PELOSHA

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PERSONALIZABLE SERVICES FOR SUPPORTING HEALTHY AGEING

PARTNERS

CO-FUNDED BY

PELOSHA package basic requirements

Deliverable D1.1

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This deliverable has been produced as part of the PELOSHA project which is co-financed through the AAL Joint Programme, managed by the AAL Association and supported financially by the European Commission within call no. AAL-2017 AAL packages / Integrated solutions. The project is also co-financed by national funding agencies in Poland, Belgium, Switzerland, and Hungary.

This deliverable is confidential / restricted / **public**.

Nature of this deliverable: **Report** / Prototype / Demonstrator / Other

Consortium partners contributing to this deliverable: University Hospitals of Geneva (HUG), Poznań Supercomputing and Networking Center (PSNC), Woonzorgcentrum Sint Jan Berchmans (SJB), terzStiftung (terz)

Version/revision: 1.00

Delivery date: 30.06.2019

Versioning:

Version	Date	Organization
0.5	6.04.2019	HUG
0.8	10.05.2019	HUG
1.00	30.06.2019	HUG, PSNC

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ABBREVIATIONS

AAL	Active Assisted Living
AI	artificial intelligence
GPS	Global Positioning System
HN	Home nurse
IC	Informal caregiver
PELOSHA	Personalizable services for supporting healthy ageing
S	Senior
UI	user interface
UX	user experience

1 INTRODUCTION

The goal of this deliverable is to present the results and conclusions of the user needs analysis performed within the PELOSHA project, as well as the work that was performed in order to obtain those results. Section 2 presents the initial vision of the PELOSHA system, which was developed in order to form a generally defined basis for further actions. Section 3 provides a summary of the results of the performed needs analysis and the conclusions that were drawn from them. The following sections present the performed research in more detail, including its methodology, results, and a discussion thereof.

2 INITIAL VISION OF THE PELOSHA SYSTEM

At the beginning of the PELOSHA project, a literature research was performed in order to preliminarily identify the most common and severe needs of seniors. Taking into account the results of this exercise, as well as the context of the project, an initial vision of the PELOSHA system was developed. Although this vision has since changed in some of the details, it was the basis for preparing the needs analysis described in further sections of this deliverable, therefore it is presented here in its original form.

As people age, they are faced with ever new problems concerning their health and wellbeing. While technology can help seniors cope with many of them, these very problems make it difficult for the seniors to adopt new technological solutions. The PELOSHA project will tackle this difficulty by developing a highly flexible set of services suitable for users from their fifties onwards. This way, they will be able to start using the PELOSHA system while they do not yet find it difficult to learn new technology, and then the system will evolve with their needs as they age. The services will provide comprehensive health and wellbeing management for older adults, so that they will be able to satisfy most common health-related needs.

The package combines different technological components into a coherent system capable of supporting user needs in managing: mental health, physical and functional fitness, social health, frailty prevention and living with chronic illness. The solution will be modular and extendable, meaning it will be possible to add other specialized services into it in the future (e.g. for the management of Alzheimer).

The technologies and devices comprising the base of the various PELOSHA services will be organised into independent modules. A module will be a logical entity able to provide recommendations based on the operation of dedicated hardware (sensors) and software (rules for interpreting the measurements from the sensors). Therefore, from the point of view of the whole platform, a module is an autonomous unit capable of providing a specific recommendation-based service.

The utilisation of PELOSHA services will be managed by the PELOSHA Assistant – an intermediary component between the user and the different modules integrated within the PELOSHA platform. The Assistant will initially determine the general needs of the user based on their age, a set of preliminary measurements from the available sensors and/or a simple questionnaire. Based on this data, the Assistant might recommend obtaining additional modules from the PELOSHA catalogue. Afterwards, the Assistant will query the available PELOSHA modules about the current status of the user and their surroundings. Upon receiving an answer that is unsatisfactory in the context of the previously established personalised goals, the Assistant will send a follow-up request to the module, asking for recommendations for the user. The Assistant will also be able to ask the modules for more specific data or to request that they perform a specific function (e.g. display guidance for an exercise).

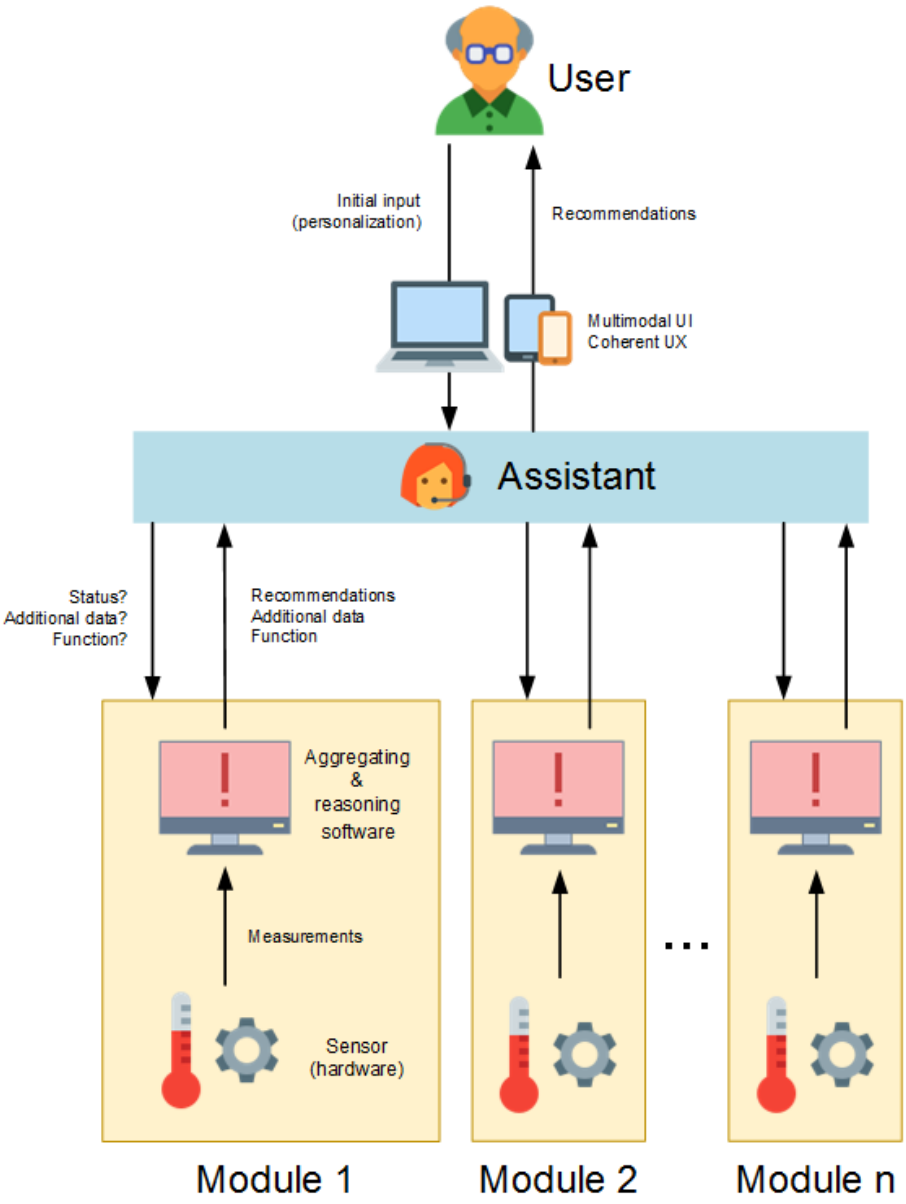


Fig. 1 General architecture of the PELOSHA platform

The modules, on the other hand, will be able to initiate communication with the Assistant whenever the need to send a recommendation arises, e.g. a measured value exceeds a certain threshold. It will be the Assistant's role to decide which recommendations obtained from the modules should be presented to the user, as well as how to combine the data received from different modules. The purpose of such an architecture is to provide the user with a single entry point to the modular PELOSHA services that will assist them in maintaining a healthy, active and happy lifestyle in a seamless and proactive way. This impression of unity will be perpetuated by assuring that the potentially multimodal user interfaces allowing interaction with the PELOSHA Assistant (smartphone, tablet, web app, hardware touch display) will provide a common user experience across the different platforms and devices, including for example such elements as artwork, branding or UX paradigm.

The PELOSHA package will provide the customer with access to a growing set of services that will be relevant for their needs. The comprehensive health, well-being and prophylaxis solution will bring continuous and personalized care. The unified user interface, service catalogue and payment will decrease the effort and learning curve for the primary and secondary users. The personalised Assistant will give users the opportunity to learn of and try out solutions that they might not come in contact with otherwise.

PELOSHA's target group when it comes to primary end users are people aged 50+. They will start out with different sets of services depending on their age and condition. Afterwards, they will continue to utilise the system while aging and the set of services will evolve according to their changing needs, from preserving a good quality of life to managing the difficulties that will arise. The marketing claim of the PELOSHA platform will focus on the positive ways it influences the life of the user - "Assist me in living an active and happy life".

Besides the seniors, another group targeted by PELOSHA are secondary users - formal and informal caregivers. They will benefit from the system's efficiency when it comes to providing comprehensive health and wellbeing services, which will lower their burden. Tertiary end users - institutions like public health service organizers, social security systems or insurance companies will appreciate the lowered costs of providing their services and the role of regular prophylactic operation in delaying or decreasing the number of unwanted medical conditions.

3 METHODOLOGY OF USER NEEDS ANALYSIS

3.1 AIM OF THE RESEARCH

The main goal of the presented user needs analysis is to establish the features that should be incorporated in the PELOSHA system. Those can be divided into 3 categories:

1. Features to include in order to improve senior autonomy
   How to help the seniors to stay at home and be independent as long as possible?
   a. Identify the needs of the older people to be independent
   b. Understand why the seniors cannot be independent anymore
2. Features to include for help the informal caregivers and / or home nurses
   How to help the caregivers or the home nurses to take care more easily of the seniors?
   a. Identify their role
   b. Identify the need of these people to care for seniors
3. Features which already exist
   Identify the features or systems that are already used or exist
   a. Identify if institutions use these systems/features
   b. Understand the utility of these systems/features
   c. Evaluate the appreciation of these systems and identify what can be improved.

3.2 INTERVIEW POPULATION

Each participating partner (HUG, terz, PSNC, SJB) will strive to interview:

- 5 Home Nurses
  - Private care at home
- 5 Informal Caregivers (person close to the elderly person like children, partner, etc., who helps the elderly in their daily life activities)
- 1 Institutions that take care of seniors in assisted home
- 5 Seniors who live at home (private house or in house with assisted living facilities)

3.3 GUIDELINE FOR THE SEMI-DIRECTIVE INTERVIEW

This is the guideline for each interview. This is permitted to have answer at each question presented in the interviews' aims for each participant. And to avoid having different questions for each partner who does the interview.

Preparation:

- Estimated duration of interview: 60 min
- Interview is audio recorded with the participant's agreement
- Choose a calm environment (meeting rooms etc.)

The interview should be conducted according to the following procedure:

1. Presentation of the researcher

"I am a researcher from (name of the institution) for the European project PELOSHA. We want your opinion for this project which aims to develop a system to assist seniors to be independent. I give you more details later."

Sign the consent form (see Appendix A)

"Do you agree if I record this interview ?"

Start the audio recording if the participant has agreed

"To begin, can you respond to this question…"

2. Demographic questions

- How old are you ?
- What is your profession ?
- Gender (not asked, but recorded)

For informal caregivers

- Do you have training to take care of seniors?
- Who help you in this duty?
- What is your experience, in years/months?

For home nurses

- What is your training?
- When have you graduated?
- Since when do you do this job?

For seniors

- Do you have someone who helps you to stay independent? Do you have someone who takes care of you?
- Do you benefit from any home services? Like homes nurses.
  If yes:
  - For what kind of services?
  - Are you satisfied with them?
- Do you use a system helping you stay independent? By system we mean a telealarm (a button on a necklace or a bracelet or other to call emergencies), a system in a mobile phone such as an application, some elements in the home that indicate your presence or the activation of a device (like smoke detection, detection of the opening of the doors, windows etc.)
- Are you familiar with smartphones?

3. Introduction

"As previously explained, we want to have your opinion about a system that we want to develop to assist the seniors to stay independent as long as possible.

We think of a system composed of three components:

- An assistant for the senior, it is a system with which the senior can interact with to maximize his autonomy (for example: by accessing advice about physical exercise, health information, etc.)
- A monitoring system, which provides the assistant information about the situation and allow to do remote monitoring of seniors. For example: fall or blood pressure monitoring

- An administrative system, it's a system that allows caregivers/home nurses to visualize home situation of the seniors."

4. Grid for the semi-directive interview

Start the interview with this grid. The interview begins with the first question (the general question of introduction).

The questions in bold are the questions to ask. The other questions are additional questions to ask if the respondent doesn't respond clearly enough to the first general question.

Table 1 Interview grid for Informal caregivers and Home nurses

Criteria Research	Questions
General question of introduction	**According to what I just told you about the system that we want to develop, can you tell me what you think about it in general?**
Questions about the assistant	
Features to include for help the older people	**According to you, what are the features to include in the assistant to help the senior independent?**
Assistant's utility	How do you imagine these features to help the senior to be independent?
Assistant's usability	Can these features be used easily by older people?
	How should these features be designed and accessed to be easily used by the elderly?
	How you imagine the adequate interaction for including this feature ? For example, in a smartphone ? Tablet ? Laptop ? A box? etc.
Questions about the monitoring system	
Features for help the caregiver or the home nurse	**What are the parameters to include in the monitoring system that you will be interested to observe remotely?**
System monitoring's utility	How these parameters are useful to help the elderly to be independent?
	How these parameters are useful to help you take care of the elderly?
Questions about the administrative system	

Features to include in the administrative system	**What type of system would you like to see?**
Administrative system's usability	**How do you imagine this system?**
General final questions	
Comparison with existing systems	**Are these features / systems already available for the person?**
Usefulness and usability already existing system	Is it useful? Is it used? Why?
Specific needs depending of the disease	**For what type of population? (Dementia, etc.)**
Will you be interested in using this system?	
Final question to conclude and know the most important features to include	**Can you summarize what you think would be the most useful and usable feature in a system helping seniors to stay independent?**

Table 2 Interview grid for seniors

Criteria Research	Questions
General question of introduction	**According to the description of the system that we want to develop, can you tell me what do you think about it in general?**
Questions about the assistant	
Features to include for help the older people	**What threatens your independence?**
	What are the activities of daily life where you would receive support?

