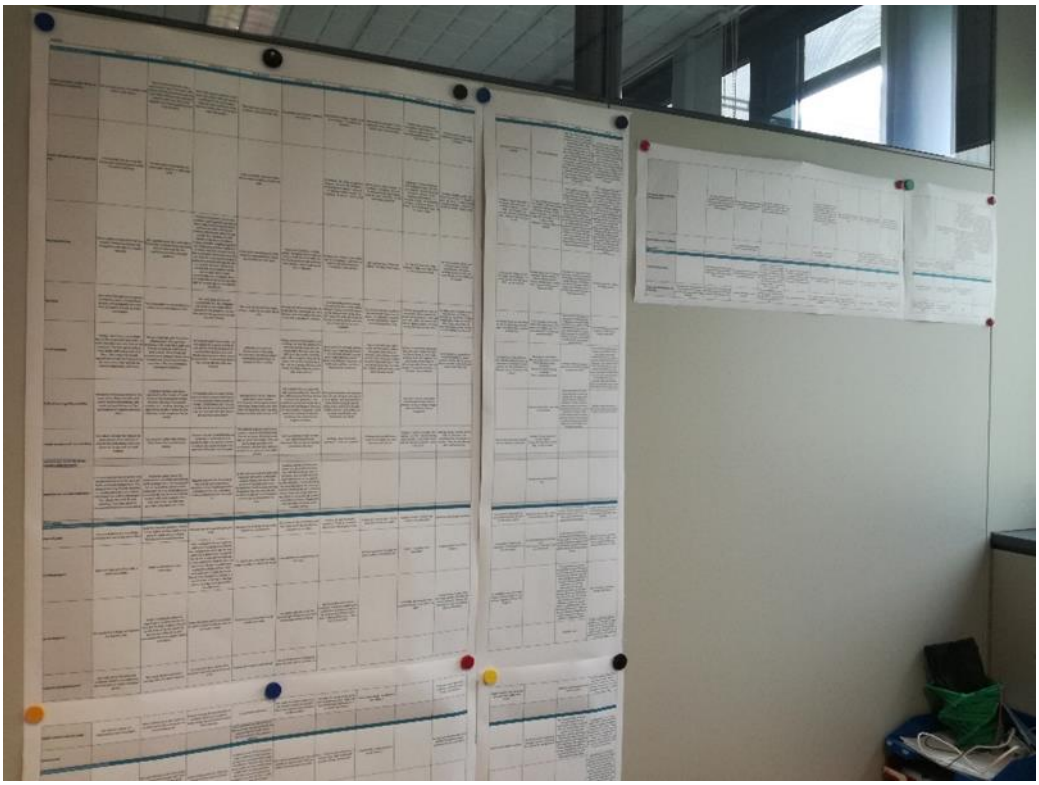


Figure 1.- Co-design reports (detail) plotted for analysis

The joint analysis of the co-design reports, together with the results of the descriptive statistics of the questionnaire (see next section), provided the bases to build the requirements.

4.2 Descriptive statistics

The data gathered through the questionnaire (see 9.4) have been subsequently analysed in order to have a clear picture regarding user preferences. Given the small number of respondents (N=22), the responses have been used for descriptive purposes only, higlighting main trends that could be used in order to complement the build up of requirements. Graph-bars (see user finding section for examples) have been used to this purpose, so as to facilitate the interpretation by all the partners of the project. Consequently, only distributions with a clear-cut distributions of preferences have been employed to give a precise direction to the requirements, whilst others have been employed only as empirical results to be used for additional reflections.

5 Methodology: Data analysis

The data analysis produced two main sets of results. On the one hand, the probes (diaries, WhatsApp conversations) have been analysed in concert with the in-depth interviews. Each respondent's data have been summarised through the co-design reports. Consequently, the template analysis made emerge the most salient cross-country characteristics to be adopted in the WellCo system. The analysis looked at patterns of similarities between subjects, and overshadowed how different country characteristics may have influenced the individuals' reponses.

This set of findings responds to the need of producing a generic body of knowledge on users and caregivers that allow the drafting of a list of requirements. For instance, knowing what are the commonalities between the goals and the obstacles of the users in their daily life permits to design a general set of requirements that could suit most of them. Similarly, knowing what are the daily actions undertaken by the caregivers when interacting with the users helped shaping another part of the system.

On the other hand, the descriptive statistics obtained through the questionnaire have been used to obtained precise information on specific requirements.

5.1 Template Analysis

5.1.1 Main findings

To define requirements of WellCo system we gathered qualitative data using Cultural Probes. WhatsApp, diaries and interviews have been analysed following Template Analysis method. This section will be focused on the main findings emerged from the analysis, using the categories presented above.

- **Daily activity and well-being.** In general, the elderlies involved in the user requirement gathering enjoy a significant degree of autonomy in the management of their daily life (despite some difference among countries. In general, Spaniards involved are in need of some assistance while Danish users are active and independent).
  Nevertheless, over the last year most of the participants, have developed chronic illnesses which are represented as threats for their autonomy and for their global health (hypertension, chronic illness, respiratory problems, overweight, back pain, meniscus injuries). At the moment of the study, elderlies had an active daily life in the following areas:
  - Physical activity. Elderlies practice various kinds of physical activities as, for example, sports (swimming, fitness, cycling, martial arts), housework (cleaning, cooking, grocery shopping) and activities strongly interwoven with the reproduction of social relations (dancing, walking with friends or relatives).
  - Nutrition. Elderlies seem concerned to follow a healthy diet. A diet can be conceived as healthy when it follows clinical guidelines (e.g. reducing the salt intake

because of the hypertension), when it reproduces traditional receipts (e.g. cooking Danish food) or when it includes healthy food (e.g. organic food).

- Social activity. People involved in the research expressed the wish to extend (or at least preserve) their social relations, represented as vital for their well-being. It proved hard to make an analytic distinction among sociality and other forms of activities. Sociality is intertwined with the most of the other spheres detailed in the project such as physical activities (e.g. walking with friends, going to playground with grandchildren), social games (e.g. playing cards at elderly centre), voluntary work (with parish or ONG), or the use of social network (e.g. Facebook). As a result, social wellbeing is derivative concept rather than a stand-alone one and it should be pursued engaging elderlies in one or more spheres of wellbeing.

- Cultural and cognitive activity. Cultural and cognitive activities are represented by interviewees as vital for elderly's well-being and, in particular, for "keeping the mind alive". Daily life of elderlies is characterized by participation in cultural events (e.g. theatre, festivals), reading, surfing the web (e.g. streaming videos for cooking tutorials, playing Sudoku).

- Health and personal care activities. Finally, elderlies periodically maintain relationships with healthcare professionals (e.g. general practitioners, hospital doctors), receiving and following daily clinical prescriptions. These activities are not predominant in elderlies' daily life. Despite the increasing relevance of health issue and contacts with health providers, the people involved in the research showed interest in preserving their autonomy and avoiding to rely on others.

- **Goals to achieve improvements in well-being.** Elderlies are worried about their physical-cognitive decline and loss of autonomy, to contrast these trends, they have future goals that, in the most of cases (except for nutrition), overlap with their current activities. Indeed, for the interviewees the main goal is to keep doing what they are already doing, reducing negative effects of ageing:
  - Physical goals. Elderlies seem worried about their physical decline, trying to slow down it through physical exercise. Consequently, the future goals of elderlies are strongly connected with the maintenance or the improvement of the physical activity, such as: increasing or keeping fitness, gym, swimming, walking, cycling.

  - Nutritional goals. In the most cases, elderlies want to improve their nutrition, following clinical guidelines. The improvement of nutrition is often associated with weight loss and involve the following specific goals: eating more vegetables/fish/fruit, following specific diets, following old/new receipts.

  - Social goals. For the future elderlies want to have an active social life, keeping or increasing the activities already carried out at the time of the interview. For

example: going to trips organized by the parish, meeting friends, visiting relatives, travelling with friends.

- Cultural and cognitive goals. Cultural and cognitive goals seem less important than others. Also in this case, the main goal is to keep or increase some ongoing activities as for example: playing Sudoku, reading, attending IT classes.

- Health and personal care goals. Elderlies are concerned about their future health status. In many cases, they have as future goal the management of chronic illnesses (for example hypertension and cardiovascular diseases), taking medications and changing lifestyle.

- **Obstacles and challenges to improve well-being.** In this category, we gathered data concerning the obstacles detected for the maintenance/improvement of seniors' well-being.

  - Physical barriers. First, the improving of well-being is obstructed by the emergence or the worsening of mobility problems. If on the one hand, elderlies desire to keep themselves active, on the other hand carrying out some activities has become more and more difficult for them (the most common problems are lack of energy, arthrosis, pressure and respiratory problems and prosthesis).

  - Social barriers. In this category, the main barrier is the loneliness. Sometimes elderlies claim to have poor social relationships, more often they have network composed by relatives and peers with different goals and preferences. In these cases, elderlies want to do something (e.g. walking, going to the theatre, travelling), but they would love also love to find company to perform such activities.

  - Economical barriers. These barriers are not important for elderlies involved. In most cases elderlies are still working, if retired they have no relevant economic issues and do not foresee to have any significant economic problem in the near future. This outcome suggests that the people cannot be considered a representative sample of the population. However, the choice to target people with no significant economic problem (and with a basic/good informatics literature) is consistent with the decision to address potential early-adopters of the WellCo platform at this stage of the design.

  - Motivation for improvement. Elderlies are motivated to improve their well-being and overcome the abovementioned obstacles by different elements: advices and prescriptions of healthcare professional, their willpower, the benefits and the relief connected with the desired activities, etcetera.

- **Daily strategies for avoiding obstacles.** Elderlies are often included in network composed by several people that play different role in their well-being (professionals, relatives, friends, neighbours, colleagues or ex colleagues). In this category, we have

included the following topics concerning the importance of networks in elderly's well-being:

- People and roles. Elderlies in the diaries defined a hierarchy among these actors, the most common criteria are: trust (the most important actors have a strong relationship of trust with the elderly), temporal regularity (the importance of the actor grow with the frequency of interactions with the elderly), proximity (the actors that live near the elderly are the most important for his/her wellbeing).

- Interaction and activities with experts. Considered elderlies have general a good level of autonomy and they are followed only sporadically by healthcare professionals and services (e.g. hospital visits for monitoring specific illness).