	According to you, what are the features to include in the assistant to help you to be independent? (if the senior has no suggestions ask about the functionalities that we foresee for the assistant)
Assistant's utility	How do you imagine these features will help you to be independent?
Assistant's usability	Do you feel confident to use such system?
	What could simplify the use of the system?
	How do you imagine your interaction with the system? (If the senior has no suggestions, give these examples: through a smartphone? Tablet? Laptop? A box? etc.)
Questions about the monitoring system	
Features to help the caregiver or the home nurse	**What (vital) parameters would you be interested to share remotely with informal caregivers or home nurses?**
System monitoring's utility	Why do you think sharing these parameters will help you?
	How will these parameters help the caregivers to take care of you?
Questions about the administrative system	
Access authorization in the administrative system	**Who should have access to this system?**
	What type of information should be accessible to each user?
General final questions	
Comparison with existing systems	**Do you know a similar system/features already available for seniors?**
Usefulness and usability of already existing system	Is it useful? Is it used? Why?
Specific needs depending of the disease	**For what type of population? (Dementia, etc.)**

Will you be interested in using this system?	
Final question to conclude and reveal the most important features to include	**Can you summarize what do you think would be the most useful and usable features in a system helping seniors to stay independent?**
Any other questions?	**Would you like to add anything? Do you have any further questions? Did you enjoy the interview and was its form clear for you and easy to follow?**

To identify the needs and the features to include in the PELOSHA system, the interview results need to be analysed.

3.4 ANALYSIS STEPS

For do the analysis we follow these steps.

1. Transcript each interview

2. First lecture and establishment of statement list

- Highlighting what you feel is important in the transcript
- Write down these ideas in the form of a memo
- Summarize the ideas you have collected thus far

3. Begin to code your data

- Memo become category/concept
- Give a label to a segment text
- Literal code becomes analytical categories (for example: “need to have more time for himself” → “informal caregivers need: time”)
- Assembled analytical categories into a guide of analysis and coding. This contains detailed descriptions of each category with subcategories and its definition (see provisional guide of analysis)
- Code each interview with this guide

4. Quantifying analysis

Presentation of results in the form of tables:

- Indication of frequencies in individual analytical categories identify in each interview
- Frequencies must be presented for each interview and for all interviews (one table by interviews and on the table with the frequencies for all interviews)

5. Results interpretations

Results interpretations according to the analysis

(For more details see:

Hesse-Biber, S. N., & Leavy, P. (2010). *The practice of qualitative research*. Sage. p. 343

Flick, U., von Kardoff, E., & Steinke, I. (Eds.). (2004).*A companion to qualitative research*. Sage. p. 254)

3.5 GUIDE FOR ANALYSIS

For the analyses, we can extract this guide of analysis with analytical categories in function of our hypothesis and aims.

Table 3 Guide for the analysis of interview results

Category	Sub-category	Definitions
Senior autonomy	Senior need to be independent	For example: fall detection
	Factor explains why senior cannot be independent	Reasons that explain why senior go to nursing home.
Features to help the home nurses	Home nurse role	Home nurse role to take care of the senior and permit his autonomy
	Home nurse needs	Home nurses need to help her to take care of the senior
Features to help the informal caregivers	Informal caregiver role	Informal caregiver role to take care of the senior and permit his autonomy
	Informal caregiver needs	Informal caregivers need to help her to take care of the senior
Assistant utility		Assistant utility for the senior. For example: can be taken care of quickly after a fall.
Assistant usability	Used easily by older people	Features that can be used easily by the senior. For example: GPS is easy to use.
	Features design and access	Design and access imagine by the respondent for the assistant are usable For example: do not use touch function
	Interaction includes	For example: in a tablet, smartphone …
System monitoring features to help the		For example: health monitoring for gain time

home nurses		
Features to help the informal caregivers		For example: health monitoring to reduce his stress
System monitoring's utility	Useful for the home nurse / doctor	Features that are useful for the home nurse (for example: health monitoring)
	Useful for the informal caregiver	Features that are useful for the informal caregiver
	Useful for the senior	Features that are useful for the senior
Features to include in the administrative system		For example: temperature detection in the house
	Type of information should be accessible to each user (for senior)	For example: health information only for home nurses
Administrative system's usability		For example: receive an alert when the temperature is too cold or too hot
	Who should have access to this system (for senior)	For example: only informal caregiver and home nurses
	How person can have access (for senior)	For example: have access in their home with a website
Existed system	System utility	For example: alarm the medical service
	System usability	For example: a button on a collar to alert the medical service
	Positive / negative appreciation	For example: useful but not used because people forget to wear it
For specific population		Features for specific populations. For example: GPS is useful for elderly people with dementia.

4 RESULTS OF USER NEEDS ANALYSIS

This analysis permit to extract the features to include in the PELOSHA system. By calculating the frequency of each feature or needs mentioned by the respondent we can identify the priority to include in the PELOSHA system.

We can also extract the problems of existing systems to avoid repeating the same problem.

Key:

IC: Informal Caregiver

HN: Home nurse

S: Senior (senior is used here as a general term for elderly people)

CH: Switzerland

PL: Poland

B: Belgium

4.1 RESULTS FOR INFORMAL CAREGIVERS

Table 4 Informal caregivers - democgraphic measurements

Participant identification	**IC1**	**IC2**	**IC3**	**IC4**	**IC5**	**IC6**	**IC7**	**IC8**	**IC9**	**IC10**	**IC11**
age	30	58	59	75	52	51	67	53		71	79
gender	M	F	F	F	F	F	F	F	F	F	F
profession	student	governess	pharmacist	Psychologist	housewife	Nurse	economics technician, retired	teacher		aviation	Nurse
formation	no	no	no	no	no	Nurse	none	none		no	yes
other people for help	home services	senior's partner, IMAD	only home help	home services	home services 24h/24	Other siblings	no	husband	home services, family	home services, family	daughter

		(home services)									
since when	3 years	3 years	5 years	10 years	4 years	Several years, when mom died	few months	5 years			2 years
which person she is taking care of	couple of senior	now his stepmother	mother, 90 years	her husband	her parents	father	brother	mother	her stepmother	her mother	her demented husband
Country	CH	CH	CH	CH	CH	B	PL	PL	CH	CH	CH

Table 5 Features to help the Informal Caregiver

Features to help the IC	**Number of IC who have mentioned this features**	**Country**	**Priority for the IC**
Medical information access (prescription, check-up, medical file)	3	CH	High
A box for keys with a code (prevent the door from being broken by emergencies)	3	CH	Medium
Emergency or professional people go directly when alarm ring	2	CH	Medium
know home services the senior could have	2	CH	Low
Inclusion IC in the medical system	1	CH	High
Psychological formation, advice for help to take care of the senior	1	CH	Medium
Communication with the doctor	1	CH	Medium

GPS for find senior	1	CH	High
Senior have false hunger and go to eat a lot during the night => alarm if he leaves is room	1	CH	Low

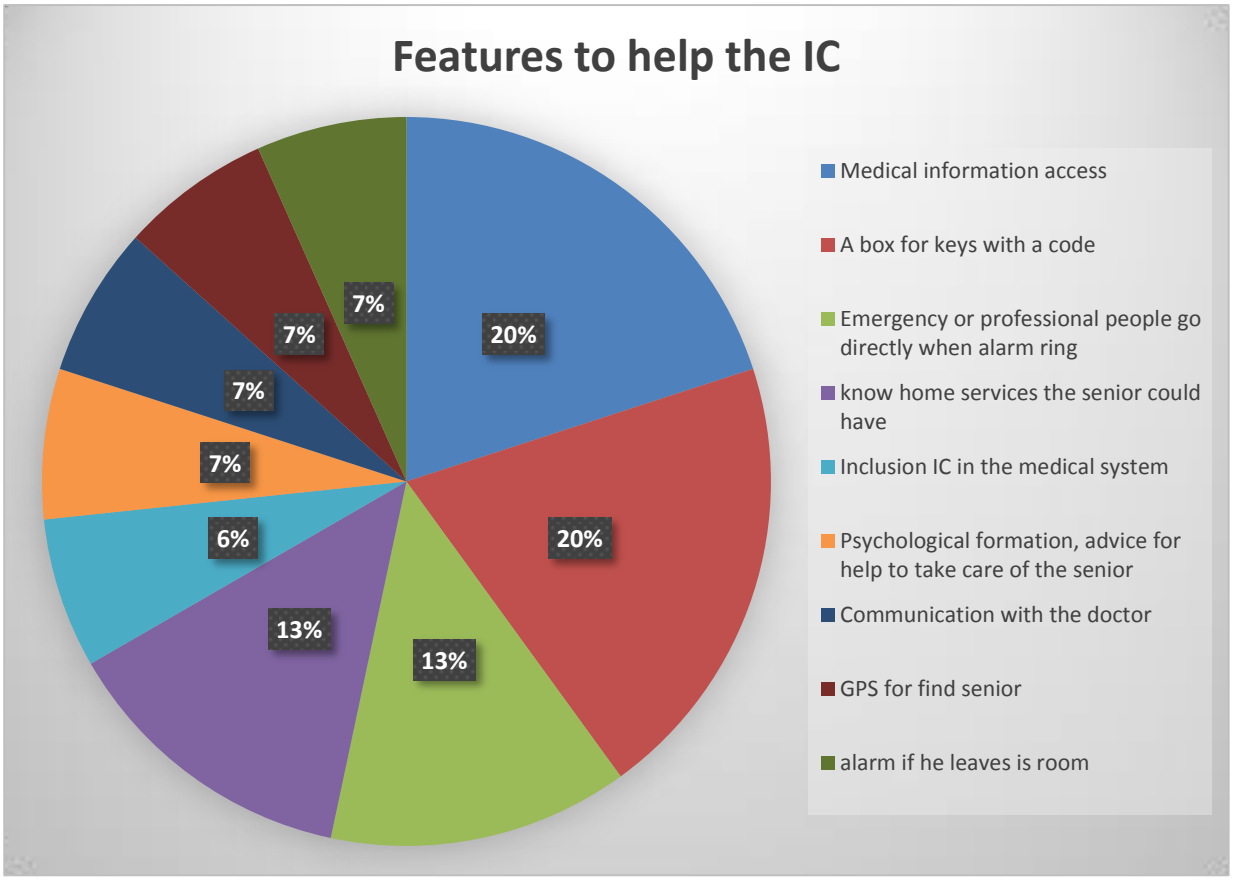


Table 6 Features to help the IC in the monitoring system

Features to help the IC in the monitoring system	Number of IC who have mentioned this features	Country	Priority for the IC
Fall detection	7	CH, PL	High
GPS for locate the senior	5	CH, B	High
Access to the pulse, blood pressure	3	CH, PL,	High
Taking medication	3	CH	High

Smoke detection	3	CH	High
Move detection	2	CH, PL	Medium
Access to medical file	2	CH	Medium
Agenda (with appointment)	2	CH, B	Low
Eating and drinking monitoring	2	PL	Medium
Gas detection	2	CH	Low
Bed sensor	1	CH	Medium
Camera*	1	CH	Low
Luminosity (light on when senior move during the night)	1	CH	Low
Link with home services	1	CH	Low
Know if senior is at home	1	CH	Medium
Talk back system	1	B	Low
If S lock the front door	1	CH	Low

*Camera is not well perceived, it's considered to violate the seniors' intimacy

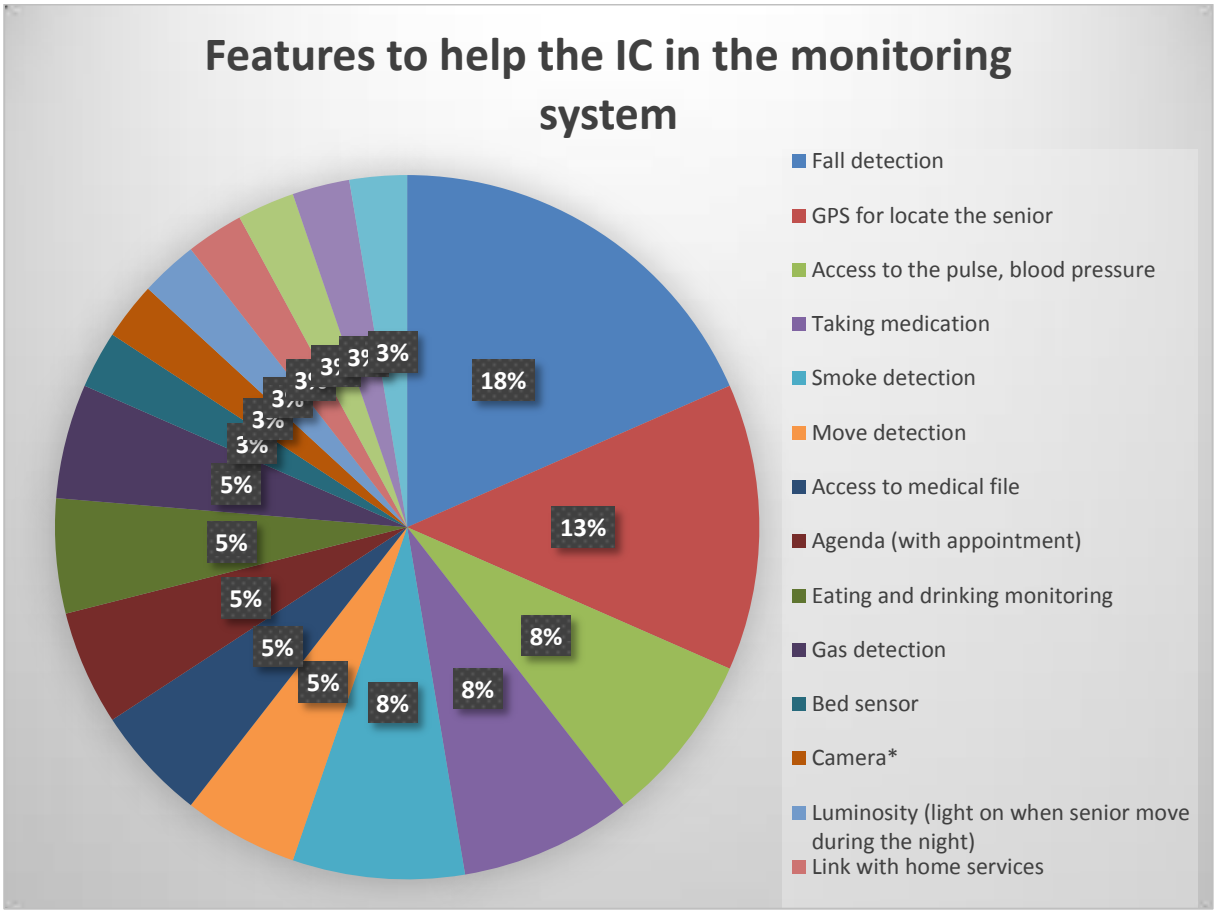


Table 7 Features to include for the IC in the administrative system

Features to include for the IC in the administrative system	Number of IC who have mentioned this features	Country	Priority for the IC
Analysis health situation (take medication, vital sign, graph with evolution etc.)	3	CH	High
Access shopping list	2	CH	Low
Medical information for medical services	1	CH	Low
Edits functions in the agenda	1	CH	Medium
Alarm for health problems (hypertension, heart etc.)	1	CH	High
Not the IC go to check when alarm is activated	1	CH	Low