- Interaction and activities with informal caregivers. The family is crucial in almost all cases, but the characteristics of the network can change from person to person: some networks are tight but with dense relationships (e.g. elderly woman without sons and daughters who lives with her husband), other networks are wide and dense (e.g. elderly man who lives with his wife and has sons/ daughters that live in the same city) and others are wide and characterized by both dense and weak relationships (e.g. elderlies with positive and intense relationships only with some sons or daughters, grandsons/granddaughters). Relatives are generally important both for receiving help in some daily tasks (e.g. housework) and for the social well-being of elderlies.

- Interaction and activities with other people. The most common people who are neither professionals nor relatives are friends, mates of courses/voluntary works/parish groups. These actors are not caregivers, but people important for elderlies social well-being.

- **Daily use of ICT**. The involved elderlies have been selected for their skills in the use of mobile devices. Consequently, in most cases elderlies know to use smartphone, to surf the internet, to send images and video, to play online games and so on.

- **Pointers towards improving well-being.** In this category we gathered data concerning suggestions provided for constructing future interventions for senior's well-being:
  - Aspects important to improve their wellbeing. Elderlies desire to receive personalized follow-up by experts about their health status and advices about the management of specific illnesses and therapies.

  - Self-tracking activities that might improve well-being. Elderlies conduct the following self-tracking activities that can be supported by specific technological intervention: reading and saving recipes, counting steps with smartphone apps, tracking diary about nutrition, monitoring their heart-rate, storing old photos. The wide range of self-tracking activities and information seeking in the domain of health/wellbeing management confirms on the one

hand the interest in this topic and the readiness to adopt technology (should it be considered fit to their needs).

- Desired insight into own well-being. Elderlies are, at same time, interested in receiving feedbacks and in being autonomous and free. For this reason, a recurrent theme of the analysis is the perceived intrusiveness of a technology too pushy (e.g. too frequent feedbacks) as this would cause them to "feel constantly sick" or in need of attention.

5.1.2 Main discrepancies between seniors and caregivers

In general, the representations about seniors' daily life given by seniors and caregivers overlap. For this reason, the partners involved has decided to analyse the data gathered using the same template. Nevertheless, the analysis underlined some differences between these targets groups:

- **The representation of daily activities.** Caregivers observe with critical lens the daily life of elderlies, underlining their health issues and the discrepancies between their behaviours and clinical guidelines (for example, caregivers describe frequently health concerns as depression or the lack of compliance with medical prescriptions). Also the topic of loneliness is more mentioned and empathized by caregivers (in particular by informal caregivers) than by seniors. These issues are less recurring in elderlies' interviews because they are probably perceived as stigmatizing.

- **The representation of future goal.** Caregivers underline more explicitly than elderlies, that the main goal of the latter is keeping the ongoing physical, social and cultural activities, struggling against the physical decline.

- **The representation of obstacles.** Elderlies highlight continuously the importance of autonomy, describing the loss of autonomy as an inevitable event. Caregivers complete the representations given by elderlies, focusing on the emerging difficulties experienced by elderlies in conducting an independent daily life. If for elderlies the loss of autonomy is a future occurrence, for caregivers this is an ongoing event.

- **The representation of future intervention for elderlies' wellbeing.** The suggestions offered by elderlies for the improvement of their life are often vague. In contrast caregivers often provide in detail examples of intervention that, according to them, could help preserving the wellbeing of the elderlies. Of particular relevance is that technological interventions (e.g. platform dedicated to elderlies for dedicated sales promotions and tele-monitoring systems for the communication with healthcare professionals).

5.2 Questionnaire Analysis

The descriptive statistics were used for the design and evaluation of specific requirements. Most questions were connected to a specific requirement, which has been evaluated according to the response distribution obtained through the descriptive statistics. Crucially, the findings emerged in this phase were integrated with the co-design reports and discussed with all partners: this implies that each single insight has produced a series of different requirements.

However, given the high number of responses and requirements, three examples will help clarifying how the questionnaire findings influenced the subsequent phase.

First, take the response distribution to the following questions:

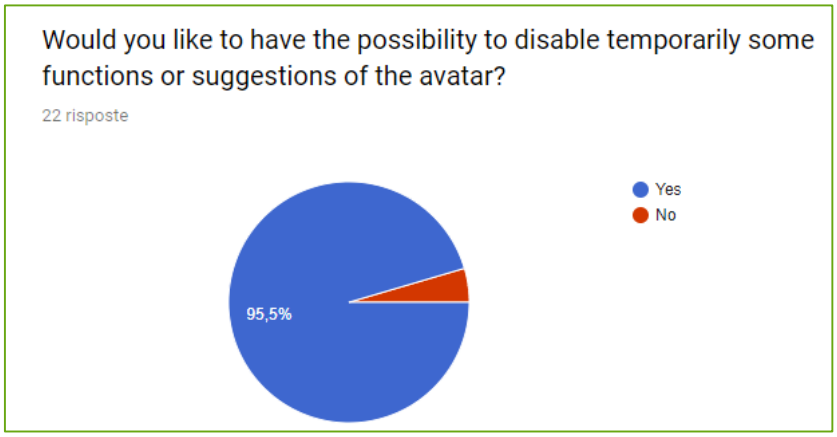


Figure 2.- Example of clearly expressed preference (1) –disabling suggestions

Since basically all users clearly expressed the desire to control the functions, suggestions and monitoring activities of WellCo, the requirements contain a clear suggestion in this regard. For instance, requirement N1 states that "The user must always have the possibility to switch off each monitoring activity in order to be in control of the application". The MoSCoW system highlights that this is a must in the development of the application, as its absence would undermine the value of the system itself.

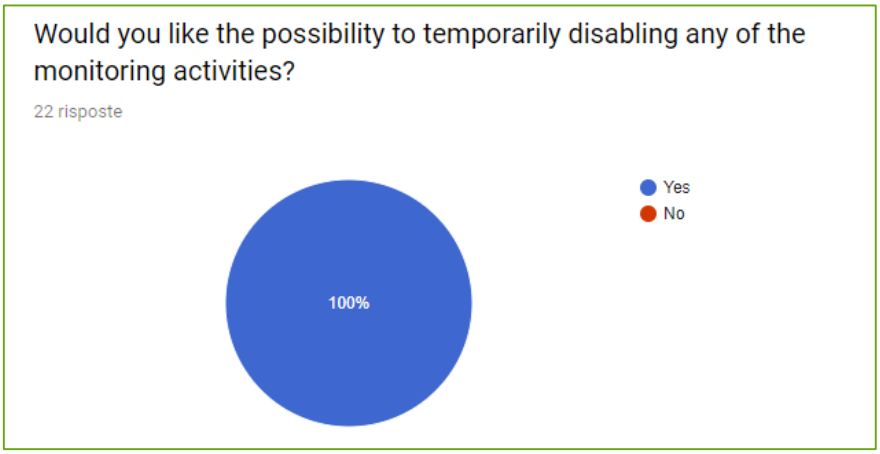


Figure 3.- Example of clearly expressed preference (2) – disabling functions

A second example is provided by the two bar-graphs here below. One of the most important aspects of the system is the connection to a wearable device. We provided two questions and 4

choices selecting the most known devices, and users could choose more than one answer. The braiding between these two questions permits to understand at the same time the users' desiderata and dislikes.

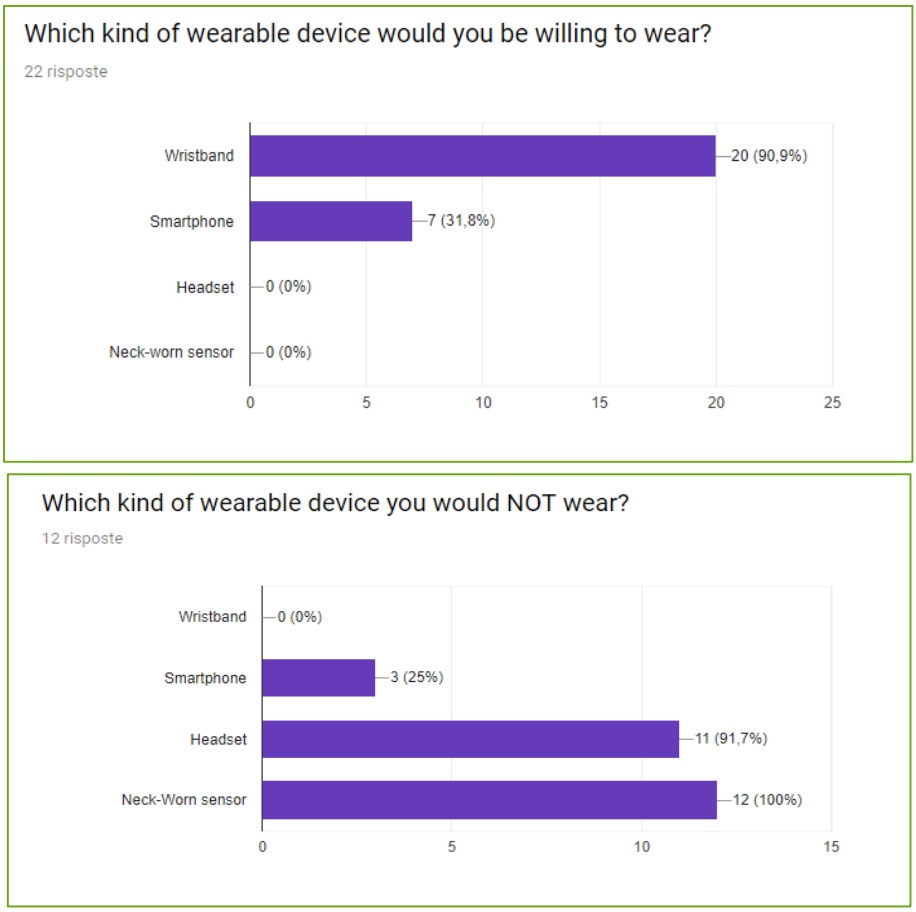


Figure 4.- Examples of clearly expressed preference (3) – wearable devices

The intertwine between these two graphs, suggest that the wristband is the only wearable device that users are willing to wear. The wristband is at the same time a desideratum for most users, and does not pose a problem to anyone. Contrarily, the headset and the neck-worn sensor are discarded as viable options by most users, and therefore cannot be considered in the development of the WellCo system. Similarly, the smartphone is not considered as a useful wearable device, and therefore is discarded as a viable option to this purpose.