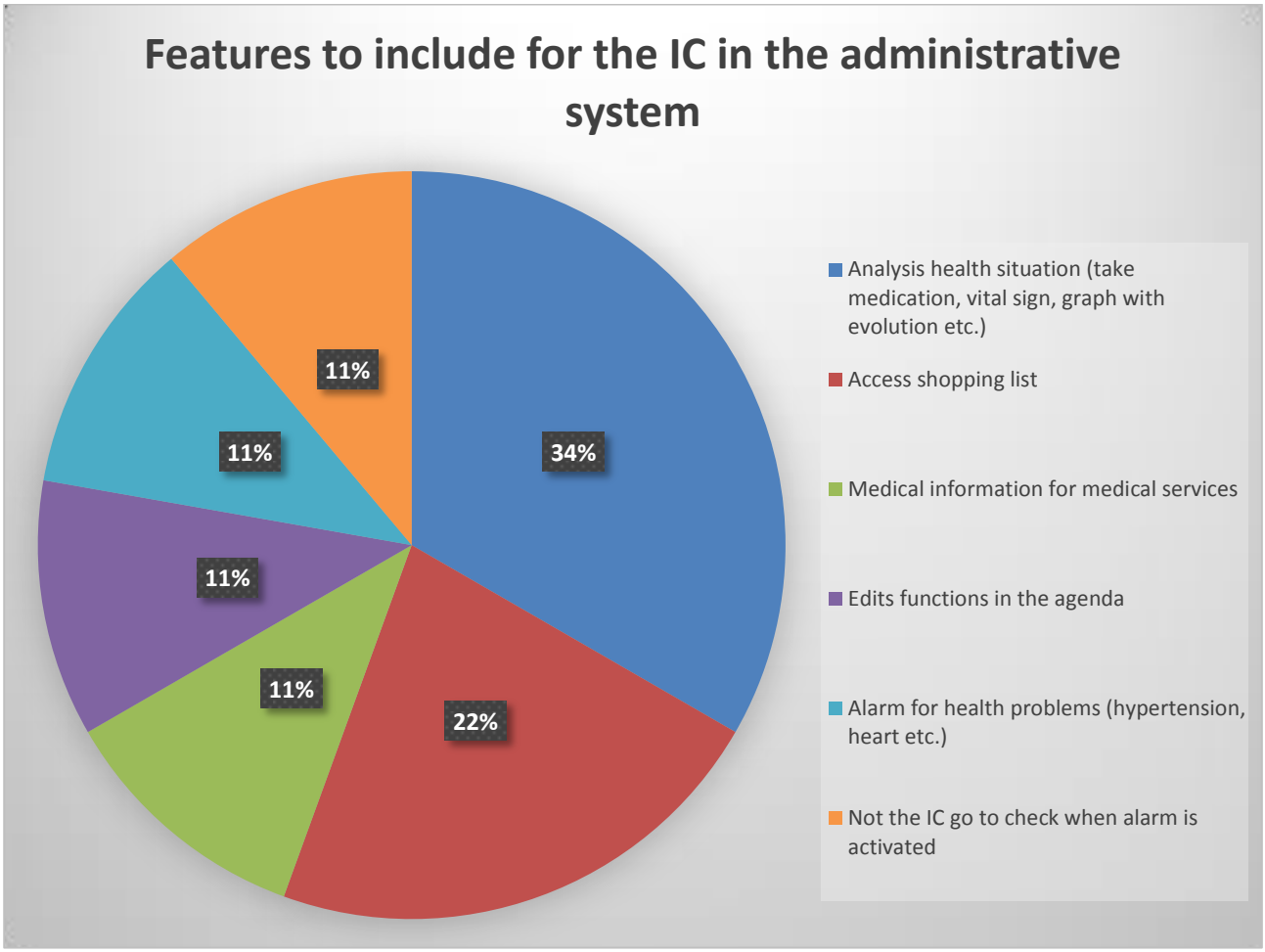
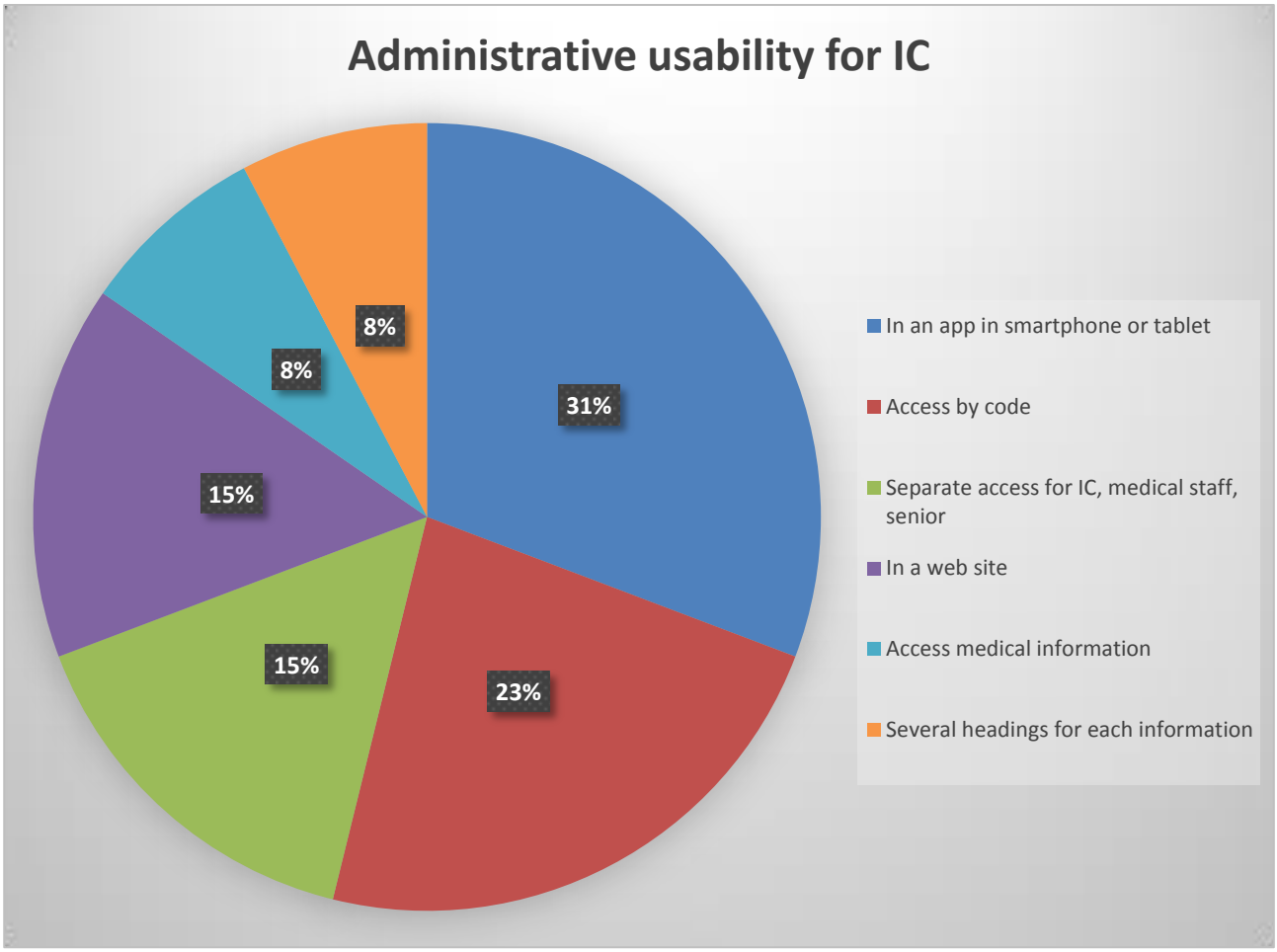


Table 8 Administrative usability for the IC

Administrative usability for the IC	Number of IC who have mentioned this features	Country	Priority for the IC
In an app in smartphone or tablet	4	CH, PL	high
Access by code	3	CH	high
Separate access for IC, medical staff, senior	2	CH, PL	medium
In a web site	2	CH	low
Access medical information	1		low

Several headings for each information	1	CH	low



4.2 RESULTS FOR HOME NURSES

Table 9 Demographic measurements for Home Nurses

Participant identification	HN1	HN2	HN3	HN4	HN6	HN7	HN8
age	63	43	60	58	56	29	53
gender	F	F	M	F	F	F	M
profession	home nurse	home nurse	home nurse	home nurse	Nurse	Nurse	Nurse

formation	nurse formation, degree in therapeutic education and certificate on mental disability	nurse and specialization in intensive care	nurse	nurse	Nurse	Nurse	Nurse
When graduated	1972, 1996, 2003	1999 and 2002	1983	1882	2001	2012	1990
since when do this job	since 2016	2006	2015	1995	2001	2018	2011
Country	CH	CH	CH	CH	B	B	B

Participant identification	**HN9**	**HN10**	**HN11**	**HN12**	**HN13**	**HN13**
age	51	31	39	46	25	40
gender	F	F	F	F	F	F
profession	Nurse	social worker	head of the social-therapeutic team	therapist	therapist	home nurse
formation	Nurse	rehabilitation pedagogy, philosophy	pedagogy	musician	pedagogy	nurse
When graduated	1989	2011, 2013	2004	1996	2016	2000
since when do this job	1991	4 years	3 years	20 years	3 years	2015
Country	B	Pl	PL	PL	PL	CH

Table 10 Features to help the Home Nurses

Features for the HN in the monitoring system	Number of HN who have mentioned this features	Country	Priority for the HN
Have health measure (patient can indicate health measures, permit to the HN avoid traveling in emergency) • Weight • Blood pressure • Temperature • Pain assessment • Glycemia (diabetic patient) • Intestinal transit • Urinary removal	9	PL, B; CH	High
Blood pressure	7	PL	High
Have app or rubric with all the medical files (like prescription, doctor notes etc.)	7	CH, B	High
Fall detection automatic	6	PL, B	High
Talk back function, HN and senior can communicate like a phone	4	CH, B	High
GPS to locate senior	3	B, CH	High
Smoke detector	3	PL,	High
Gas detection	3	PL,	High
Heartbeat is not useful except particular disease	2	CH,	Medium
Detection if seniors are outside or in his home	2	CH,	Medium
using home appliance by the senior (fridge, gas etc.)	2	CH, B	Medium
Take medication detector	2	CH	Medium
Detect neurologic attack (cardio vascular accident)	1	CH	High
Talk function, patient can send voice message about his situation	1	CH	Medium

Check social isolation (see if senior contact his family)	1	CH	Low
Access to an agenda with the appointment and visit of the home services for the senior	1	CH	Medium
Exit alarm, if seniors leave his home	1	CH	Low
Temperature inside	1	PL	Low
Behaviour monitoring	1	CH	Low
Sleep monitoring	1	CH	Low

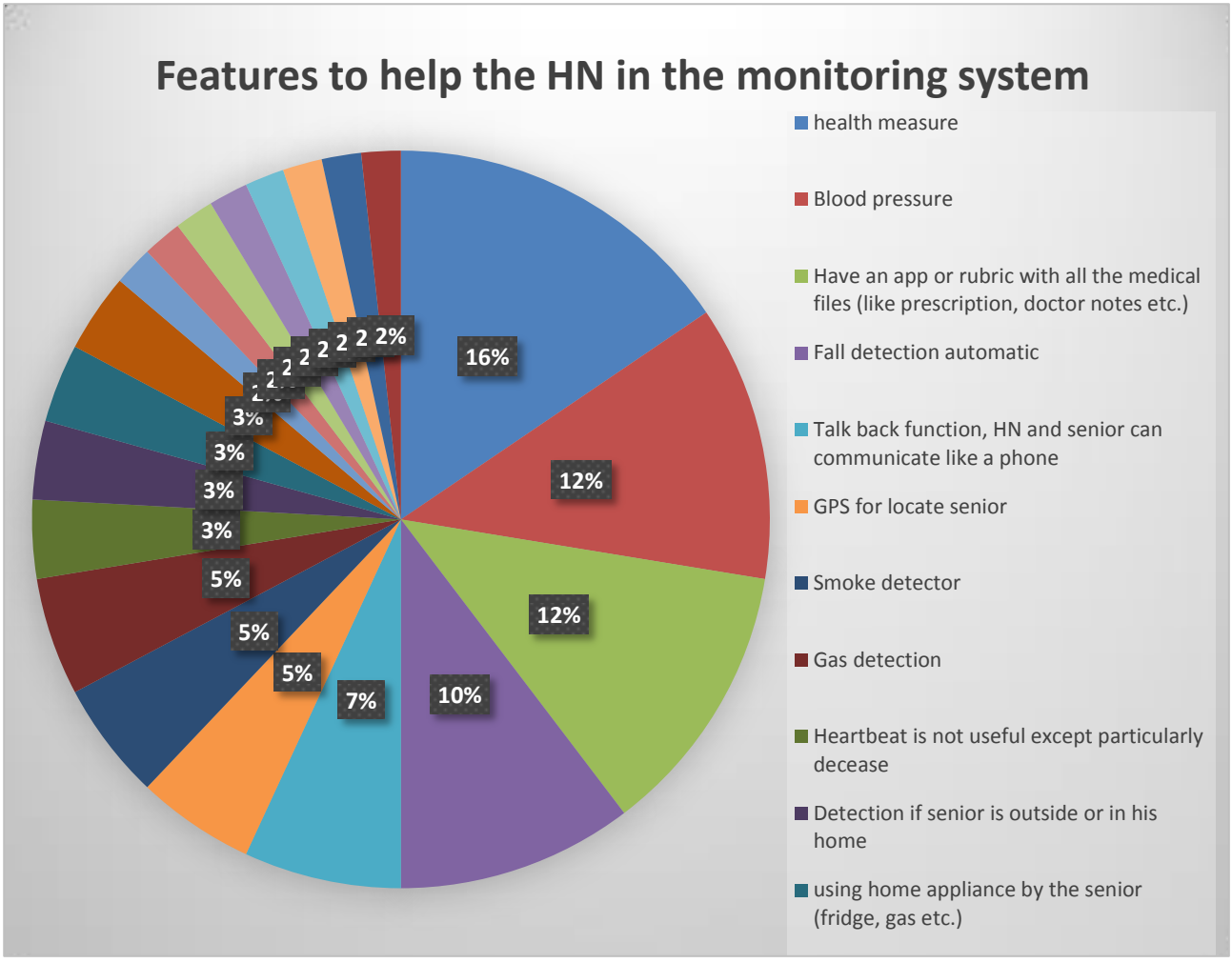


Table 11 Features for the HN to include in the administrative system

Features to include in the administrative system for	Number of HN	Country	Priority

the HN	who have mentioned this features		for the HN
Receive notification in the smartphone if a problem is detected	4	CH, B, PL	High
HN can indicate the HN who replace him when he is not available (deviate alert to the replacement)	2	CH	high
Have a counsellor who can talk and reassure senior when he calls for a problem, can also check the camera	2	CH	medium
Communication with the doctor with system like WhatsApp	2	CH	Medium
Activate alarm for recall to the senior (eat, take medication, close the door)	2	CH	High
Home service can indicate when they will arrive (if they have late)	2	CH	low
Change the emergency numbers (change number of IC to contact)	1	CH	Medium
Add appointment in the agenda	1	CH	High
Have a journal with notes of the home services, HN, doctor etc.	1	CH	High
Print info to the journal	1	CH	Medium
Level emergency call, when call the HN indicate if it is an emergency	1	B	medium
Charts with an overview of the past month	1	B	low
Reminders about what needs to be done for the senior	1	PL	medium
Error notification when something is wrong in the system	1	PL	High

Communication with the IC	1	CH	low
Access to important papers (like id card)	1	CH	low
Advance directive to the person (what is the directive if the S is in serious condition) *	1	CH	low
Communicate prescription to pharmacy	1	CH	low

*It is directive that the S give to someone to indicate what he wants if he is in a serious condition of illness (like coma).

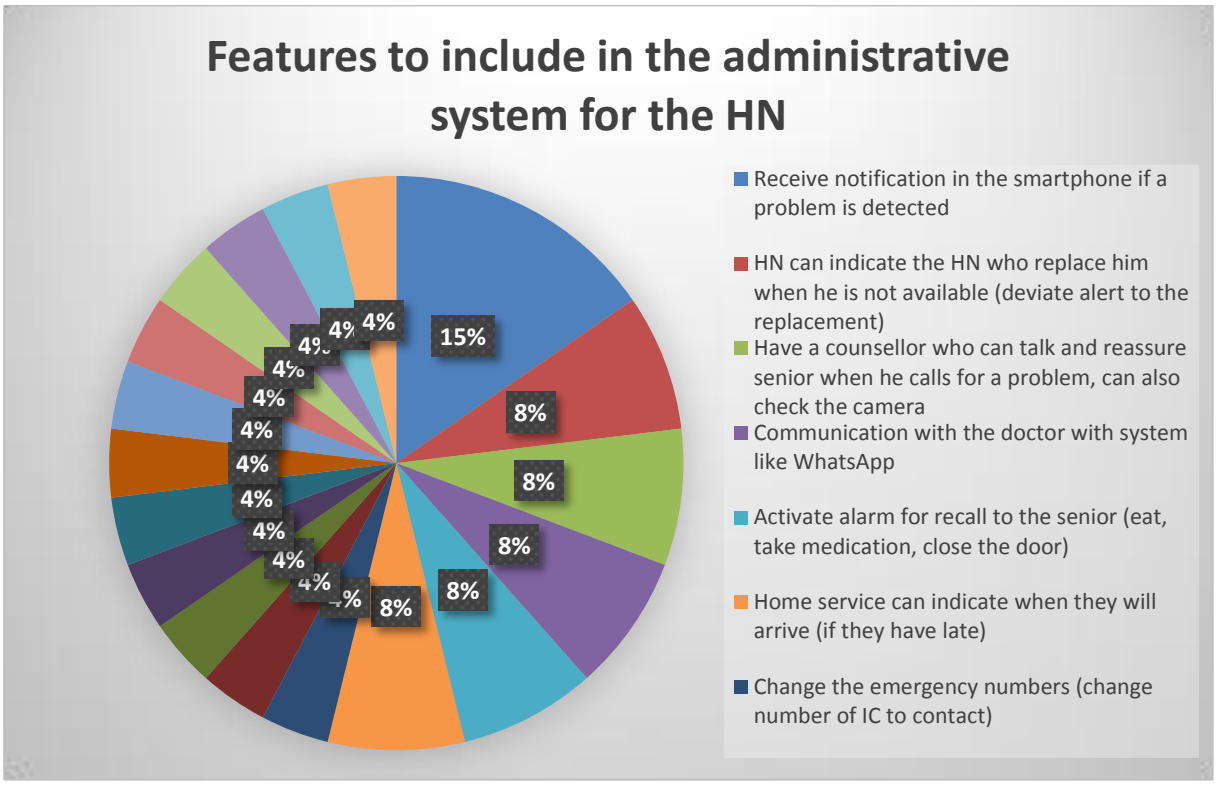
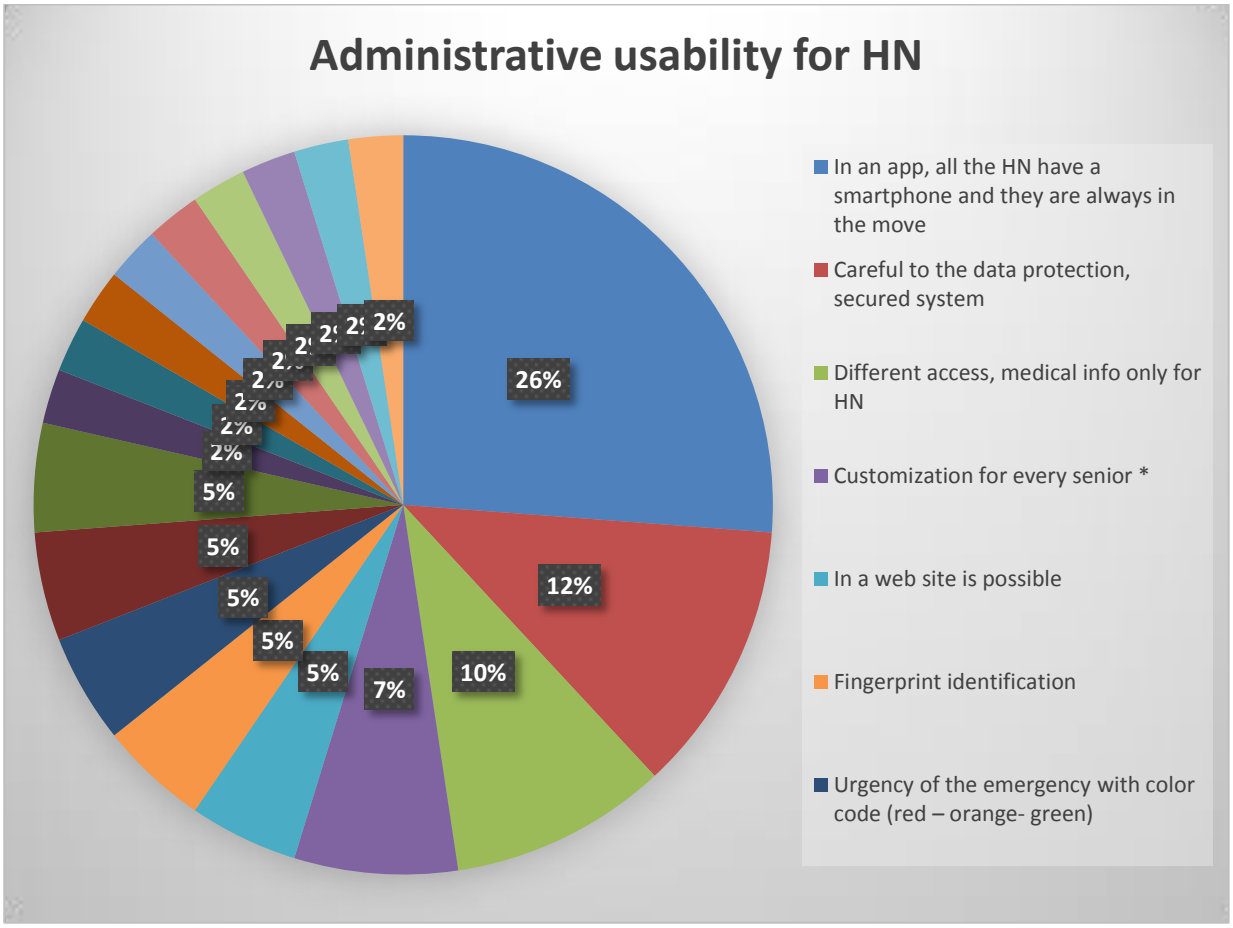


Table 12 Administrative usability for the HN

Administrative usability for HN	Number of HN who has mentioned this features	Country	Priority for the HN
In app, all the HN have a smartphone and they are always in the move	11	CH, PL, B	High

Careful to the data protection, secured system	5	CH, B	high
Different access, medical info only for HN	4	CH	High
Customization for every senior *	3	CH	high
In a web site is possible	2	CH	low
Fingerprint identification	2	CH	Low
Urgency of the emergency with color code (red – orange- green)	2	CH	Medium
Alarming emergency services	2	PL,	medium
Chose what kind of vital sign the HN want to check	2	CH	Low
Several people who receive alarm notification (IC and HN)	1	CH	Medium
Send notification directly to the person	1	CH	low
Insert medical info quickly and easily	1	CH	Medium
Restriction access for some user, he can read but not write	1	CH	low
System has work with no false alarm	1	B	High
Something simple, easy, good overview	1	B	High
Access with password	1	PL	high
Connected to existing systems (system HN use in the enterprise, with health measure taken and prescription)	1	CH	medium
Receive alarm only if health information exceeds a threshold set by the doctor*	1	CH	medium

*HNs don't want to have access to all health information, because "too much information kills the information". The relevant information will be drowning amid other irrelevant information, and HNs don't have time to see each information.



4.3 RESULTS FOR SENIORS

Participant identification	S1	S2	S3	S4	S5
age	73	81	80	53	89
gender	male	male	female	male	male
someone help to be independent	family (daughters), social workers from nursing home	no	husband	yes	no
benefit home services	no	no	yes	yes	no
what kind of home services	-	-	personnel of the nursing home	there's a nurse at the nursing home he can go to if needed	no
satisfied by	-	-	yes	he can't tell	no

home services				because he doesn't use the services often	
have a system helping remain independent	no	no	emergency buttons (on the wall and by the bed), smoke detector	emergency button on the wall in the room, smoke detector	emergency button on the wall (but he doesn't use it), smoke detector
familiar with smartphone	has a smartphone but only uses it for phone calls	no	yes	yes	no
Country	PL	PL	PL	PL	PL
Participant identification	**S6**	**S7**	**S8**	**S9**	**S10**
age	87	85	89	89	87
gender	M	F	F	F	F
someone helps to be independent	Daughter, nurse, cleaning lady	Daughter, nurse, cleaning lady	cleaning lady and son	nurse, cleaning lady, son and daughters	not really
benefit home services	yes	yes	yes	yes	yes
what kind of home services	Nurse (daily), cleaning lady and wife	Nurse, cleaning lady and husband	cleaning lady and son	nurse, cleaning lady, son and daughters	Cleaning lady
satisfied by home services	yes	yes, but worries a lot (she knows she has dementia)	yes, but worries about the groceries. She misses her car since 2 months)	yes	yes
have a system helping remain independent	emergency button	emergency button, timer on cooking fire	emergency button	emergency button	emergency button
familiar with smartphone	no	no	no	no	no
Country	B	B	B	B	B

Participant	**S11**	**S12**	**S13**	**S14**	**S15**

identification

age	93	88	84	92	97
gender	F	F	M	F	F
someone help to be independent	her daughter	her stepdaughter	his son and daughter	her sons and stepdaughter	her daughter
benefit home services	yes	yes	yes	yes	yes
what kind of home services	cleaning home, cook	cleaning home	cleaning home	cleaning home, walking, shower	cleaning home and company
satisfied by home services	yes	moderately, she goes with it	yes	moderately for the cleaning home	yes
have a system helping remain independent	teleassistance	teleassistance	no	teleassistance	teleassistance
familiar with smartphone	no	no	no	no	no
Country	CH	CH	CH	CH	CH

4.3.1 FEATURES TO HELP THE SENIORS

The following desired features of the system for Seniors have been indicated by the Seniors, Informal Caregivers and Home Nurses.

Table 13 Features to help the Seniors in the assistant

Features to help the Seniors in the assistant	Number of participants who have mentioned this features	Country	Priority
Fall detection	21	CH, B, PL	High
Physical exercise	10	PL, CH, B	High
Vocal function	9	CH	High
Recall take medication (with an alarm)	7	CH, B	High
Talk back function, talk with the HN	7	B, CH	High
Blood pressure monitoring	6	PL,	high
No camera	5	CH, B, PL	High
Smoke detector connected	5	CH	high
Appointment recall	4	PL	High
Detector electronic device	4	CH, B	Medium
Recall agenda	4	CH	High
Gas detection	4	PL, CH; B	Medium
GPS for be localized	3	B	High
Panic button	3	B	High
See health parameters	3		Low
Diet information	3	PL	Low
Call easily contact to closest family, like phone numbers	3	CH, PL	High
Fall detection outside with localisation	3	CH	High
GPS that indicate how to return to the home	3	CH	High

Recall eat and drink	3	CH	medium
Information about the weather	3	PL	Low
Panic button	2	B, PL	Medium
Talking clock	2	B	Medium
Help for groceries	2	B, CH	Medium
Computer lessons	2	PL,	Low
Body temperature monitoring	2	CH	Medium
Heart monitoring	2	PL,	high
Emergency contact	2	PL, CH	High
Cognitive functions training	2	PL	Medium
access information about the situation and senior's personal data in case of getting lost	2	CH	Medium
weight	2	CH	Low
Shopping list	2	CH	Low
Order meal, groceries	2	CH, B	Low
Recall events senior can go to	2	PL, CH	low
Alarming emergency services	2	CH, PL	Medium
Watch say the agenda	2	CH, PL	Low
System for find important objects like the keys	2	CH, PL	Medium
Panic button at 30 cm from the floor	1	B	Medium
Recall taking blood pressure	1	CH	High
Medicine suggestion	1	PL	Low
Prescription delivery	1	PL	Medium

Access new music	1	PL	Low
Senior care about entertainment the most	1	PL	Low
Air quality outside	1	PL	Low
Air quality in the room	1	PL	Low
glycemia monitoring	1	CH	Low
teleconference	1	PL	Low
Internet network to communicate for all people who use PELOSHA	1	PL	Low
Parameters report to print out	1	CH	Medium
Temperature outside /inside	1	PL	Low
pedometer	1	PL	low
Contactless payment	1	CH	Low
Window blind automatization	1	CH	Low
Exchange platform for create social link	1	CH	Medium
Recall contacting his family	1	CH	low
camera	1	CH	low
Senior stop the alarm for the recall when he has make the action	1	CH	Medium
Recall close the door	1	CH	low
Watch alarm not wear	1	CH	low
Signalling a need for bathroom	1	PL	Low
Water detection	1	PL	low

*Alarms for the recall can say what is it, for example “take your medication” “close the door”, “you have an appointment with the doctor” etc.