As a consequence, this information produced a set of requirements based on the wristband (see M7-M13 below) that becomes the privileged device to obtain information on the user (heartbeat, sleeping patterns etc.) At the same time, users' reluctance to wear the headsets, and the neck-worn sensor are summed up in another requirement (M12), that states that "the application should not be connected to a headset or to a neck-worn sensor".

Finally, the last figure was used to build some of the requirements regarding the users' relation with social network. The figure suggests that more than half of the respondents use social networks: this implies that sharing information with other users could be a desired feature for many (see U3).

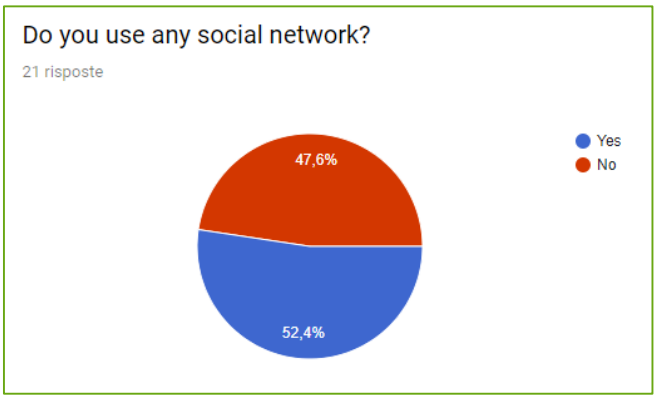


Figure 5.- Example of non–decisive response – use of social networks

6 From data analysis to requirements

Requirements were formulated drawing on the analysis described above.

Data gathered from questionnaires (almost) automatically translated into requirements. This was due to the choice to formulate question in such a fashion that responses led to a requirement (see Appendix 9.4 for the questionnaire and chapter 5.1 for the analysis).

Formulating requirements drawing on the qualitative data gathered with the diary, the cultural probes and the interviews benefitted from the structured template adopted to create the co-design reports (chapter 4.1) and the strict formulation of the questions of the topic guide (appendix 9.2, 9.3). Drawing on the analysis of the co-design reports we identified and ranked the requirements. The process entailed, at times, to go back to the raw data to ensure a correct interpretation of the users.

As a general rule, the fundamental features of the application ("Must have", according to the MoSCoW method – see chapter 6.3) are those whose lack would lead users to consider not using the application. For example, since user deem very important keeping control over the application must have a functionality to allow them to switch off notification.

The same line of reasoning applies to the "Won't have", features whose presence will require users to reject the proposed solution. For example, considering the value attributed to privacy, users would not easily accept audio to be recorded to capture automatically detect some activities.

A more nuanced approach was used to determine "Should have" and "Could have". "Should have" was attributed to features that could be well accepted and provide value to the most part of the users. "Could have" are more peripheral functionalities, deriving from suggestions often proposed by a small number of users that could, nonetheless, provide an added value to the platform.

6.1 Requirements Formulation

Each requirement has a unique ID, based on the cluster and a number to allow referencing towards it in other parts of the project.

6.2 Requirements sources

For each requirement, the document indicates the most salient source of origin, thus distinguishing between 5 categories. When available, the specific part of the source is added for traceability.

CR: Co-Design reports; these reports are a summary of all the user research performed within this project

QU: The Questionnaire that has been taken with end users after the Co-design reports

PC: Discussions with the project coordinator

PT: Discussions with the project team

PR: Requirements coming from the analysis of the proposal; in brackets the precise paragraph has been indicated.

6.3 The MoSCoW method

Requirements have been assessed using the MoSCoW method (IIBA, 2009). This technique is commonly used in software development for the prioritization of requirements.

Besides being time effective, the MoSCoW allows to reduce the information into a set of statements that can guide the project through next phases. Although the reduction of requirements into a set of single sentences inevitably implies a loss of information, it is well suited for giving standardized information on the user requirements. Moreover, such a method permits to highlight potential contradictions between user requirements and technical requirements, thus speeding up the decision process for acceptance or dismissal.

Regardless of priority, each requirement is defined with should as the main verb. The priority can be easily adjusted after the requirement definition phase. As MoSCoW has various implementations, we use the following definition within the WellCo project.

Must have: Requirements labelled as must have are critical to the application for it to be a success. "Must have" requirements are crucial for the development of the WellCo prototype.

Should have: Requirements labelled as should have are important but not necessary for delivery of the current scope of the application. While "should have" requirements can be as important as must have, they are often not as time-critical or there may be another way to satisfy the requirement, so that it can be held back until the future

Could have: Requirements labelled as "Could have" are desirable but not necessary, and could improve user experience or customer satisfaction for little development cost. These will typically be included if time and resources permit.

Won't have: Requirements labelled as "Won't haves" are considered not of direct relevance for the end-users.

7 List of requirements

The requirements were gathered to guide the development the design of the prototype maximizing the chances of its adoption.

The requirements are divided in four macro-categories, containing several sub-categories that ease the reading of the list. A distinction is made between General Requirements, End-User Application Requirements, Informal Caregiver Application Requirements and Expert Application Requirements.

General Requirements: apply to all the users of WellCo.

End-User Application Requirements: needed by the end-user for the system to work

Informal Caregiver Application Requirements: needed by caregiver to interact with the end-user

Expert Application Requirements: needed by expert to validate suggestions

Please note: section 7.2 presents only functional and end-users requirements gathered from the user research, from the analysis of the proposal, and from the preliminary discussions with

the project coordinator. In the next phase (D3.1) we will also integrate requirements based on technical possibilities that have not yet been included. In case of conflicting, a decision will be made in this next phase.

Before moving to the actual list, the document clarifies the terminology adopted when referring to the users and to the technological and functional properties of the system.

7.1 Terms and definitions

As this document deals with several abstract concepts and terms that can be interpreted in various ways, we define all terms before moving to the actual list of requirements. We distinguish between user-related terms, referring to the actors that will actively make of WellCo and technical and functional terms, referring to the different components making up the system.

7.1.1 User related terms

Term	Explanation
User	end-user, the senior interacting with the seniors' interface in WellCo
Informal caregiver	The caregivers are the people involved in the day to day care of the seniors. These can be family members such as the spouse, children or grandchildren but they can also be friends and neighbours. These caregivers support the senior with practical aid as well as emotional support.
Expert	Professionals like a GP or a medical specialist and other formal caregivers who care for the user/senior as part of their profession, such as social workers (acting as the user's case manager), home nurses, personnel of an elderly center, health coaches, etc. In this project, experts are a synonym of formal caregivers.

7.1.2 Technical and functional terms

Term	Explanation
Platform	The entire WellCo application platform, including all user interfaces
Application	One of the three specific user interfaces (for the user, the informal caregivers or the expert)
Recommender	The recommender performs all the complex tasks needed to provide personalized interventions to users
Intervention	The complete set of interactions between the user and the application in order to convey a specific recommendation
Virtual coach	The virtual coach acts as (visual) interface among the recommender and the user, showing the user recommendations
Recommendation	The virtual coach provides **recommendations** to the user, based on what the recommender provides
Goal	The user can accept or reject recommendations. If a recommendation is accepted, it is converted into a **goal.**

7.2 General Requirements

As the **platform** covers all 3 applications, this paragraph only states requirements that apply to all 3. Specific requirements can be found in the application-specific paragraphs. Please note that the lists of abbreviations are available in 7.2. (requirement sources) and in 7.3 (definitions of MoSCoW labels).

7.2.1 Overall System Structure (O)

ID	Requirement	Source	MoSCoW	Comments
O1	The platform should consist of 3 applications: - An application for the users - An application for the informal caregivers - An application for the experts	PC	M	
O2	The platform should be functional anytime and anywhere, and should provide information at request of the user at any moment	QU	S	If hardware/internet is functional. The users should be able to trust the platform to have no downtime and be always available for them

7.2.2 Privacy (PR)

ID	Requirement	Source	MoSCoW	Comments
PR1	The platform should only store data necessary for the functional purpose of the platform	CR	M	
PR2	The platform should allow each user to see an overview of which data is gathered and processed by the platform	CR	C	
PR3	The user should be able to change its privacy preferences at all times, including data portability, archiving and processing for scientific research.	QU	C	
PR4	The user must have the right to rectification, erasure of personal data, restriction of processing, data portability and to object when processing personal data for archiving purposes in the public interest, scientific and historical research purposes or statistical purposes.	PR	M	

7.3 End-user application requirements

7.3.1 Technical outlines (T)

ID	Description	Source	MoSCoW	Comments
T1.	The application should be a responsive application that can be used on both smartphones and tablets	PR, 1; 1.3	M	
T2.	The application should be able to run on the Android OS	PC	M	
T3.	The application should be able to have access to the device's hardware as provided by Android	PT	M	Location, Storage, Notifications, Camera, Microphone, Compass, Accelerometer, visible Wi-Fi access points, number of SMS and phone calls sent/ received/missed (no actual content of SMS or phone calls), screen on/off events
T4.	The application should be always active in the background by default and thus be supported with continuous data internet connection in order to provide real-time interaction with the user	PR, 1.1	M	
T5.	The application should be able to provide push notifications, both when it is running in the foreground and in the background	PC	M	
T6.	The user should be able to use the application regardless of physical/geographical location	PT, WP3	M	If there is internet connection
T7	The application should be able to assess the user's mood and emotion through emotion analysis via a combination speech analysis, facial expression analysis and body gesture analysis	PR, 1	S	Related to IN10

7.3.2 Technical input and output (IN)

ID	Description	Source	MoSCoW	Comments
IN1.	The application should support both touch input and speech input as main means of controlling and navigating the application	PR, p9, QU, CR	M	The user should be able to set in the application's settings if and when he wants to use either touch or speech as primary input method

IN2.	The application should support natural language interaction (NLi) as a data input and output method	PR, 1	M	At minimal supporting English, Danish, Spanish and Italian
IN3.	The user must have the possibility to set the desired input method without the need of interacting with the virtual coach	QU	S	The user should be able to switch between interfaces without asking the coach to switch
IN4.	The user should be able to set in the application's settings if and when he wants to use textual output or voice output or both as primary output	CR	M	
IN5.	The application should be able to interpret speech volume, pitch, pace and fluency in order to support emotion recognition in the speech of the user	PR, 1.3	S	
IN6.	The application should be able to gather audio input	QU	**W**	Most elderlies do not want the devices to gather audio information. This requirement directly contradicts with the requirements above
IN7.	The application should support facial and gesture recognition based on video/camera input	PR, 1.3	S	The recognition should be done in real-time, without storing the data afterwards

7.3.3 Intuitive Interface (I)

ID	Description	Source	MoSCoW	Comments
I1.	The application should have an interactive, intuitive interface	PR, 1.3	S	
I2.	The application should be centered around an affective aware virtual coach	PR, 1.3	S	
I3.	The user interface should consist of both the virtual coach-based interface and additional traditional user interfaces to support the exchange of other data	CR	M	
I4.	The application's interface and UX should be adaptable to the user's needs, taking into account: - Emotional state - Hesitation - Engagement - Context of use - Physical and cognitive limitations	PR, 1.1	S	
I5.	The adaptability of the interface and the functionalities present in the interface should be steered by decision trees or rules based on context-of-use user	PR, 1.1	M	

	profiles, context models and heuristic context aware models.			
I6.	The user should be able to adapt the user interface of the application to its own needs	PR, 1	S	

7.3.4 Notifications and engagement (N)

ID	Description	Source	MoSCoW	Comments
N1.	The application should engage the user by giving (push) notifications/reminders about interacting with the platform regularly	PC, QU	S	
N2.	The user should be able to snooze or dismiss notifications of the application	PC	S	E.g. by postponing it to later
N3.	The user should be able to set "off-time" in the application as a period in which he doesn't want to be disturbed by the (notifications) of the app	PC	C	E.g. by setting a schedule or taking into account location data or data from other apps
N4.	The application should remind the user of goals he has set every week	CR	S	
N5.	The user must always have the possibility to switch off each monitoring activity in order to be in control of the application	QU	M	E.g. for reducing the output provided by the system
N6.	The application should remind the user about physical activity goals every week after the setup phase and readjust them every two months after the periodical monitoring (see M)	CR	S	
N7.	The application should allow user to set font/views size that allows him/her to read easily in case of mild common vision difficulties due to their age	PT	S	

7.3.5 Virtual coach (V)

ID	Description	Source	MoSCoW	Comments
V1.	The virtual coach should be represented by only the face of a person	QU	S	
V2.	The user should be able to choose among different appearances of the virtual coach	QU	C	
V3.	The virtual coach's gender should be female	QU	S	
V4.	The communication style of the virtual coach should be customizable according to users' preferences	QU	S	e.g. empathic, prescriptive, wordy; succinct

V5.	The virtual coach should support dialogues with the user through speech, using human affects such as empathy	PR, 1.2	S	
V6.	The virtual coach should be able to imitate the way people incrementally get to know and trust each other through conversations	PR 1.4	S	

7.3.6 Coaching and behaviour change (C)

ID	Description	Source	MoSCoW	Comments
C1.	The application should provide the user with personalized advice and coaching (interventions) about health and wellbeing based upon the 7 areas of the BCW in order to maintain or improve health and wellbeing	PR, 1	M	
C2.	The application should give the user recommendations in the areas of: - Cognitive stimulation - Nutrition - Leisure and entertainment - Supporting groups - Physical activity - Health and mental status	PR, 1	M	The idea is that the recommendations try to cover the 7 areas of the BCW followed in WellCo.
C3.	The application's recommendations should be based upon the user's physical activities, vital signs, stress, sleep patterns, anxiety, depression, mental status and context.	PR, 1.3	S	
C4.	The application's recommendations should be based on the user's individual Life Plan	PR, 1.1		which will be gathered by the application by two means: a) user's interaction with the application through machine learning technics b) questions to be formulated by the avatar during a period based on the Life Plan Protocol
C5.	The recommendations should reflect the current condition and constraints of the user as gathered by the monitoring activities and present in the Life Plan in order to be realistic, desired and feasible for the user.	CR	S	G1

C6.	The user should be able to accept or decline recommendations given by the application	PC	M	
C7.	The application should allow the user to convert recommendations given by the system into personalized goals and pathways	PR, 1	M	The senior decides which of the recommendations are established as Goals. E.g. the virtual coach asks the senior "Do you want to convert this recommendation to a goal"?
C8.	The recommendations which are converted into goals should be represented as milestones in a game and within the social network of the user	PR, 1	S	
C9.	The achieved goals should be represented as a game-like scoring system, for example badges, points, or labels	PC	C	
C10.	Achieved goals should amend scores obtained through the monitoring in order to provide combined feedback to the user.	CR	C	
C11.	Recommendations should immediately be given after the completion of the set up phase of the application		C	
C12.	The application should contain video tutorials about nutrition in order to give tips and suggestion to the user	QU	S	e.g. meal recipes
C13.	The application should contain video tutorials about physical activities in order to give tips and suggestion to the user	QU	S	e.g. gym exercise tutorials
C14.	The application should provide cooking recipes for users with diabetes, hypertension, allergies	CR	S	

7.3.7 Goals (G)

All the requirements below are about goals that should be provided based on the reasoning of the recommender. Users who do not need a certain goal, will not see related recommendations. The below requirements should thus be assessed based on the fact that they are actually useful for a specific user.

ID	Description	Source	MoSCoW	Comments
G1.	The application should provide recommendations for goals for maintaining or increasing social contacts with friends	CR	S	

G2.	The application should provide recommendations for goals for maintaining or increasing social contacts with relatives	CR	S	
G3.	The application should provide recommendations for goals for maintaining or increasing volunteering activities	CR	C	Only in case of interest in volunteering of the person.
G4.	The application should provide recommendations for goals for maintaining or increasing reading activities	CR	C	Only in case of interest in reading of the person.
G5.	The application should challenge the user to learn a foreign language day after day	CR	C	Only in case of interest in learning of the person.
G6.	The application should provide recommendations for goals for maintaining/increasing the following physical activities: walking, gymnastic, swimming, cycling and in case of interest for the person, how to relieve his/her pain linked to physical activity	CR	S	(steps or km per day; hours per week)
G7.	The application should be able to connect to external services providing cultural activities and suggest the user to participate to a cultural event at least once a week	CR	S	Once a week only when appropriate activities are available at least once a week
G8.	The application should provide goals for weight loss every week after the setup phase and readjust them every six months after the periodical monitoring (see C6)	CR	S	
G9.	The application should provide goals for weight maintenance every 2 months (see C6).	CR	S	
G10.	The application should give recommendations for goals in order to maintain or increase vegetable consumption every two months	CR	S	
G11.	The application should set goals in order to maintain or increase fruit consumption every two months	CR	S	
G12.	The application should suggest the user to introduce new ingredients in the diet every two months	CR	C	Only if the level of consumption of a certain type of nutrition is not sufficient and should be increased

G13.	The application should propose an alternative goal when the user refuses the first proposal.		S	The new goal should be downwardly (e.g. if the user refuses the goal of 10.000 steps, the system will provide a new goal of 8.000 steps) or horizontally adjusted (e.g. if the user refuses the goal of going to the cinema once per week, the system will replace cinema with another cultural activity).
G14.	The application should set physical activity goals on the basis of clinical guidelines in the field of physical activity (e.g. WHO) and on the basis of the score provided by the monitoring section	CR	S	
G15.	The application should set sleep pattern goals on the basis of WHO guidelines for appropriate amount of sleep per day	PR, 1		
G16.	The application should set nutritional goals on the basis of clinical guidelines (e.g. Mediterranean pyramid)	CR	S	
G17.	The application should set cognitive, social, and cultural goals at increasing levels of difficulty starting from the preferences provided by the monitoring section	CR	S	
G18.	The application should readjust set goals every two months after the periodical monitoring (see M3)	CR	S	

7.3.8 Profiling and setup (P)

ID	Description	Source	MoSCoW	Comments
P1.	During setup, the application should gather the gender, first name, prefix and last name of the user in order to allow personalization of the interface	CR	M	This allows the coach for example to call users by their name and gender declension
P2.	During setup, the application should gather the date of birth of the user in order to allow personalization of the interface	CR	M	This allows the coach for example to give birthday wishes
P3.	During setup, the application should gather a simple estimation of the economic situation of the user by asking a number of questions in an assessment, in order to adjust the setting of cultural goals	CR	S	This should result in a basic economic status value that defines whether the user is

				facing economic constraints or not
P4.	The application should gather information on the height and weight of the user during the setup phase of the application, in order to calculate the BMI.	CR	M	
P5.	The virtual coach should ask during the setup phase what physical activities the user does in order to support goal setting (providing a physical activity score) and monitor their achievement (comparing goals with actual activities).	CR	S	
P6.	The application should ask what cognitive activities the user does (e.g. crosswords, brain teasers, reading books, reading newspapers, videogames, playing cards, painting, playing music) in order to support goal setting (e.g. matching between user preferences and cognitive goals).	CR	S	These data will be gathered first during the setup phase, then through periodical questions (e.g. questions about number of book read) but also monitoring the results of the cognitive activities (e.g. providing scores/evaluations based on the achieved results in inbuilt crosswords)- This information should be gathered in the setup phase.

7.3.9 Life plan (L)

ID	Description	Source	MoSCoW	Comments
L1.	The Life Plan should be the main backbone of the application	PR	M	
L2.	The application should contain a model of the user that includes data about: - Health goals - Health outcomes - Physical activity - Vital signs - Stress - Sleeping patterns - Anxiety - Depression - Mental status and context - Gender - Age - Preconditions	PR, 1, PR 1.4	S	

	- Family history			
L3.	The application should contain a Life plan of the user that includes data about: - All areas of a user's life - Health - Work - Community involvement Relationships with friends and family - What kind of care the person want to receive	PR, 1	M	
L4.	The application should ask the user questions throughout the usage in a randomized way in order to determine a proposal for the person's Life Plan and evaluate if the contents set up in the Life Plan are achieved	PC	S	
L5.	The application should support data input by the patient framed as "Patient-reported outcomes" such as: - Health goals - Pain reports - Quality of life reports - Life plan information	PR, 1	S	
L6.	The application should gather information about the chronic condition of the user (e.g. arthrosis, backpain, osteoporosis, respiratory, diseases, memory loss, arthritis, chronic depression) in order to support goal setting (e.g. giving information useful for adjusting the physical activity goals on individual capabilities).	QU	S	This data will be gathered both in the setup phase and periodically (e.g. every 6 months).
L7.	The application should ask the user what physical activities he does in order to suggest recommendations and monitor their achievement	CR	S	e.g. Gym, Fitness, Swimming, Cycling, Martial arts, Trekking, Dancing in order to compare goals with actual activities). Related to P5
L8.	The application should ask periodically whether the user walks daily and for how long in order to support goal setting (e.g. providing a score based on the number of steps) and monitor their achievement (comparing goals with steps counted through the wristband).	CR	S	These data should be gathered both in the setup phase and monitored constantly through the wristband.