Table 14 Features used easily by the senior, features design and access

Features used easily by the senior, features design and access	Number of participants who have mentioned	Country	priority
Fall detection automatic	18	CH, B	high
Vocal function	9	CH	High
Mobile phone adapted for senior	3	CH	High
No internet	3	CH	High
Difficulty with new technology	3	CH	High
System wear permanent	3	CH	High
Large element	3	CH, B, PL	high
No informatics	2	CH	High
Big button	2	CH	High
Automatic system	2	CH	High
No button	2	CH	Medium
Few buttons	2	PL, CH	Medium
Big screen	2	PL	Medium
Simple icons	2	PL	High
Teach the senior how to use it	2	PL	High
Touchscreen	2	PL	Medium
No computer	2	CH	Medium
Call button	1	CH	High
Insert easily health measure	1	CH	Medium

Evolve system with the senior's difficulty	1	CH	High
One button max	1	CH	High
No pulse access (anxious)	1	CH	low
Several languages	1	CH	High
No search information	1	PL	Low
No mouse no keyboard	1	PL	Low
Panic button	1	B	High
Labels element	1	PL	medium

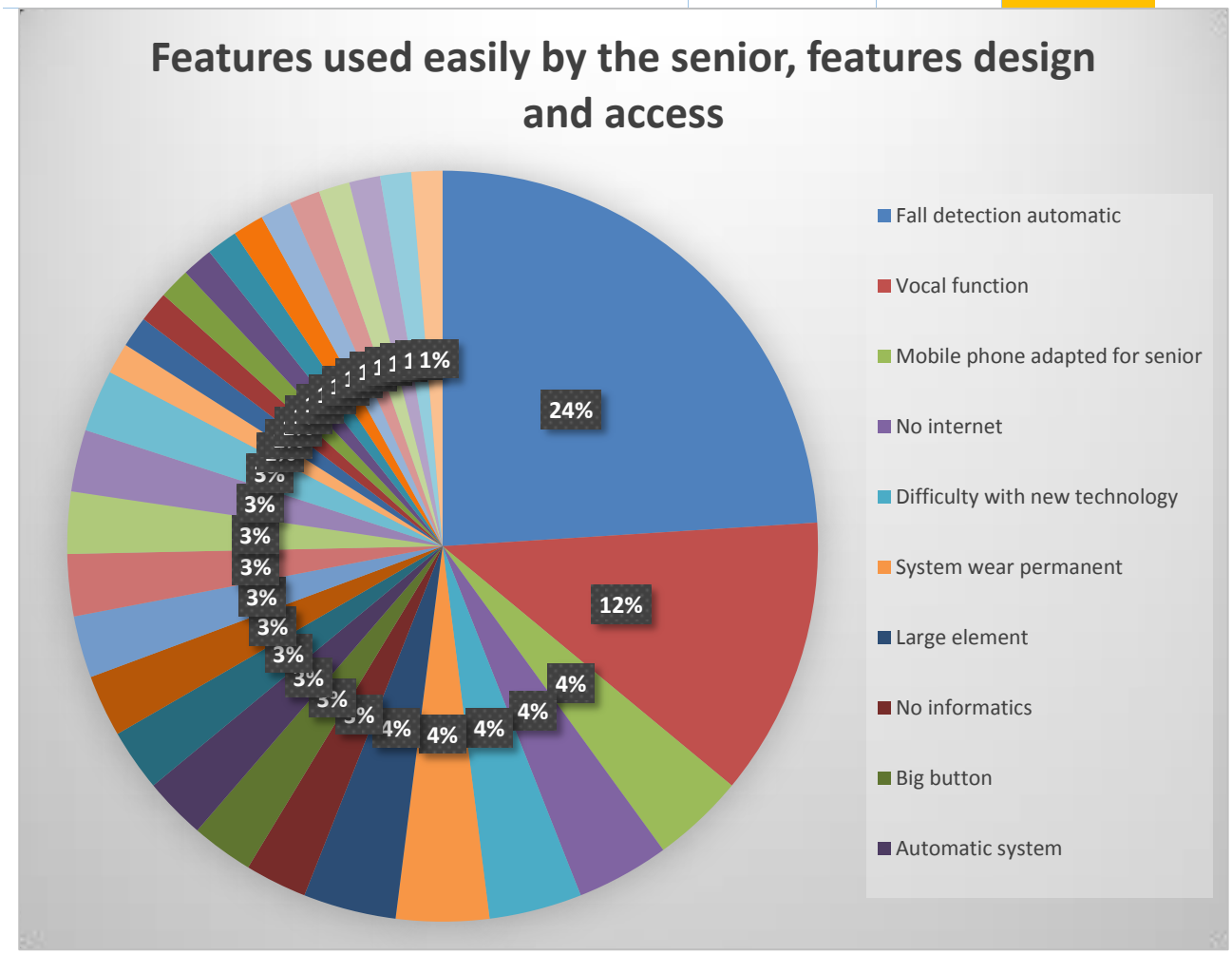
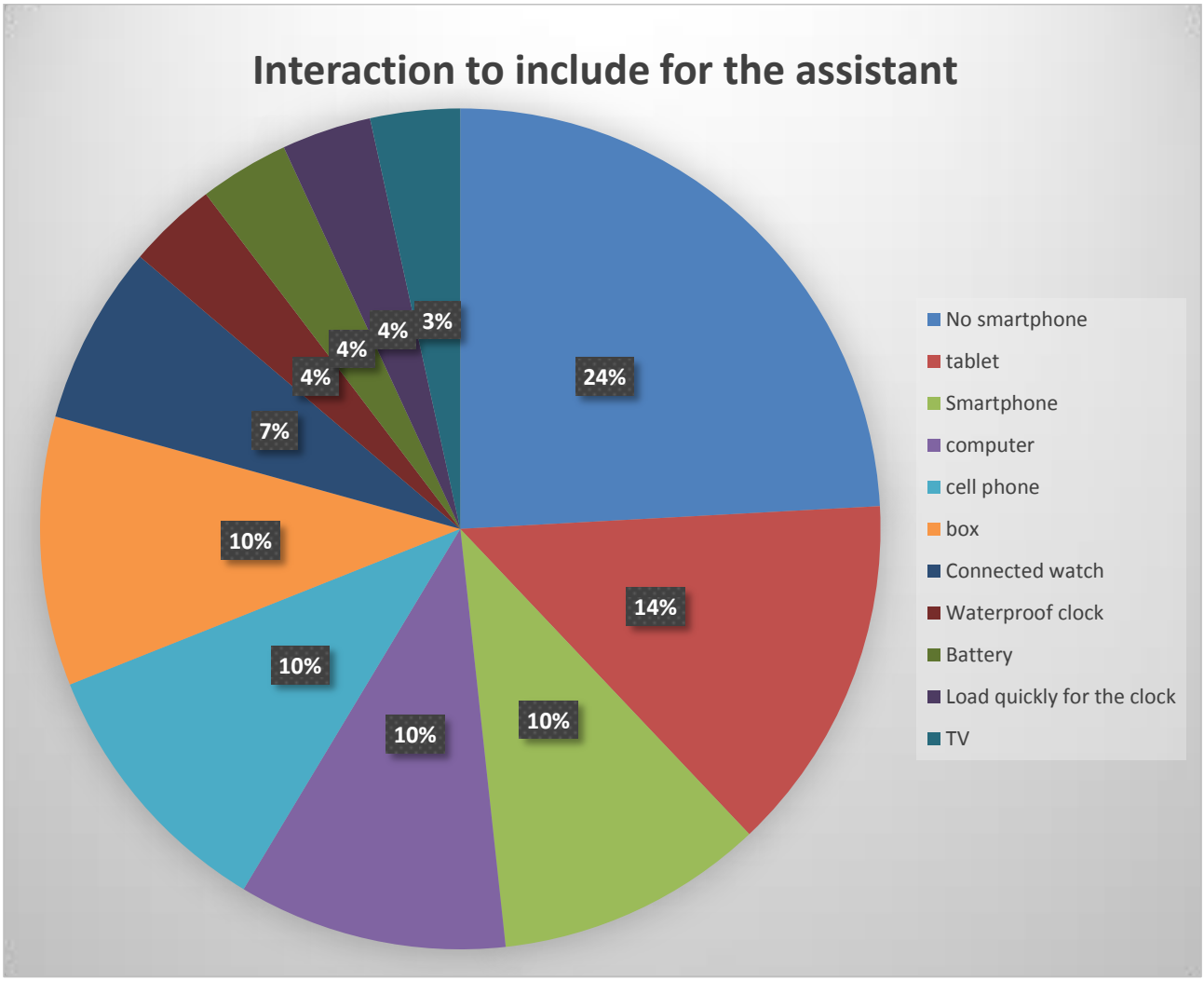


Table 15 Interaction to include for the assistant

Interaction to include for the assistant	Number of participants who have mentioned	Country	priority
No smartphone	7	CH, B	High
tablet	4	CH, PL, B	Medium
Smartphone	3	PL	low
computer	3	PL	Medium
cell phone	3	PL	low
box	3	CH, PL	Low
Connected watch	2	CH, B	high
Waterproof watch	1	CH,	high
Battery	1	CH	high
Load quickly for the watch	1	CH	High
TV	1	B	low



4.4 RESULTS ON EXISTING SYSTEMS

Table 16 Existing systems known by the Informal Caregivers

Existing system	Number of IC who have mentioned it	Country
Remote alarm	7	CH
Smoke detector	2	CH
phone	2	CH
Box pills	1	CH
Remote alarm with string in the house	1	CH

as a panic button		
Talk back system	1	B
Monthly training	1	B
Heart monitoring over the phone	1	PL

Table 17 Existing systems known by the Home Nurses

Existing system	Number of HN who have mentioned it	Country
Remote alarm	8	CH; B, PL
GPS for locate S	2	CH
Open door detection (open the door one time each day)	2	CH
Exit alarm	1	CH
Communication platform for medical information (Threema)	1	CH
Medical file online (mondossiermedical.ch)	1	CH
Electronic fax (for prescription)	1	CH
phone	1	CH
Monitoring system in the institution	1	CH
Visual bell for hearing impaired	1	CH
Bed alarm	1	CH
Light path from bed to toilet	1	CH
Outdoor remote alarm	1	CH
Fibri-check: measures on a distance, but when you want it to measure	1	B
Cognitive functions evaluation	1	PL

Spoken information about the date and hour	1	PL
Program to read text to blind people	1	PL
Armband	1	PL

Table 18 Existing system sknown by the Seniors

Existing system	Number of S who have mentioned it	Country
Remote alarm	10	CH, B
armband	2	PL
Panic button in cell phone	1	CH
Hospital monitoring	1	PL
Temperature outside /inside	1	PL
Object localization (robot)	1	PL
robot	1	PL

Table 19 Positive aspects of existing systems

Positive aspect	Number of participant who have mentioned it	Who mentioned it	Country
Monitoring all the time -> reassure S	6	IC, HN, S	CH, PL, B
Reassurance for IC	4	IC, S, HN	CH, B
systems for seniors are good because they make seniors learn something new	1	S	PL
Prevent social exclusion	1	S	PL
privacy	1	HN	B

training	1	IC	B
Doesn't use phone to answer	1	IC	B
GPS good system for S who are lost	1	HN	CH
Talk assistance, can talk with assistance when S push panic button	1	IC	CH

Table 20 Negative aspects of exisitng systems

Negative appreciations	Number of participants who have mentioned it	Who mentioned it	Country
Forget use panic button	6	HN, S	CH
Can't push panic button (unconscious for example)	5	HN, S	B, CH
Assistant robot is too expensive	3	HN, S	PL
False alarm	3	IC, S	CH
Robot has limitation (physical)	2	HN	PL
Robot is too big for small flat	2	HN	PL
Robots have mobility limitations	2	HN	PL
Armband too expensive	2	S	PL
No wear at night (avoid false alarm)	2	S	CH
Smash door if emergency go	2	IC	CH
Battery (no warning when battery is dead)	1	S	B
Panic button to high	1	S	B
People don't know robot existing	1	HN	PL

Smoke detector constantly ringing	1	S	CH
Old people doesn't want new thing	1	S	CH
electronic pill with alarm when the person doesn't open the case. But person with amnesic trouble can't know what is the alarm	1	HN	CH
expensive	1	HN	CH
Fall outside (no remote alarm)	1	IC	CH
Remote alarm not cover the whole house and garden	1	IC	B

4.5 ATTITUDES TOWARDS THE PELOSHA SYSTEM

Table 21 Positive sentiments towards the system

Positive sentiment	Number of participant who have mentioned it	Who mentioned it	Country
Test system before	2	HN	CH
Help S	1	IC	CH
Useful system	1	IC	CH
Personalizable reason according to each disease and S's needs	1	IC	CH
Easy to use	1	IC	CH
Reassure IC	1	IC	CH
Useful when home services are finished	1	IC	CH
Not too expensive	1	IC	CH

For the next generation	1	HN	CH
Gainful for the assurance*	1	HN	CH

Table 22 Negative sentiments towards the system

Negative sentiment	Number of participants who have mentioned it	Who mentioned it	Country
Machine is not useful	2	S, IC	CH, PL
If too expensive	2	S, HN	CH
Difficulty to use	1	IC	CH
Prefer human support	1	IC	PL
Difficulty to accept by senior	1	HN	CH
S doesn't use	1	S	CH

There were some questions about the price of the system, and if the system will be financed by the state or insurance companies (as the remote alarm is partially co-financed, for example).

4.6 POPULATION THAT COULD BENEFIT FROM THE SYSTEM

Table 23 Populations that can benefit from the system

Kind of population	Number of participant who have mentioned it	Who mentioned it	Country
Amnesic trouble people (GPS, alarm recall)	8	IC, HN, S	CH, B, PL
Alzheimer's patient	3	HN	CH
Physical handicap people	2	IC, HN	CH
Not psy people	2	HN	CH

Diabetic people	2	IC, HN	CH, PL
S who are alone	2	S, IC	CH, B
Polyhandicap people	1	HN	CH
Person with panic attack	1	HN	CH
Not for Alzheimer's patient	1	HN	CH
Chronic disease people	1	HN	CH
Parkinson's patient	1	HN	CH
Children, teenagers diabetic	1	HN	CH
asthmatic disease –> respiratory monitoring	1	IC	PL
People with pacemaker -> heart monitoring	1	HN	PL

4.7 INDEPENDENCE-RELATED NEEDS OF SENIORS

Table 24 Independence-related needs of seniors

Need of seniors	Number of participant who have mentioned it	Who mentioned it	Country
Physical fitness	5	IC, S	CH, PL
cooking	3	S, IC	CH
Walk outside with a companion*	3	S	CH
Feeling of independency	2	HN	PL
Mental health	2	S	PL
Cleaning home	2	S, IC	CH
Internet access	1	HN	PL

Computer lessons	1	S	PL
Asking for help	1	S	PL
Privacy	1	HN	B
Customization system	1	HN	B
Medical help	1	IC	CH
driver	1	IC	CH
Night help	1	IC	CH
Medical communication	1	IC	CH
Social presence	1	IC	CH
Medical monitoring	1	IC	CH
Pill box	1	IC	CH
Social link	1	IC	CH
Morale / will to live	1	IC	CH

* S are afraid to walk outside alone, are afraid to fall

4.8 ROLES OF CAREGIVERS

Table 25 Roles of informal caregivers

Role of IC	Number of participant who have mentioned it	Who mentioned it	Country
Make groceries	4	S, IC	CH
Driver	3	S, IC	CH
Company the S	2	S, IC	CH
Help senior's partner	2	IC	CH

Medical help	2	IC	CH
Cooking	2	S, IC	CH
Psychological help	1	IC	CH
Cleaning home	1	IC	CH
Prepare medication	1	IC	CH
Call for help	1	IC	CH
Talk with the doctor	1	IC	CH
Shower help	1	IC	CH

Table 26 Roles of Home Nurses

Role of Home Nurse	Number of participant who have mentioned it	Who mentioned it	Country
Customization system	1	HN	B
Continuous health evaluation	1	HN	CH

4.9 USER SCENARIOS

From this analysis we have been able to establish the following personas. The personas allow us to put in context what we have identified in the analysis to better understand the needs and functionalities to be included with fictitious profiles based on the participants of the interviews.

4.9.1 ROBERT AND VIOLETTE

Robert, 58 years, technicians, married, lives in a house in the Geneva countryside.

Digital skills	●●●●○
Stress level	●●●○○
Fatigue level	●●●○○
Distance of the elderly people	●●●○○

History

Robert is the only son of Violette. His father died 5 years ago, his mother lives alone in a flat in Geneva. His mother feels lonely and depressed since the death of her husband. She has also physical difficulties for walk.

Robert has set up a home services for his mother. The home services help Violette for the toilet and cleaning the house. His mother has difficulty walking, so Robert installs a remote alarm if Violette falls. If she falls, she can push the panic button in the bracelet.

Robert makes groceries for his mother every week. But sometimes, he forgets some articles.

Robert comes to see his mother every week to bring the groceries, and make the pill box for the week. The Saturday, he comes with his wife for the afternoon tea.

Robert also helps his mother for the medication, he goes to the pharmacy and drives his mother for the medical appointment.

Robert cannot see his mother every day because he works and leaves too far. He wants to be more reassured about his mother, if she falls, has a health problem, groceries 'needs. He is stressed if his mother falls and cannot push the panic button.

Aims

- Have a better health monitoring to his mother
- Have remote monitoring of his mother
- Be warned immediately if his mother has a serious health problem
- Be warned immediately if his mother falls
- Falls detection

Violette, 85 years, widow, has one son, lives in a flat in Geneva.

Digital skills	○ ○ ○ ○ ○
Home service needs	● ● ● ● ○
Practices sports activities	● ○ ○ ○ ○
Have physical difficulties	● ● ● ○ ○
Have memory impairment	● ○ ○ ○ ○

History

Since the death of her husband, Violette feels lonely. Her son, Robert, helps her for the groceries, the medication and the medical appointment.

She has more and more motor difficulties, she has trouble walking mainly. She has home services for help her for cleaning the house and for her toilet.

Because she has trouble walking, she is afraid to fall. To fall also during the night when she goes to WC. Robert installed remote alarm. But when she fell she forgot to activate it.

Violette always cooking. But she cannot make her grocery, Robert does it for her every week. But sometimes he buys the wrong product or always the same products.

She sees her son every week for the grocery, he also makes her pills box for the week. The Saturday he comes with his wife.

Violette is afraid to have health problems alone at home, and nobody comes. She doesn't want to leave her home.

Aims

- Her son is quickly warned if she has a health problem
- Her son is quickly warned if she falls
- Falls detection
- Feels less alone, need to interact with other seniors
- Send grocery list to her son
- automatic light to go to WC during the night.

Use of the PELOSHA system by Robert and Violette:

Robert explained to Violette the importance of this system. This system helps to prevent serious accident. For instance, it can call Robert automatically if Violette falls, or if Violette has serious health problems like cardiac problems, temperature, blood pressure's problems, etc. Or help Violette action to keep a healthy life by keeping him physically active and by taking his medication.

Violette is convinced by the system, Robert installs easily the box in the living room and sensors in the Violette house. Robert can install this connected sensor (in order of priority):

- Gas detection
- Smoke detection
- Water detection
- If Violette is in the bed
- Temperature inside / outside
- Doors, windows locked
- Air quality

Robert gives the watch and the tablet to Violette, and explains how to use it.

Violette never quit her connected watch. Violette takes her shower, sleeps with it. Etc. Robert reloads the connected watch at each of his visits.

Violette has discomfort, falls and is unconscious. The watch detects the fall. Robert or a central receives an alarm and calls Violette to control the situation, Violette doesn't answer. Robert thinks Violette has a problem, and goes immediately to the Violette's house to help Violette.

Robert receives calls to Violette from the connected watch, he hears nothing. He thinks Violette is falling. He looks on the app if falls was detected. There is a notification "falls detected". He can activate the camera to see Violette, he sees that Violette is falling and unconscious. Robert looks on health parameters, no alert is activated. Robert goes immediately to Violette's house.

Another day, Violette falls. The watch, detects the fall. Robert or a central calls Violette. Violette explains, she falls and cannot get up but doesn't think she has a serious problem. Robert goes immediately to the Violette's house for help Violette.

Robert receives call to Violette from the connected watch. Robert answers, Violette explains she fell and cannot get up. Robert reassures Violette and goes to help Violette to get up.

Violette is not feeling well, pushes the button of her watch. Violette says to the connected watch, "I am not good, call my son" or "I am not good, call emergency". The connected watch call Robert or emergency.

Violette goes to the cemetery, she falls in the cemetery, nobody is in the cemetery. Connected watch detects the fall. System calls Robert and indicates the localisation.

Robert receives calls to Violette from the connected watch. Robert doesn't see calls, receives a notification with the indication "falls detected, if you don't call Violette in 15 min we call emergency". Or central calls Robert if Robert doesn't answer, central call emergency. If central call emergency can indicate to emergency the code for the keys that are in a box close to front door (avoid smashing the door).

Violette needs food for cook, Violette says to the watch, “buy vegetables, steak etc.”. Or in the tablet, add in the shopping list what she needs. Robert can have access to the check list, to buy the grocery for Violette. Violette can also order groceries for a delivery at home.

Violette wants to test a new recipe, she looks in the tablet for a new recipe for her diabetes. She sees an easy recipe. She clicks in the ingredient list and the ingredient has added in the check list for groceries.

Robert goes to shopping, Robert looks on the app, in the shopping list and the notes. Violette needs some vegetables, steak, etc. Home services added a detergent and sponges in the shopping list. Robert can check in the list during the shopping each time he collects an item.

Violette gets up at night to go to WC. When Violette puts her foots on the ground, led under the bed turn on. And have led until the WC.

Robert wants to know if Violette wakes up. Robert opens the app in his smartphone, and has access to information organized in several rubrics:

- the health constant
- staffing note
- calendar
- shopping list
- sensors in the house (or routine observance).
- GPS
- Medical files
- important papers
- parameters.

Robert can also see the information in a website with access codes.

Robert wants to know more about routine observance, Violette wakes up this morning at 8 am. Violette took her medications this morning. The night before, Violette went to sleep at 9 pm, Violette wake up twice. After Robert looks on the rubric health constants, he has only access to some constants (Suzanne chooses the constant that can have access Robert), that are displayed in a graph. After he looks if he has messages from Suzanne or home services. He is reassured to see that everything is OK. Finally, he looks at the calendar to see if Violette has an appointment today or in the week.

Robert receives alarm in his smartphone, if a sensor installed in Violette’s home is activated like smoke detectors, water detectors in the bathroom, electronic device turns on. Robert can call Violette to warn her. Robert can also receive notification for appointments, if Violette gets out the house or if Violette has a health problem. Robert can choose in parameters if he wants to receive notification or calls for each function.

Robert goes on vacation for 2 weeks. Robert can indicate it and who contact during this vacation in the system parameters. System doesn’t send notification to Robert during his vacation, all the calls, alarms and notifications are sent to the phone number insert in the app. System also sends a note to home services to indicate he is in vacation.

4.9.2 JEANNE AND MARIE

Jeanne, 52 years old, housewife, married, has 2 teenagers, lives in a house in Geneva.

Digital skills	●●●○○
Stress level	●●●●○
Fatigue level	●●●●○
Distance of the elderly people	●●●○○

History

Jeanne lost her father a year ago. Her father helped her mother with her memory impairment. Now, her mother lives alone and she doesn't want to leave her home.

Brothers' Jeanne lives farther to her mother and work, so it is Jeanne who takes care to her mother. Her brothers go see their mother at the weekend with the children.

Jeanne noticed that her mother forgets to take her medication. So, she calls for each meal her mother to remind her to take her medication. The evening, she also calls for reminding to her mother to lock the front door.

Every morning, Jeanne calls her mother to remind her of the day he is and if she has any appointments today. But when Jeanne comes to bring her mother to the doctor, her mother had forgotten the appointment and she is not ready, she had forgotten where is the prescription. Thus, Jeanne comes 1 hour before the appointment.

Jeanne knows that her mother loves to walk around, for go buy bread, for example. But sometimes she is lost.

Sometimes, when Jeanne will visit her mother, she does not answer. Jeanne bought a mobile phone to her mother, but she forgets to take it and lose it. So, Jeanne go to the village to find her mother.

Jeanne is also worried because her mother always cooking but sometimes forget to turn of the fire. Jeanne is afraid that her mother will fire in the house.

Aims

- System with recall alarm, she can configure alarm.
- Get off to have more time for her and see her mother "for pleasure".
- Have a GPS to know where is her mother
- Sensor in the house to prevent her if there is a problem in the house, for example smoke detectors
- Important papers inside a mobile app
- Remote monitoring to reassure oneself
    - Know if her mother had taken her medication.

Marie, 82 years, widow, has 3 children, lives in a flat in house around Geneva.

Digital skills	● ○ ○ ○ ○
Home service needs	● ● ○ ○ ○
Practices sports activities	● ● ○ ○ ○
Have physical difficulties	● ○ ○ ○ ○
Have memory impairment	● ● ● ● ○

History

Marie is a widow for one year. She has no physical difficulties, she loves to walk around, go to the bakery, to the cemeteries, etc. But sometimes, she is lost. So, she is waiting on a bench in the village. The villagers know her and help her to find the way home. Her daughter Jeanne bought her a mobile phone but she forgets to take it.

Sometimes, she forgets to take her medication, her daughter calls her every day to remind to her to take her medication, lock the front door, the appointment, etc. She feels guilty about relying so much on her daughter.

Marie benefits from home services for help her to cleaning the house. She hesitates to order meals, because she often forgets to turn of the fire. But the meal order is not good.

Marie wants to walk around with other seniors, but she does not know how to contact them. She also wants to make more physical exercise to maintain good health.

Aims

- Help to find her way when she gets lost
- Recall alarm to unload his daughter
- Can cooking without risk
- Find other seniors for a walk around
- Have access to physical exercise

Use of the PELOSHA system by Jeanne and Marie:

Jeanne installs easily the box in the living room and sensors in the Marie's house. Jeanne can install this connected sensor (in order of priority):

- Gas detection
- Smoke detection
- Water detection
- If Marie is in the bed
- Temperature inside / outside
- Doors, windows locked
- Air quality

Jeanne gives the watch and the tablet to Marie, and explains how to use it.

Marie never quit her connected watch. Marie takes her shower, sleeps with it. Etc. Jeanne reloads the connected watch at each of his visit.

Every time Jeanne visits Marie, they talk about the system, how to use it, what is its utility, etc.

A typical day:

Every morning when Marie wakes up, the connected watch reminds her the current date and his appointment of the day "it is the 1st of May 2019, today the home service will come at 10 am, and the doctor at 3 pm. "

One hour after, the connected watch recalls Marie to take her medication, "have you taken your medication?" The message is repeated until Marie pushes the button (one button in the watch) to stop the alarm, when he takes her medication. / Or Marie can have an electronic pill box connected to the system. If Marie doesn't take her medication after a certain time, the recall alarm is activated. If Marie deactivates the alarm but doesn't take is medication. A notification is sent to the Jeanne and Suzanne.

At 9am the connected watch recalls that the home service comes at 10 am.

At 12pm the connected watch recalls Marie to lunch and drink water.

At 2:30 pm alarm recalls that the Marie has an appointment with the doctor at 3pm. Marie doesn't find her keys and the prescription from the hospital. Marie pushes the button, that activate vocal function, Marie says, "where are my keys?" The connected keychain rings, Marie finds her keys. Jeanne comes to drive Marie to the doctor. Jeanne says to Marie that the prescription is in his smartphone.

The evening, Marie wants to go for a walk. Marie uses the tablet, Marie has access to a group discussion with another Marie in the same city who want to walk. Marie chooses a person in the discussion, sends him a message. An appointment for walk is planned for Friday at 3pm. The appointment is added in the system calendar.

At 6:30 pm connected watch recalls having dinner and take medication. 1h after the watch recalls that the Marie to turn off the gas.

At 8pm connected watch recalls Marie to lock the front door.

Jeanne wants to post a letter, she goes to the post office. But she is lost. Marie pushes the button in the watch and says, “I am lost, where is my house?” The watch indicates the path “turn at left” etc.

Jeanne will visit to Marie. Marie doesn’t answer. Jeanne looks on app where is Marie in the GPS rubrics. Marie is in the park near the house. Jeanne will join Marie in the park.

Jeanne receives notification because Marie isn’t going home at 7pm. Jeanne looks on GPS rubrics where is Marie. Marie is in the village. Jeanne calls Marie in the connected watch to know if Marie is lost.

Marie wants to do some physical exercises. In the tablet, she selects physical exercises. Turn on the TV, the physical exercise appears in the TV. Or in the tablet.