L9.	The application should ask what social activities the user does (e.g. attending religious service, caregiving, cultivate family relationships, parish activities, elderly social centre, trips, voluntary service, eating out) in order to support goal setting (e.g. providing a score based on the user's social life, for example SASOWS or SAI-E scale) and monitor their achievement (comparing goals with actual social activities).	CR	S	These data will be gathered both in the setup phase and periodically (e.g. every 2 months).
L10.	The application should ask what cultural activities the user does (e.g. theatre, cinema, concerts, museums, course and workshops) in order to support goal setting (e.g. providing evaluations based on the number of attended events) and monitor their achievement (comparing goals with actual cultural activities). These data will be gathered both in the setup phase and periodically (e.g. every 2 months).	CR	S	
L11.	The application should ask information about the user's nutrition on a weekly basis in order to support goal setting (e.g. gathering a dietary compliance score based on a standardized questionnaire) and monitor their achievement (e.g. proposing periodically the questionnaire such as the HEI or DHD indices and monitoring the score evolution). These data will be gathered both in the setup phase and periodically (e.g. every 2 months).	QU	S	

7.3.10 Education (E)

ID	Description	Source	MoSCoW	Comments
E1.	The application should contain a tips-functionality that educates the user about healthy behaviour	PR, 1	M	
E2.	The application could contain quizzes and surveys to test the knowledge of users about health behaviour	PR, 1	S	

7.3.11 Interaction with other users (U)

ID	Description	Source	MoSCoW	Comments
U1.	The application should contain electronic patients supporting groups based on shared properties of users	PR, 1	S	These groups will be automatically suggested to the user based on his/her static and dynamic profile.
U2.	The application should allow users to meet in virtual rooms and share experiences through video-conference	PR, 1	S	
U3.	The application should contain a social network functionality that allows the user to socialize with his/her close circle and other users of the platform	PR, 1	M	
U4.	The application should allow the user to invite other people into his social network		S	In case these people are not registered in WellCo, an invitation to join is sent to them
U5.	The application should support sharing of photos and videos by the user with the close circle		S	
U6.	The application should allow sharing of achievements (of goals) by the user with the close circle and other users of the platform	PR, 1.3	M	
U7.	The platform should support additional leisure and entertainment functionalities next to sharing content with the social network such as video-call communication	PR, 1.3	S	
U8.	The leisure and entertainment functionalities should only be shared with the close circle		S	
U9.	The application should engage users in competitive games	QU	W	
U10.	The application should allow users the possibility to share goal achievements with other users in order to improve the social wellbeing	QU	S	
U11.	The application must allow users to share video and pictures only with selected users in order to be in control of their privacy	QU	M	
U12.	The application should allow users to choose the people they want to share their pictures with, in order to be in control of their privacy	QU	S	

U13.	The application could allow users to organize activities together in order to improve social wellbeing	QU	C	

7.3.12 Monitoring, sensors and hardware (M)

ID	Requirement	Source	MoSCoW	Comments
M1.	The application should support data input by the system framed as "Performance-based outcomes" and inputs from sensors	PR, 1	S	
M2.	The application should be able to process data from fitness trackers, smartphones and sensors, providing monitoring data of: - Physical activity - Diet - Vital signs - Sleep patterns - Stress - Anxiety - Depression	PR	S	
M3.	The application should gather information on the mobility impediments of the user in order to support goal setting	QU	S	(e.g. user in wheelchair will not be given physical activity goals). These data will be gathered both in the setup phase and periodically (e.g. every 6 months).
M4.	The application should gather information on the eating constraints of the user in order to support goal setting	QU	S	(e.g. diabetes, glycaemia, intolerances, allergies, hypertension, overweight/obesity). These data will be gathered both in the setup phase and periodically (e.g. every 6 months) (e.g. user with diabetes will be invited to avoid sweets).
M5.	The application should gather information on the weight of the user every 6 months.	CR	M	
M6.	The application should calculate autonomously the BMI of the user during	CR	S	(e.g. if the user's BMI is over 25, the application

	the setup phase of the application, in order to support goal setting The BMI will be calculated every 6 months.			will set physical and nutritional goals aimed at losing weight).
M7.	The application should be connected to a wristband in order to measure heartrate and movement	QU	S	
M8.	The wristband should monitor heartbeat automatically and continuously	QU	S	
M9.	The wristband should monitor sleeping patterns (hours and depth of sleeping) automatically	QU	S	
M10	The wristband should monitor walking activity automatically and continuously in order to support goal setting (e.g. suggesting to do more steps per day)	QU	S	
M11	The application should produce evaluation reports containing all information gathered through the wristband	CR	S	(e.g. the report will provide an evaluation on the sleeping quality).
M12	The application should not be connected to a headset or to a neck-worn sensor	QU	S	
M13	The application should adjust physical activity recommendations for goals on the basis of the data gathered through the wristband	CR	S	

7.3.13 Additional leisure (A)

ID	Description	Source	MoSCoW	Comments
A1.	The application should contain video tutorials about hobbies (e.g. gardening) in order to give tips and suggestion to the user	QU	S	
A2.	The application should contain videos about the events and activities of the living environment of the user	QU	S	
A3.	The application could contain information on the associations in search for volunteers in order to give tips and suggestion to the user	CR	C	
A4.	The application should provide the latest information on the cinema movies available in the surroundings in order to give tips and suggestion to the user	CR	S	
A5.	The application should provide the latest information on the art exhibitions	CR	S	

	available in the surroundings in order to give tips and suggestion to the user			
A6.	The application should provide the latest information on the theatre performances available in the surroundings in order to give tips and suggestion to the user	CR	S	
A7.	The application should provide the latest information on the concerts performances available in the surroundings in order to give tips and suggestion to the user	CR	S	
A8.	The application should provide the latest information on courses/workshops available in the surroundings in order to give tips and suggestion to the user	CR	S	
A9.	The application should provide the latest information on major local events available in the surroundings in order to give tips and suggestion to the user	CR	S	
A10.	The application should challenge the user to solve brain teasers (crosswords, sudoku) at increasing levels of difficulty	CR	S	
A11.	The application should be able to link with external sources of information regarding social activities within the region	PM	S	In order to fit social activities to the needs of the user
A12.	The user-app should contain a calendar of local events around the user		C	

7.4 Informal caregiver application requirements (IR)

ID	Description	Source	MoSCoW	Comments
IR1.	The informal caregiver-app should be a responsive application that can be used on both smartphones and tablets	PR, 1; 1.3	S	
IR2.	The informal caregiver-app should be able to run on the Android OS	PC	S	
IR3.	The informal caregiver-app should be able to use the device's hardware provided by Android	PC	S	Only aimed at the phone or tablet. The caregiver app doesn't connect to a wearable device.

IR4.	The informal caregiver-app should be able to run in the background and provide push notifications	PC	S	
IR5.	The informal caregiver-app should allow the user's close circle (family, friends) to become part of a social network functionality through invitation from the senior	PR, 1	S	
IR6.	Within the informal caregiver-app, the user's close circle should be able to observe the user's evolution in goals and should be able to give input / feedback based on this observation, framed as "Observer-reported outcomes", in order to encourage seniors to achieve their goals	PR, 1	S	
IR7.	The personalized goals of the user should be visible as milestones within the social network functionality of the caregiver-app or within a game format	PR, 1	S	
IR8.	The informal caregiver-app should allow viewing of achievements of goals of the user within the social network	PR, 1.3	S	
IR9.	The informal caregiver should be able to like the goals of the user, encouraging the user on specific challenges	PR	S	
IR10.	The informal caregiver-app should support sharing of photos and videos with the close circle and the user	CR	S	
IR11.	The informal caregiver-app should support video-calls of the informal caregiver with the senior and with other people within the social network	PC	S	
IR12.	The informal caregiver-app should support the creation of groups within the social network	PC	S	
IR13.	The informal caregivers should be able have access to recommendations of the virtual coach to the user	PC	W	

7.5 Expert application requirements (ER)

ID	Description	Source	MoSCoW	Comments
ER1.	The experts should only be able to view the users related to their (trial) site area	PC	M	

ER2.	The experts should be able to view the user-profile of each of the users they can access	PC	M	
ER3.	The expert-app should allow experts to validate recommendations provided by the virtual coach to a user in order to allow the system to learn from this and provide more accurate recommendations next time.	PR, 1	S	
ER4.	The expert should be able to view **Pending Recommendations,** recommendations that has been already generated by the system but that have not been shown yet by the virtual coach to the senior because they are pending of validation.	PC	S	
ER5.	The expert should be able to view Recommendations already provided; recommendations that have been already proposed to the senior. In these ones the expert could like/dislike them, so the Coach informs the senior that his/her GP approves the recommendation (reinforcement).	PC	M	
ER6.	The expert-app should give the expert access to the goals of a specific user	PC	M	
ER7.	The expert app should allow the expert to upload/input tips for a healthy lifestyle to the system in the form of videos, documents, links and guidelines	PR, 1.2	S	
ER8.	The experts should be able to tag/categorize the tips they give, so it can be used for the correct end user by the platform	PC	S	
ER9.	The experts should be qualified health professionals that give scientific based information to the user	QU	S	
ER10	The experts should be trustful and have a public profile to be accountable and increase the user trust.	QU	S	
ER11	The user could have the possibility to pay for the supervision of a group of experts to have additional personalized suggestions	QU	C	

8 Conclusions

The users' requirement gathering phase aimed at involving the elderlies, caregivers and experts in the process of design of the WellCo platform. The methodology adopted allowed to understand the lived experience of potential early adopters of the WellCo platform and gather their perceived needs.

We will summarize the process of the requirement gathering phase performed in the three sites (IT, ES, DK) describing the overall result of the analysis.

First and foremost, the platform should consist of 3 applications:

- an application for the elderlies (the main target population of the WellCo platform)
- an application for the informal caregivers,
- an application for the experts.

Each application is not only meant for a different end-user, it also plays a different role in the economy of the WellCo platform. The user-app is meant to be used by elderlies, engaging and providing a digital counselling. The caregiver-app is meant to be used by people that already have a close relationship with the elderly, providing them a supplementary mean of communication for networking and to provide encouragement in the pursuit of wellbeing goals. The expert-app is meant to be used by professionals, providing them a tool to validate and refine the digital counselling provided to the elderlies, offering thus the WellCo platform the information needed to learn from the knowledge offered by the experts.

Some requirements (presented in parentheses) are used here to present the main characteristics of the three apps. These do not represent the full list of requirements gathered (see previous section) but only for illustrative purposes.

8.1 User-app (engagement and counselling)

The platform aims at providing elderlies with personalised advice, guidance and follow-up in order to encourage them to adopt and maintain healthier behaviour choices that help them to keep or improve their well-being status and being independent for as long as possible. In this section, we shall try to provide a view of the user-app identifying some recurring themes.

A major issue in providing advices to elderlies deals with the usability and the acceptability of the system itself. The research conducted with users confirmed that a key to success is a satisfactory user experience. To this end, requirements gathered show how users would appreciate the possibility for an adaptable style of interaction. Users-app should be customizable to the users' needs and preferences, providing multiple possibilities of interaction with the virtual coach, both touch input and speech input (IN1, IN3, IN4) and adoption a context-aware user experience (I4). The virtual coach, however, according to the majority of respondents, should be represented by a female face (V1, V3) – go to section 9.4 to see the different possibilities of avatar shown to the senior.

An area of concern is the possibility to "be in control" of the app. For instance, elderlies should thus be given the possibility to switch off the monitoring activities of the application (N5), set "off-time" to avoid receiving notifications (N3), refuse goals proposed by the virtual coach and suggest alternatives (G13), decide who to invite to join the social network (U4). These features

and several others suggest that the elderlies would not accept an application deemed to be too "intrusive" and their wish to have the final decision on the level of engagement with it at any given time.

User expects the WellCo platform to be intelligent and tailored to their specific needs. To this end, users are willing to be profiled and allowing the platform to continuously adapt and refine their profile. In particular, elderlies are willing to:

- provide inputs regarding their profile (see section P), preferences, activities performed (L7, L9, L10), eating habits (L11) and existing chronical conditions (L6)
- being automatically monitored by the app allowing it to gather data from sensors (wristband, M7) regarding heartrate, movement (M8) and sleeping patterns (M9).

In exchange for all the data provided to the WellCo platform, users expect it to deliver some services deemed useful to preserve and increase their wellbeing in different areas.

Users expect to be suggested personalized goals adapted to the status of the user, thus being realistic, desired and feasible (C5). These goals should cover many different aspects of the life of the elderlies ranging from physical activities (G6) to weight control (G8), from social activities (G2) to participation to sleep patterns (G15). The app may have all the resources needed to suggest a goal (e.g. steps per day). In some cases, though, the user-app may need to be connected to external services to propose a specific activity (e.g. going to the movies or to theatre, see G7).

As for leisure activities, several additional suggestions emerged research conducted (see section A – Additional Leisure). Elderlies would love WellCo to provide information regarding their preferred social activities and the possibilities offered in the local area. The detailed list of the areas in which users expect to be proposed goals (section G) reveals the significant variability in terms of wishes, preferences and objectives of the users.

A closer look at the features requested suggests that users would like the app to be a channel of information already available on the web. The desire to receive notification regarding movies (A4), workshops (A8) or even request of volunteer work by local associations (A3) leads to envision an app that considers the context and community and interpersonal relationships of the senior, as main incentivisation to encourage them to adopt healthier lifestyles.

8.2 Informal caregivers app (networking and encouragement)

Informal caregivers are people that have a pre-existing intimate connection with the user of WellCo platform. Caregivers are part of the close network on the elderlies and they are already involved in their care and support. Informal caregivers do already have established a set of means of communication with the elderly (e.g., face-to-face encounters, phone calls, text messaging). The informal caregiver- app will be yet another communication tool that will not replace the existing ecology of communication among elderlies and caregivers but it will rather become a part of it. For these reasons, the caregiver-app will have only a limited set of functionalities that will strictly refer to the new activities that the WellCo platform will allow the elderlies to perform.

The caregiver-app, more specifically, will allow informal caregivers to become part of a social network and be aware, provide feedback, and encourage elderlies in the activities suggested by the virtual coach application. The cornerstone of the caregiver-app is that it should preserve elderlies' control regarding their wellbeing management and it should not have features that could hinder the perceived control of elderlies on their autonomous management.

In this frame, the limitations of what caregivers can do through the app are to be considered the most relevant features of the app itself. First and foremost, caregivers cannot be part of the WellCo social network if not invited by the elderlies (IR5) which thus remains in control of who can/cannot interact with them through the platform. Moreover, caregiver-app won't give access to the recommendations provided to the elderlies by the virtual coach (IR13). The main purpose of the app is to provide caregivers a tool to encourage and stimulate elderlies. To this end, the application should allow caregivers to have a view of the milestones of the accepted goals (not all the goals suggested by the virtual coach) by the elderlies and encourage (e.g. giving a "like") them to reach the goals, providing inputs and feedback to the user, stimulating the achievement of specific challenges. Other features, such as video/message sharing among the network of care, are functional to these ends.

8.3 Expert-app (validation and evolution)

Unlike informal caregivers, experts are individuals that are part of the network of care of the elderly for professional reasons (e.g. GPs, educators, social workers). Experts may be acquainted with the elderly but, as a rule, interact with the elderly less frequently and with a much narrow focus with respect to informal caregivers. In the expert-user relationship, the application will allow expert to provide their expertise by supplementing and validating the recommendations provided by the user-app to the elderlies.

The expert-app has two core functions.

The main function of the expert-app is to filter and adapt the suggestions provided to the elderlies by the virtual coach (ER4). Validation will ensure that goals are fit to the users' profile and needs, avoiding that unnecessary or potentially harmful suggestions are provided to the elderly. Besides validating the goals proposed by the virtual coach, expert play a role in encouraging elderlies in pursuing their wellbeing goals. To this end, through their app experts will be able "like" the goal proposed (reinforcement) and supplement the suggestions of the virtual coach with personalized tips in the form of text, documents, or multimedia content (ER8).

The second function of the expert-app is to improve the WellCo platform learning from the choices made by the experts. Validation (or rejection of the goal) will provide the system a feedback to learn and refine the recommendation system itself (ER3). The categorization or tagging of the tips provided to the elderlies could allow to improve the platform over time.

It is pleonastic to add that experts, besides their formal qualification and their actual ability, should be perceived as such by the elderlies. The perceived reliability and trustfulness of the experts is needed to ensure elderlies trust them and the overall platform (ER9; ER10)

8.4 Final remarks

The research conducted with users has provided information regarding the functionalities the three app should have. Some of the requirements may be not specific enough. This is largely due to the difficulties encountered by users to imagine a technology far from their experience. While the recruitment has privileged individuals with good computer literacy (imagined as potential early adopters), WellCo project ambition is to deliver a novel solution that can hardly be imagined by users. Should this be the case, we foresee a compensating measure consisting in delivering a structured questionnaire to users regarding specific functionalities. This method

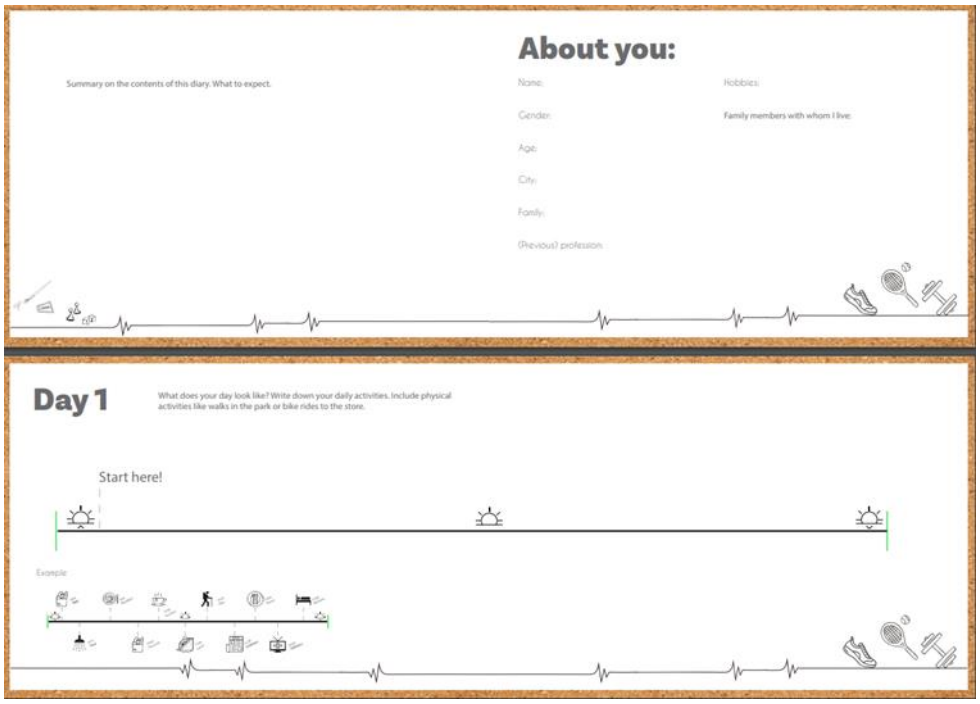
has already been used in this phase of the project and proved to be easy, fast and well accepted. A decision regarding the need of such additional step will be taken by the consortium after the next phase of the project in which the partner shall determine the integration of end users' requirements and technical requirements (WP 3).