Marie wants to make some cognitive exercise. In the tablet, she selects cognitive exercises and what she wants to train, for example her memory. The exercise appears in the tablet.

The connected watch rings and says, “reload me”. Marie calls Jeanne to reload the watch.

The evening Jeanne checks in the app if Marie took her pills and if Marie has locked her front door. The next day, Jeanne looks on the app Marie left up several times during the night and she is always in bed at 9pm. At 12pm, Jeanne looks on the app, Marie wake up, Jeanne calls Marie to get news.

Jeanne can parameter the system, she can modify the recall alarms for Marie (add recall alarm for lock front door at 7pm, for example). He can also modify the sound volume for the recalls alarm (some Marie has hearing problems).

Jeanne can add an appointment in the calendar and set a recall for her and/or Marie (like app calendar in smartphones). Jeanne can add a prescription in the medical files.

Jeanne comes with Marie to the doctor. The doctor can scan a prescription in the app and add notes for Suzanne. Jeanne can print prescription who are in the app if Marie lose her prescription.

Jeanne receives alarm in her smartphone, if a sensor installed in Marie’s home is activated like smoke detectors, water detectors in the bathroom, electronic device turns on. Jeanne can call Marie to warn her. Jeanne can also receive notification for appointments, if Marie gets out the house or if Marie has a health problem. Jeanne can choose in parameters if he wants to receive notification or calls for each function.

4.9.3 SUZANNE

Suzanne, 43 years old, home nurses for 5 years in Geneva

Digital skills	●●●●○
Stress level	●●○○○
Fatigue level	●●○○○

History

Suzanne follows 6 seniors for care.

Some seniors have memory impairment, sometimes when she arrives for the care the senior cannot answer to the door. These patients sometimes forget to take her pills, Suzanne wants to know when senior forget to take her medication. To adapt the treatment. They also forget where is the important papers.

Other times, Seniors forget the appointment or take the medication for the pain before the painful care.

Suzanne takes each time the patient's health measures such as their blood pressure.

For one senior, neighbour was reported that the senior seemed to stay awake all night. She wants to know if senior has a good sleep, reverse day and night, etc.

Sometimes, Suzanne has doubts about treatment. She wants to contact doctor easily.

Suzanne loses a lot of time ordering at the pharmacy. She also loses time for call senior if she is late.

She also wants to contact easier the informal caregiver, to inform him about the health problem, etc.

Suzanne wants to know the medical appointments' senior and add some appointment for the senior.

Some seniors call Suzanne if they have health problems.

Some seniors need to have regular health monitoring according to certain health issues.

Suzanne needs to indicate to seniors, who is replacing her when she is absent for vacation or training.

Aims

- Know where is senior if he doesn't answer
- Contact easier with doctor
- Fast order in pharmacy
- Prevent quickly senior if she is late
- Contact easier with informal caregiver
- Access to a calendar and add appointment in the calendar
- Have health monitoring automatically.
- Know if senior forget to take his medication
- Have routine monitoring
- Seniors can call her easier
- Customizable health monitoring according to the health problem of the senior
- Receive alarm if senior has health problems.
- Indicate her absence

Use of the PELOSHA system by Suzanne:

Suzanne has the same app as informal caregivers except she can access additional health information

Suzanne is late for her appointment with seniors. In the app, she clicks in a button to send a vocal notification to seniors in her connected watch.

Suzanne looks on her app if seniors had health problems since the last visit. If senior takes her pills and have a good sleep. If home services or informal caregivers add notes for her, for example, “today senior looks tired”. Suzanne can have a discussion with senior if something is detected, for example “have you slept well? I see you get up very often during the night.”

Suzanne reloads connected watch during the visitation.

Suzanne inserts in the app the health information that she takes during the visitation (if this health information cannot take automatically by the system), for example blood pressure or weight. This information must be adding very easily by the Suzanne.

Suzanne has a doubt about a prescription or a care. She sends a message to the doctor to have more information or advice. Doctors can change prescription and send in the app. Suzanne can send the new prescription to the pharmacy.

Suzanne need ID card or health assurance cards but senior had lost them. But this card is a scan in the app in the rubric important papers.

For the next visitation, senior will need to take a medication for the pain because the care will be painful. Suzanne in the app adds in the calendar her next visitation and a recall one hour before for that senior takes the pills for the pain.

Suzanne goes to the visitation but senior doesn’t answer. She looks on the app where his senior, she can also call seniors in the connected watch to know where she is and she comes for the visitation. Suzanne can also meet senior, if seniors are lost.

Suzanne can see in the calendar the next appointment with the doctor.

Suzanne needs to can have access to parameters. Suzanne configures what kind health information the system needs to monitor, what kind of health information informal caregiver can have access. Configure when the system sends alarm to home nurses for health problems in agreement with the doctor, for example if the pulse reaches a threshold several times a day. Suzanne can add or remove recalls alarms for seniors, for example add recall alarm for drink during the summer.

Suzanne needs to indicate in the app when she is not available, because she is in vacation or formation. She can indicate the phone number of her replacement.

Suzanne receives alarm if a health problem is detected (in functions of what the Suzanne has configured).

Suzanne receives alarm if senior falls and informal caregivers don’t answer maybe.

Seniors can push the button and calls Suzanne if she’s not feeling well. Suzanne can judge if it is an emergency.

4.9.4 SCENARIO FOR NURSES IN A CARE HOME

Nadine works in a carehome in Geneva. Together with her colleagues, she takes care of the residents in her department, but she is also responsible for the care of the residents of the service flats.

The residents of the service flats can give an alarm via an emergency button in the event of an acute situation (feeling unwell, falling, etc.). In addition, Nadine and her colleagues visit the residents on a daily basis for daily care.

Some seniors have memory impairment, sometimes when she arrives for the care the senior cannot answer to the door. These patients sometimes forget to take her pills, Nadine wants to know when senior forget to take her medication. To adapt the treatment. They also forget where is the important papers.

Other times, Seniors forget the appointment or take the medication for the pain before the painful care.

Nadine takes each time the patient's health measures such as their blood pressure.

For one senior, neighbour was reported that the senior seemed to stay awake all night. She wants to know if senior has a good sleep, reverse day and night, etc.

Sometimes, Nadine has doubts about treatment. She wants to contact doctor easily.

She also wants to contact easier the informal caregiver, to inform him about the health problem, etc.

Nadine wants to know the medical appointments' senior and add some appointment for the senior.

Some seniors call Nadine if they have health problems. Some seniors need to have regular health monitoring according to certain health issues.

The wzc is located next to the service flats, Nadine can cross a walkway to the service flats. It would be handy for her if she could call up information about the residents on a tablet during her walk: how did they go today? How is the blood pressure, heart rate, saturation, glycemia, has the doctor visited, ...?

Aims:

- Know where is senior if he doesn't answer
- Contact easier with doctor
- Contact easier with informal caregiver
- Access to a calendar and add appointment in the calendar
- Have health monitoring au
- Know if senior forget to take his medication
- Have routine monitoring
- Seniors can call her easier
- Customizable health monitoring according to the health problem of the senior
- Receive alarm if senior has health problems.
- Indicate her absence
- Automatically

4.9.5 USE OF THE PELOSHA SYSTEM BY HOME SERVICES

Home services have only access to the rubric notes and shopping list, to add notes for informal caregivers or home nurse and groceries.

Home services can also indicate if he is late, like for home nurse.

Maybe the supervisor of Home services can have access to more sensitive files. Like the GPS if senior doesn't answer, important paper and prescriptions if it is the home services who go to the pharmacy. And calendar for adding the home services schedule.

4.9.6 DESIGN

Connected watch must have few buttons, one or two big buttons. Its battery should last a long time and be reload quickly. Connected watch must be waterproof, if senior wants to take is shower with it.

Prefer vocal function for activating the functions.

For the tablet, need a tablet with also big button. Easy to use for seniors. Tablet must be for few functions because seniors can't go with tablets all over. The tablet is too big and smartphones too little. And seniors are uncomfortable with its use and reports that they will not think of using it.

5 DISCUSSION OF RESULTS

5.1 INDEPENDENCE-RELATED NEEDS OF SENIORS

Older people have several needs to be independent. They need to perform physical exercises to stay healthy. They are afraid to walk outside alone, they are afraid to fall. That it's why a fall detection that work outside is important. Seniors also need help for cooking, home services or informal caregivers cook for them, or they are having meals delivered. Often, they have home service for cleaning their house and make their toilet. Older people often suffer from social isolation. Seniors need to have morale and envy to live, this is making the difference for stay at home healthy.

Informal caregivers have different roles, they make groceries for seniors, drive seniors for medical appointments or other. They keep company to seniors, help for the shower, talk with the doctor during the appointment, help for cleaning home. They also help senior partner to take care of the senior. So, the informal caregivers have a lot of roles for help the senior to be independent at his home, without informal caregivers' help it is difficult to seniors to be independent, home services cannot do everything.

5.2 EXISTING SYSTEMS

Home nurses know a lot of systems that can permit to seniors to be independent at home. They use GPS to locate seniors that have memory disorder and have risk to get lost. Some institutions use a system detecting open doors, if senior doesn't open their front door at least once a day, the staff will receive a warning. There is also beds alarm if senior falls from the bed. Light path from the bed to the toilet can also be installed for seniors that wake up several times during the night to go to the toilet that risk of falling if they can't turn on the light. Home nurses known system with spoken information, like the date and hour. Some home nurses mentioned the use of robots. Until now these robots are often too expensive and too big for little apartment. Home nurses use several systems to help them to take care of their patients. Some use Threema, a secure messaging (https://threema.ch/en/) used for communicating directly with the doctor. Home nurses use also systems to deal with medical files (contains: medical examinations, medication prescriptions, results of your last lab tests, plan of your treatments, follow-up of your home care) for each patient, this is used in Geneva (https://www.mondossiermedical.ch/). One home nurse uses an electronic fax to receive prescription directly, because some doctors still use fax to send a prescription.

The problem with most of these systems is the price, some systems are too expensive and some seniors cannot buy them. Some security systems are disabled because they don't work as expected, like smoke sensors that rings constantly. Sometimes, senior are not aware that the system has empty battery. It is important to have a warning to prevent that the battery is weak. Another problem is alarms without indication, for example electronic pill rings to take the medication, but seniors with amnesic trouble do not known the reason of the alarm.

The major advantage of constant monitoring is to reassure seniors and informal caregivers. Seniors are reassured because they know that informal caregivers or emergency can be quickly informed if they have a problem. Informal caregivers are also reassured because they know they are quickly warned if seniors have a problem.

5.3 FEATURES IMPORTANT FOR SENIORS

5.3.1 FALL DETECTION

Several features stand out as paramount, the first is fall detection. Seniors, informal caregivers and home nurses find that a system that detects automatically falls is important. Effectively, the fall is the first reason for hospitalization of seniors, and loss of independence. Actually, many old people possess remote alarm (practically all seniors interviewed in this analysis are using such system). Unfortunately, many time seniors forget to use the system when they fall, they forget to push the panic button in the bracelet and prefer to drag themselves to the phone to call that is dangerous for seniors. Sometimes seniors cannot push the panic button, if they have a discomfort or a stroke attack. So, it is necessary to have a system with fall detection, without panic button. It is also important to have a system without false alarm, because remote alarm has several false alarms. Senior push accidentally the panic button, when they sleep, for example. Some remote alarms system are associated with assistance that call senior to know if they have really fall. Other remote alarm call immediately informal caregivers to prevent the elderly person from falling without contacting the older person before, that is a problem because the informal caregivers doesn't know if it is a false alarm. Some senior doesn't want to wear alarm system during the night for fear of activating it by accident. If seniors can talk with the system when a fall is detected it can avoid a false alarm. A senior can confirm if he is falling, if it is a false alarm, if it is serious, etc. Informal caregiver cannot go every time help senior if he is falling, in this case is the emergency who go there, but they broke the front door. So, a system with a key in the box locked by a code in front of the door can be a good solution to avoid to have to break the door. Another problem with remote alarm is it limited coverage in the house but not when the seniors are outside.

5.3.2 RECALL ALARMS

Recall alarms are important for seniors who have memory disorder. A lot of recall alarms can help seniors to be independent such as recall alarms for medication, appointment, meeting, meal, open door. Remote alarms need to be explicit about what is recalled. Only a ring isn't sufficient to indicate what is the action to do for seniors with memory disorder. This alarm can ring until the senior has done the action.

5.3.3 PANIC BUTTON

Panic Button is always important, seniors can have a health problem and can push the panic button without necessarily falling.

5.3.4 VOCAL FUNCTION

Vocal functions are also primordial, because adoption of new technology is difficult for seniors. That's why participants think smartphone is not adapted to seniors and prefer tablets because it is a big screen. Another problem link with new technology is that seniors don't always have internet at home, maybe think to use 4G system. The system needs to have as few buttons as possible, or only one big button. They can push the button and talk directly what is the problem, talk to home nurses. The vocal function can permit to add things easily in the monitoring system by seniors. For example, add an appointment in the calendar, add groceries in shopping list, add messages for informal caregivers, etc.

5.3.5 OTHER FUNCTIONS

Other functions that could added in PELOSHA system. Diet information in accordance with patients' pathology (for example, diet information for diabetics' seniors). A shopping list, were seniors can add what they need for groceries to share this information with informal caregivers. Seniors can also order a meal

easily with home delivery meals, or home delivery groceries. A system for find important object, like keys or wallet. We can imagine a system with key ring that rings when you want to find them. The GPS for find seniors who are lost is very important for informal caregivers, but we can also include a GPS for seniors. This GPS can indicate to seniors how to return to their home, like “turn at left” etc. Another problem for seniors is the social exclusion, we can imagine an exchange platform, seniors can have access to it in a tablet. In the tablet, we can also include cognitive functions training for seniors, this is can help them to prevent cognitive disorder.

The system needs to be as automatic as possible to monitor falls, health measure and sensor in the house. Because seniors don’t think to push button when they fall, or add information in the tablet. The connected watch needs to be worn permanently, because seniors can fall any time (during the shower or the night for example). The connected watch must be waterproof and have a long battery with a quick reload.

The system must be available with several languages, seniors can understand another language that the languages of the country (for example, in Geneva they have a lot of seniors who talk Italian, Albanian, Portuguese etc.).

5.4 FEATURES IMPORTANT FOR INFORMAL CAREGIVERS

Informal caregivers are very important to help seniors to be independent at home. Effectively, as seen previously informal caregivers help seniors for different tasks like cooking, or driving seniors to their appointments. It is also informal caregivers that come when remote alarm is activated by seniors. That is why, informal caregivers need help to take care of the elderly, because having to do all these tasks can exhausts them physically and psychologically. So, it is important to consider their needs for take care of seniors to maintain them at home as long as possible and to allow to informal caregivers more time for them, to be less stressed about seniors’ situation.