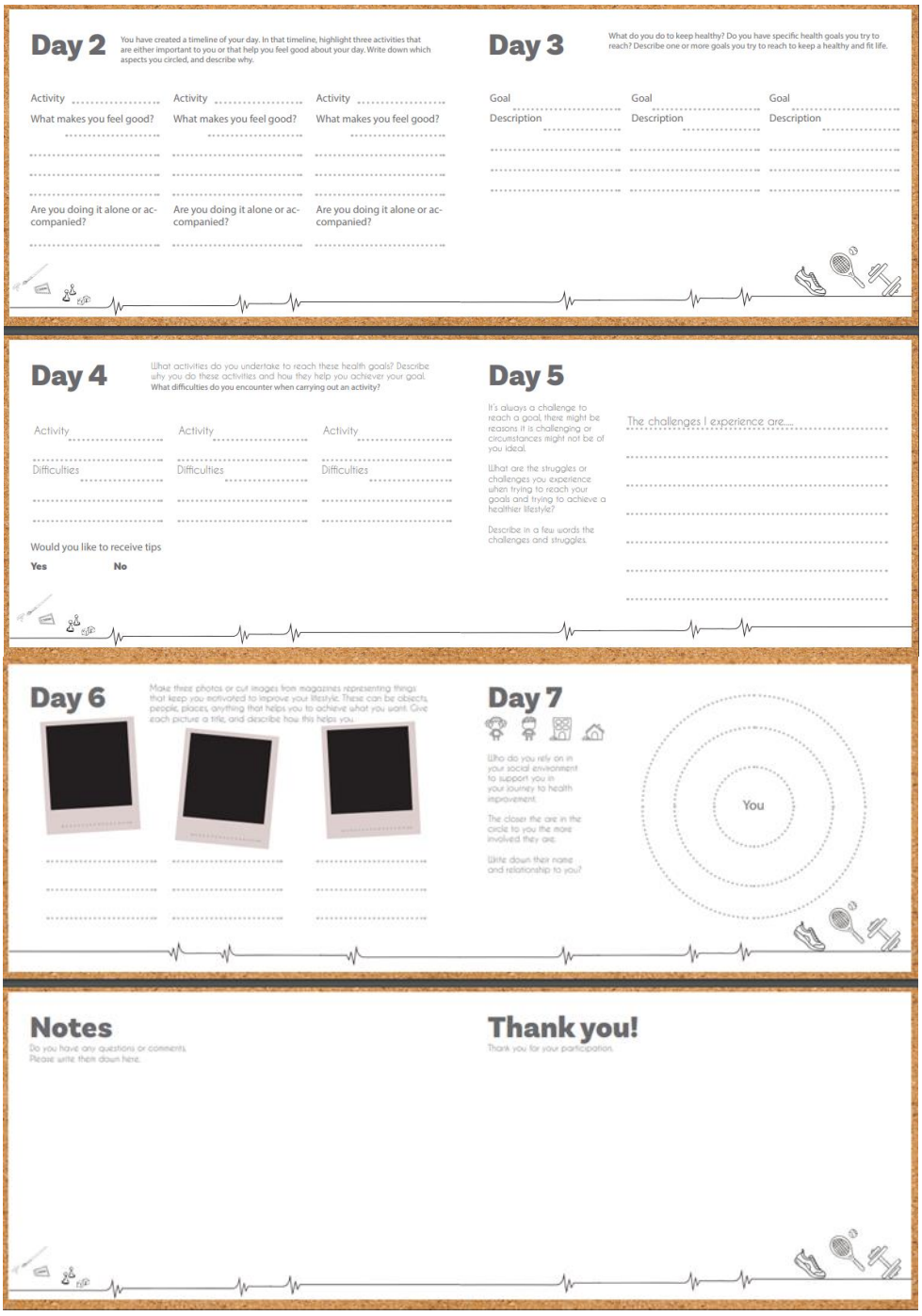
In particular, in the next phase some decisions will need to be made.

- It should be determined the compatibility of an extensive user control (i.e. disabling monitoring) and the technical possibility to furnish relevant, context-aware, and appropriate suggestions to the user;
- It should be determined the technical feasibility and the ramifications of integrating the WellCo platform with external services;
- The whole consortium will need to prioritize the requirement and develop a roadmap for development.

9 Appendix

9.1 WellCo Diaries





Day 2

You have created a timeline of your day. In that timeline, highlight three activities that are either important to you or that help you feel good about your day. Write down which aspects you circled, and describe why.

Activity ..... Activity ..... Activity .....

What makes you feel good? What makes you feel good? What makes you feel good?

Are you doing it alone or accompanied? Are you doing it alone or accompanied? Are you doing it alone or accompanied?

Day 3

What do you do to keep healthy? Do you have specific health goals you try to reach? Describe one or more goals you try to reach to keep a healthy and fit life.

Goal ..... Goal ..... Goal .....

Description ..... Description ..... Description .....

Day 4

What activities do you undertake to reach these health goals? Describe why you do these activities and how they help you achiever your goal.
What difficulties do you encounter when carrying out an activity?

Activity ..... Activity ..... Activity .....

Difficulties ..... Difficulties ..... Difficulties .....

Would you like to receive tips

Yes **No**

Day 5

It's always a challenge to reach a goal, there might be reasons it is challenging or circumstances might not be of you ideal.

What are the struggles or challenges you experience when trying to reach your goals and trying to achieve a healthier lifestyle?

Describe in a few words the challenges and struggles.

The challenges I experience are.....

Day 6

Make three photos or cut images from magazines representing things that keep you motivated to improve your lifestyle. These can be objects, people, places, anything that helps you to achieve what you want. Give each picture a title, and describe how this helps you.

Day 7

Who do you rely on in your social environment to support you in your journey to health improvement.

The closer the are in the circle to you the more involved they are.

Write down their name and relationship to you?

You

Notes

Do you have any questions or comments. Please write them down here.

Thank you!

Thank you for your participation.

9.2 General questions WellCo diary and WhatsApp – Elderlies

I would like to go through the booklet and WhatsApp messages with you and, more in general, know your daily life more in detail. I have some additional questions I would like to ask you.

1) Daily activity and Wellbeing (Day 1 and 2)

Can you shortly explain your day you have written in day 1, and tell me what you have written on diary (*day 2*) and via WhatsApp about the activities you like?

- Can you explain why you chose these activities that are important to you? Why?
- Are there activities that are not in here that you would like to do?

2) Present and future goals aimed at improving your Wellbeing (day 3 and 4)

Can you show me what you have written on the diary (*day 3 and day 4)* and via WhatsApp, what are the goals that you want achieve to keep you healthy and keep your spirits high?

- What motivates you to achieve these goals?
- What activities do you do to achieve your goals?
- What helps you to keep motivated to do these activities?
- Are there some new goals that you want achieve in the future?
- Do you have any health concerns and/or specific illness? What would you like to do in order to manage them?
- Do you have a health problem that limits your autonomy? Does your health allow you to perform household chores? Does your health allow you to perform activities outside your home normally?
- If you could choose, what kind of leisure activities would you like to do? Which of them do you sometimes? What difficulty do you find to be able to do them?

3) Challenges and obstacles for health improvement (day 5)

Now we have discussed the goals I am interested to know what the challenges are that you encounter. Can you tell what you wrote down on the diary (day 5) and why?

- Do you have struggles with achieving your wellbeing goals? If so, what are these struggles?
- Are these struggles connected with your health problems?
- What do you think you would need to keep you motivated to reach your health goal?

4) Lifestyle changes and self-tracking

- What do you do to manage and track your own wellbeing (e.g. clinical diary, health & wellbeing app, wellbeing watch)?
- What information regarding ~~health~~ well-being self-management do you think would be useful for you (to play games to improve your brain training and with social purposes, tips if you want to make a diet, rehabilitation exercises, to go for a walk, social meetings, etc.)?
- If you could get insight into your physical activity what information would you find useful to know? (example: to know the quality of your sleep, to know how many steps you have walked that day, to know your heart rate…)
- Would you be interested in monitoring your nutrition? (To put an example, otherwise "nutrition" is very general concept)
- If you would track your diet, what information would you find useful to know?

5) Motivating objects and people (day 6 and 7)

- Can you show me the three photo's you have selected to paste in your diary? Can you explain each photo? What are the aspects that keep you motivated?
- With whom have you been meeting or had any contact during this week? What was the reason or the purpose of meeting them?

6) Network and health improvement

You have written down the people that are important to you and support you in your diary (*day 7*), can you explain shortly which people you noted down and explain why?

- Can you explain what the people mean to you?
- Can you explain which person is most important and why?
- From whom do you seek/take advice when you want to improve your wellbeing?
    - My partner
    - My friends and family
    - Forums/Groups on the internet
    - My General Practitioner
    - Books/Magazine

1. Do you frequently do activities that you like with other people? Which (specify: leisure, cultural, religious, sports, charitable, etc.) With whom: friends, family, neighbours, professionals, etc. How often (daily, weekly, sporadic …)?

2. Do you usually have your friends around you and share activities to them? In negative case, why? (specify: you have no friends, they have died, etc.)? Do you have good

friends (they care about you, visit you regularly, share with them / activities, support you and / or help with what you need, etc.)

3. Do you consider that your family listens to you, takes into account your opinions, values your abilities, allows you to decide about your life, etc.?

4. Do you usually interact with people around you (receive calls and visits or does he / she visit family, neighbours, friends, etc.)? Do you have a good relationship with them? (Relationships are generally cordial, free of problems, etc.).

5. Do you feel loved by the people around you? Do you think they are waiting for you, visit you, call, etc.? Who are those people for whom you feel wanted (specify) (family, friends, others)?

These questions could be used (if possible) to find out about other aspects linked to the access and enjoyment of sanitary services.

- Do you have easy access to health services? Do you have difficulties receiving the help you need? Do you need other types of healthcare support?
- Does the medical staff who care for you regularly monitor the medicines you take? Do you take the medications prescribed? *(Adherence to pharmacological treatment)*
- Do you follow the instructions your doctor tells you about eating? And what about walking or doing exercise?

9.3 General questions WellCo diary and WhatsApp – Experts/Informal caregivers

I would like to go through the booklet and WhatsApp messages with you and the person you care for, more in general, know your daily life more in detail. I have some additional questions I would like to ask you.

1) Daily activity and Wellness (day 1 and 2)

Can you shortly explain your day (*focusing on the activities that you do together with the client/loved one*), and tell me what you have written on diary (*day 2*) and via WhatsApp about the activities you like?

- Can you explain why you chose these activities that are important to you? Why?
- Are there activities that are not in here that you would like to do together with the person you care for?

2) Present and future goals for the Wellness (day 3)

Can you show me what you have written on the diary (*day 4 and day 5)* and via WhatsApp, what are the goals that the person you care for want achieve to keep him/her healthy and keep his/her spirits high?

- In your opinion what motivates the person you care for to achieve these goals?
- What activities does the person you care do to achieve these goals?
- What helps him/her to keep motivated to do these activities?
- Are there any new goals that in your opinion the person you care for would like to achieve in the future?
- Does the person you care for have any health concerns and/or specific illness? What would he/she like to do in order to manage them?
- DO these health concerns limit his/her autonomy?

3) Motivating objects and people (day 4)

- Can you show me the three photo's you have selected to paste in your diary?
- Can you explain each photo? What are the aspects that keep the person you care for motivated?

4) Challenges and obstacles for health improvement (day 5)

Now we have discussed the goals I am interested to know what are the challenges that the person you care for encounters. Can you tell what you wrote down on the diary (*day 3*) and why?

- Does he/she have struggles with achieving him/her wellbeing goals? If so, what are these struggles?
- Are these struggles connected with him/her health problems?
- What do you think that the person you care for would need to keep him/her motivated to reach his/her health goal?

5) Lifestyle changes and self-tracking (day 6)

In Day 6 you have written down what information you would like to know in order to support the person you care for? Can you tell me what you have written down and why?

- What information would be important for you to support the person you care for?
- What information concerning tracking wellbeing (e.g. clinical diary, health & wellbeing app, wellbeing watch) do you think would be relevant to know?
- What information regarding health self-management do you think would be useful for you and the the person you care for (diets, rehabilitation exercises, etc.)?
- If you could get insight into physical activity of the person you care for what information he/she needs to know to improve his/her health?
- In your opinion, would the person you care for be interested in collecting your nutrition?

- If the person you care for would track his/her diet, what information would you find useful to know?

6) Network and health improvement

You have written down the people that are important for the person you care for and support him/her in your diary (*day 7*), can you explain shortly which people you noted down and explain why?

- Can you explain what the people mean to the person you care for?
- Can you explain what these people mean to you and how they support you in the caregiving process?
- Can you explain which person is most important to you?
- Can you explain which person is most important to the person you care for and why?
- From whom do you seek/take advice when supporting the person you care for in improving his/her wellbeing?
    - Partner
    - Friends and family
    - Forums/Groups on the internet
    - His/her General Practitioner
    - Books/Magazine

9.4 Questionnaire

1. Personal information

Firstly we would like to ask you something about yourself, your daily activities and the use of digital devices.

Name: _____
Age: _____

Gender: M/F

What technological devices do you use? *Select one or more choices*
[ ] Smartphone;
[ ] Tablet;
[ ] Personal Computer;
[ ] Smart-watch.

Do you use any social network (Facebook, Instagram, Twitter, others)?
[ ] Yes
[ ] No

Have you used an application to improve your lifestyle before? If so:
[ ] Which was it?

What did you like about it? _____
What didn't you like about it? _____
What could have been improved? _____

What kind of daily activities do you perform? *Select one or more choices*
[ ] Personal hygiene activities(self-feeding, dressing, cooking, cleaning, shopping, etc).
[ ] Walking;
[ ] Running;
[ ] Cycling
[ ] Others.

Are there specific physical activities you do to improve your health?

_____

If you could get insight into your physical activity what information would you find useful to know?

_____

If you would track your diet, what information would you find useful to know? Do you have any health concerns? Are there specific diseases you would like to prevent?

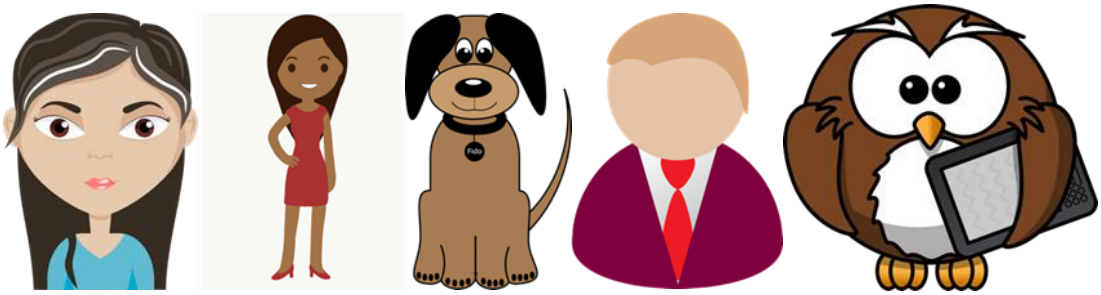
_____

2. Avatar and virtual coach

An avatar is a figure in an application that can support you by providing motivational quotes. WellCo Platform will use avatars. How would you prefer to interact with an avatar?

[ ] Voice based;
[ ] Chat based;
[ ] A combination of both;
[ ] Touch screen interaction;

What kind of virtual coach do you prefer? *Select only one*



[ ] Person with whole body:
[ ] Person with only the face:
[ ] Person with no visual body, ie text-based:
[ ] Animal:
[ ] Other (like a clip in Microsoft office, a wave, a robot, etc.)

If you like the idea of an avatar that looks human, what gender do you prefer for your virtual coach?

[ ] Woman
[ ] Men
[ ] Not relevant

On which devices would you expect to use WellCo? *Select one or more*

[ ] Smartphone
[ ] Tablet
[ ] Computer
[ ] Smart watch

The virtual coach could provide information and suggestions in many different occasion, depending on your needs and interests. How often do you want the avatar to provide recommendations and goals for health promotion? *Select only one answer*

[ ] Sometimes per week
[ ] Once a day

[ ] More than once a day

When would you expect to use WellCo? *Select only one answer choice*
[ ] At my request
[ ] When it detects some activities (e.g. eating, exercising)
[ ] At a pre-fixed time (e.g. every morning before I start my day)
[ ] All day long

Where (what places) would you expect to use WellCo?

_____

WellCo Platform should support you in the improvement of your well-being, setting new goals in different areas of your daily life (in particular: nutrition, physical activities, social relations, self-care). If you would set-up your own goal, which way of rephrasing would motivate you in changing your behavior? (e.g. "Try to reach 10.000 steps". Or "Let's establish a goal a walking 50.000 steps in the following 5 days".)

_____

Avatar could provide you recommendations during the day to support you continuously in health improvement. Would you like to have the possibility to disable temporarily some functions or suggestions of the avatar?
[ ] Yes
[ ] No

3. Devices

Within the WellCo app a wearable device can help you coach your lifestyle and track how you are doing. Which kind of wearable devices would you be willing to wear? *Select one or more answer choices*
[ ] Wristband;
[ ] Smartphone;
[ ] Headsets;
[ ] Neck-Worn Sensor

On which wrist would you wear the wristband? *Answer the question in case you prefer that your wearable device is a wristband.*
[ ] Right
[ ] Left

Would you be willing to wear it on your dominant hand side? *Answer the question in case you prefer that your wearable device is a wristband.*
[ ] Yes
[ ] No

Which kind of wearable devices you wouldn't wear? *Select one or more answer choices*
[ ] Wristband;
[ ] Smartphone;
[ ] Headsets;
[ ] Neck-Worn Sensor

4. Motivations

Sometimes application for improving individual health, use competitive games where the user can compete with him/her friends. These games generally set some goals and, achieving them, the user can earn points seeing the also the scores of other users. Would you feel motivated to change your behaviour through a competitive game?
[ ] Yes
[ ] No

Would you be willing to share your status of goals achievement with the rest of users in the platform?
[ ] Yes
[ ] No

5. Data gathering

In order to provide more detailed and personalized suggestions, WellCo will need to gather data from the users. This data will be stored and used for research but won't be used otherwise.

How would you feel about the coach sending ambient audio to understand your environment when eating to a server to provide a better experience?
[ ] I would feel comfortable
[ ] I would feel uncomfortable

How would you feel to be recorded by a camera, only your face, in order to detect your emotion status (without storing the video) just for online processing?
[ ] I would feel comfortable
[ ] I would feel uncomfortable

How would you be willing to collect nutrition data?
Would you be willing to scan food receipts (e.g. in order to store on the platform your favourite receipts)?
[ ] Yes
[ ] No
A barcode scanner is a device that can identify the nutritional value of packaged food. Scanning barcodes can be done with the camera of your smartphone.
Would you be willing to scan barcodes?

[ ] Yes
[ ] No

A food scanner is a device that can identify nutritional value of fresh food. It's a small handheld gadget that the user brings near the food for a couple of seconds. **Would you be willing to use a food scanner?**
[ ] Yes
[ ] No

Is it okay to ask about what you are eating?
[ ] Yes
[ ] No

If you answered "No", skip 25.5 and 25.6 questions.

How often? *Select only one answer choice*
[ ] Weekly
[ ] At least once a day
[ ] More than once a day

About all food or just most important meals? *Select only one answer choice*
[ ] All food
[ ] Just most important meals

If you use digital food ordering system, would you like the coach to connect to it?
[ ] Yes
[ ] No

Would you like to have the possibility of temporarily disabling any of the monitoring activities?
[ ] Yes
[ ] No

6. WellCo

Explain the general idea of WellCo to the participant
There are some functions we would like to introduce in WellCo and we would like to hear your thoughts about it. WellCo should support you in behaviour change in different area (nutrition, physical activity, self-care, social relations). The Leisure and entertainment functionality provided by WellCo will support interaction with user's close- circle, like family or friends sharing photos, videos, etc. This is made to achieve that the user feels comfortable, essential condition for behavioural change, and to promote user's social-wellbeing through socialization.
In the leisure functionality, would you like to have access to share photos/videos with your family and friends?

[ ] Yes
[ ] No

Any other feature?

_____

For the electronic supporting groups, what kind of video groups do you want to be included?
[ ] Video groups Based on your hobbies (e.g. bricolage, gardening);
[ ] Video groups on city or neighbourhood (e.g. news about your own city, weather forecast)
[ ] Video groups about nutrition (e.g. receipts, diet, rules for a good nutrition)
[ ] Video groups about physical activities (e.g. for sharing images of excursions)
[ ] Video groups about healthcare (e.g. for sharing news and reflections on specific diseases or on well-being and ageing)

How important do you find the following aspects in an application? (scale: 1-5, 1 being not important at all, 5 being very important)

	1	2	3	4	5
That it looks good					
That I can customize the interface to my likes					
That it's social (I can talk to others, chat, message etc.)					
That others use it as well (friends, family)					
That it's easy to use					
That there are a lot of functionalities					
That there are just a few functionalities					

Will you be willing to pay for a service as WellCo with a multidisciplinary team supporting you?
[ ] Yes
[ ] No