5.4.1 MONITORING SYSTEM

Informal caregivers are interested to have access to health constant, like pulse or blood pressure. This reassure them, if constants are good so that means that the elderly person is fine. This is permitted to be reassuring when informal caregivers cannot see the elderly every day, and permits to save time for them. Other monitoring system permits also to reassure them, like know if seniors have taken his medication (we can imagine a connected pill box with your system), if they have a problem in the house (like smoke detection, water detection if senior forget to turn off the water, gas detection etc., front door not locked, forget to turn off home devices, etc.), move detection (know if senior moved into the house), know if senior is at home or outside. But principally, they want to know if senior is falling. So, a fall detection automatically still stood out as the most important feature. And to extend them to the bed, with a bed sensor to know if senior is falling during the night or if he woke up. A problem with this system is also the false alarm, if seniors can talk with.

5.4.2 MEDICAL SYSTEM INCLUSION

Informal caregivers also want to be more included in the medical system, have simpler access to medical information such as prescription. Or have a access to all the medical files in a single place. Because often seniors have a lot of prescriptions different and sometimes these prescriptions are contradictory between different doctors. If it is possible to talk privately with doctors about health seniors. For example, one informal caregiver thinks her mother has maybe depressive symptoms (she cries often) although her mother reported only crying a few times to her doctor. This informal caregiver also wanted to have a

psychological formation for take care of the senior, learn how react with her mother when she is crying, etc. Maybe, include in the PELOSHA systems some psychological advisors can be a good idea.

5.4.3 HOME SERVICES

Informal caregivers are often relieved when help by home services to help with seniors, but often informal caregivers don't know what kind of service senior can have access, who contacts, what kind of system exists, what is the price in charge? So, maybe include in the PELOSHA system some advisor with all the home services and systems that can benefit the elderly person.

5.4.4 GPS

Another system that is very useful is the GPS to locate senior when he is lost. Effectively, elderly people who have memory disorder can get lost when they go out. Or they can be outside because they forget the appointment. This system can permit to informal caregivers to locate seniors. Know where is senior when is lost is very reassuring for informal caregivers or home nurses.

5.4.5 CALENDAR

Informal caregivers want to have access to a calendar with all the appointments, when the home services and home nurses come. This is can permit to know when is the medical appointment and when they must drive senior to the appointment. They can also add appointments in this calendar. The system can also recall the appointment to seniors.

5.4.6 REPLACEMENT

Informal caregivers can add other informal caregivers when they are in vacation or not available. So, informal caregivers will not be contacted during his vacation and seniors have another person who is here during this time to take care of them.

5.5 FEATURES IMPORTANT FOR HOME NURSES

Home nurses help seniors for all the medical care that informal caregivers cannot provide. Your system can help home nurses to take care of their patients. And save them time to take better care of their patients.

5.5.1 SENSORS

Home nurses generally recommend the use of monitoring systems with sensors. For example, smoke detector can be useful to warn caregiver in case a seniors' home is smoky because senior forget his bread in the toaster. Sensors can also inform if a senior wake up during the night, if he confounds night and day, sleep well, etc. It is also important for home nurses to know if seniors take their medications. They can adjust the treatment if a senior forgets to take his medication. A connected pill box with the system can permit to know if seniors take their medications, but this pill box can be difficult to open by seniors.

5.5.2 HEALTH MEASURE

Having access to health measure is helpful but some home nurses think that too much information is not useful. They are likely to have not enough time to see all these health constants collected by the system. And it is more important for them to see if health constants exceed a threshold rather than all the health constants. The thresholds must be fixed by the doctor in function of health issues of the senior. Integrated in the system all the health measures they take during the appointment (like blood pressure, weight, temperature, pain assessment, glycaemia, intestinal transit, urinary removal) can be very useful.

5.5.3 MEDICAL INFORMATION

Home nurses need to have all the medical information in the same place, in an app because they are always moving. The data repository can contain all the prescriptions, the medical notes, etc. And can be printed to have a trace or go to the pharmacy. The capacity to send prescription directly to the pharmacy is also a great time saver for home nurses. It is also important that home nurses can add notes in the app for home services, informal caregivers, doctor. They also want to have access in the app to the important paper of seniors like their ID card or health insurance card, because some seniors lost them.

5.5.4 TALK BACK FUNCTION

A feature that is important for home nurses is the talk back function. Home nurses want to talk directly with patients if they have a problem. They can reassure seniors. On the other hand seniors can call home nurses directly if they have a health problem.

5.5.5 NEUROLOGIC ATTACKS

The second major risk for seniors after the fall is the neurologic attacks. If it is possible to detect them with your system, this is a good point.

5.5.6 CALENDAR

Home nurses want also have access to the senior calendar to see when are the medical appointment are scheduled as well as adding appointment.

5.5.7 REPLACEMENT

But also indicate who replace them when they are on vacation or in formation. So, the system, informal caregivers and seniors can contact directly this replacing.

5.6 SYSTEM DESIGN

5.6.1 SENIORS

Seniors will wear a connected watch all the time. It is important that this connected watch is waterproof and has a long battery life. Informal caregivers or home nurses can reload it during their visit. This connected watch has only on big buttons. This big button permit to activate a vocal function. Seniors can talk to the connected watch to interact with the app, call informal caregivers or home nurses if they have a problem, activate the remote alarm and have access to a GPS if they are lost. The connected watch can have vocal alarms for different things, it can say “think to lock the front door” “take your medication” etc.

Seniors can also have a tablet connected with 4G. This tablet must be designed to be easy to use by seniors. This tablet can contain health information, physical exercises, cognitive training, diet advisors, recipes, shopping list, social platform and calendars.

Seniors can also have a connected pill box with the system.

Finally, senior have a box in the house. This box can contain sensors. This box must be placed in the living room, near the place where the senior spend most of its time during the day. Maybe the talk function can be in the box (but if the senior is not near of the box, the talk back function cannot work). This box can contain a video camera, but this is perceived as very intrusive by most the respondents.

5.6.2 INFORMAL CAREGIVERS

Informal caregivers can have access to the information collected by the monitoring system in a web site or an app in the smartphone. The data protection and security are very important. The access must be with a code or fingerprint in the app.

Informal caregivers have access to the calendar, access to medical information like prescription, to the shopping list, health constant with alarm if health constants exceed the threshold, alarm if sensors indicate a problem, battery level of sensors and connected watch, home services notes, GPS, important papers and parameters.

They can also configure the features to the connected watch and box. Add alarms for seniors, informal caregivers to contact when they are absent.

5.6.3 HOME NURSES

Home nurses have also access to the app, but they have access to more medical information, like medical notes. For the health constant, home nurses prefer notification if the system detects can exceed the threshold, but also charts with principal health constant. They can also configure the system.

It is important that the system is customizable. Informal caregivers, senior, home nurse can choose what kinds of sensors, alarms, etc. are useful for the senior. For example, the camera are likely to be rejected by seniors. The system must be evolutionary, seniors can have different needs over time. For example, a memory disorder can appear few years after the installation of the system.

5.6.4 POTENTIAL BENEFICIARIES OF THE PELOSHA SYSTEM

This system can benefit to all seniors. Seniors with no particular health problem, with amnesic trouble, Alzheimer, physical handicap, diabetic, Parkinson, with panic attacks.

This system can also benefit to younger people, like people with physical handicaps, asthmatic decease. But also for children and teenagers with diabetic, this new technology can permit to be more independent and can be more accepted by this young population.

However, this system is not adapted for people with psychological disorder, the monitoring is not adapted for this person because they may feel persecuted. So, this system can increase their disorder.

5.7 CONCLUSION

Overall, the vision of our system is well received by all respondents. Few informal caregivers think this system is not useful. Seniors do not see too much utility except for the detection of falls. The informal caregivers and the home nurses are the respondents who consider this kind of monitoring as the most useful. They are the ones to convince to install this system.

The most important features to include is the fall detection. All the respondent wants this feature and think is the most important. Because the fall is frequent for senior and the actual system cannot permit to prevent it. Effectively, senior didn't think to activate the remote alarm or cannot activate it. Also, include health measure and sensor in the house is important to reassure informal caregivers and seniors. They know that if there is a problem they will be warned. The GPS is also important to locate seniors who have memory disorder and who can get lost or forget to be at home for appointments.

Integrate physical exercise and cognitive training can permit to maintain senior healthy and thus maintain it as long as possible independent at home.

However, the system must be customizable. The alert and health measures must be configured in accordance with the doctor. Maybe all this health measure can make worried seniors and informal caregivers.

6 SUMMARY OF THE RESULTS AND CONCLUSIONS FROM NEEDS ANALYSIS

This section presents a synthetic summary of the results of the performed needs analysis and the conclusions that were drawn from them. These needs were summarized per identified and interviewed user groups thus enabling to more easily look into the desired features of the system within work packages WP2 and WP3.

6.1 SENIORS

Rationale:

"As a senior, I would like to stay independent as long as I can. I don't like asking for help, I would prefer to press the button than call someone. I want to stay fit, and control my life. Sometimes I need help but I don't want to be treated as a kid. I'm aware that I am getting older, but as long as I can I would like do everything by myself. I'm also aware that in some situations I will be dependent on the assistance of another person."

Desired features of the Pelosha Assistant:

- Fall detection – the most important, emergency situation
- Physical exercises – want to stay fit
- Possibility to call the nurse/family members/emergency
- No camera (privacy is very important)
- Smoke detector
- Blood pressure monitoring
- Reminders to take medications
- Appointments reminders
- Panic button
- Vocal function (voice interface)
- It should not require high computer skills and internet connection
- Big buttons, easy in use
- Automatic system

Major considerations:

- Fall detector needed – seniors are afraid of not receiving any help in such situations;
- Help to stay fit - they are aware of their limitations and they want to stay fit for as long as possible;
- Blood pressure/heart rate monitoring – a lot of seniors have heart problems (they want to monitor their health);
- Stay in contact – they want to be in touch with their family members – in a simple way.

Conclusions:

The Assistant should be something like a "life management" system for seniors. PELOSHA should not tell seniors what to do (force them to do certain activities), it should rather encourage them to do something. It should make them feel safe. They should have the possibility to call somebody (call for help). Pelosha should be like a partner, an assistant, but not like a babysitter. Pelosha should not require high technical skills from the senior, it should be a companion in his/her life, but in a non-invasive way. It should give them feedback, tell them they are doing fine. They should have the possibility to check their progress.

It should be installed at home – in a room where the senior spends most of the time during a day, so they can easily check the status. When the senior wants to go out – they can wear a smartwatch, or some kind of band with panic button and GPS locator.

6.2 INFORMAL CAREGIVERS

Rationale:

"As an informal caregiver, I would like to have an access to senior's wellbeing/medical information such as: prescriptions and medical files. It would be also helpful for me if I could locate the senior with GPS. I want to be included in the medical system (access to the medical data). I want to know if he/she is doing well, if he/she needs any help, shopping, if he/she takes medications (in the form of notifications)."

Deasired features of the Pelosha system:

- Fall detection
- GPS to locate the senior
- Access to the pulse and blood pressure
- Taking medication
- Gas and smoke detectors
- Health analysis (vital signs, status of taking medications, some kind of "health progress bar") – probably this feature should be in the monitoring system
- Alarm for health problems – probably this feature should be in the monitoring system
- Administrative system – application on smartphone or tablet – access only by code

Major considerations:

- Informal caregivers need an application – so they can easily check Seniors status
- The system has to be secure – and caregivers want to know, that no data will leak out of the system – some kind of code or extra verification needed during login
- PELOSHA should be an application which gives them possibility to monitor Seniors' wellbeing and physical status
- PELOSHA is seen as a monitoring system (quick look – just to check if everything is fine, rather than sophisticated graphs, reports, tabs, settings, etc.)
- Informal caregivers can communicate with Seniors through Pelosha, but they would probably prefer using a phone
- They want to be informed if something is wrong so they can react
- They are mostly interested in medical/health/location data/information
- They do not want to completely control Seniors (like checking everything, they are not their parents/babysitters). They want to be just sure that everything is ok.

Conclusions:

The Monitoring System should be an application (which can be installed on a smartphone or tablet – a mobile device) with a very simple interface, which gives very clear information about Senior's health/wellbeing status.

The Administrative System may be accessed via a web browser, it will not be used very often by informal caregivers (probably only for creating accounts, giving other caregivers access to data or something like that).

6.3 HOME NURSES

Rationale:

"As a home nurse I would like Pelosha to be my assistant – a tool which will make my work much easier. It should save my time and help me to be more efficient. Seniors are able to do many personal care activities by themselves. I just need to be informed whether they have already done these particular activities or if they need my help (that way I'll know with which activities they need my help)."

Desired features of the Pelosha system:

- Health measurement information such as: weight, blood pressure, temperature, glycaemia, urinary removal (if seniors can do some of these measurements by themselves – it will save nurses time and make seniors more independent)
- Section with: recommendations form the doctor, medical files, kind of disease, age, doctor notes – all info needed to take a professional care of senior) – one place to get the whole picture about the person
- Fall detection
- Possibility to call the senior (telephone number information) – easy procedure to make a contact
- Gas and smoke detection
- Notifications when a problem is detected
- Mobile application (nurses are very mobile – always on the go)
- Possibility to replace home nurse, when he/she is not available
- Adding appointments
- Having a journal with notes (nursing service, doctor visits etc.)
- It should be easy to use (alerts if something is wrong with the system)
- It should be a web application
- Data protection – secure system with medical info accessible only to nurses
- "Too much information kills the information" – only important data should be exposed
- Possibility to customize system for each senior, reducing number of sections – if they are not related to a given person). HN don't have time for searching, and reading – they just act.

Major considerations:

- PELOSHA should be a tool which makes nurses' work easier
- PELOSHA should give seniors possibility to perform many activities independently, with only a little help from nurses
- Nurses want to have access to information about seniors – but only to the most important information
- It should be an easy to use tool for monitoring, gathering and managing seniors' data (health and/or wellbeing data)
- Information included in Pelosha should be sufficient enough for each new nurse to adequately take care of the senior
- Nurses would like to be alarmed if senior's condition worsens.

Conclusions:

The Monitoring System should be a tool installed on a mobile phone, where a nurse can find specific data about the senior she is taking care of. It should allow her to be sure that all necessary health measurements were done. PELOSHA should give nurses possibility to react quickly in case of emergency (important addresses and telephone numbers should be included). System should be user-friendly and give a very clear

information (yes or no/done or not done/good or bad). It should present something like a overall (daily?) picture about the wellbeing of a senior, so she could plan her actions.

The Administrative System should include all collected data in order to observe the progress/regress of the senior (historical data included.) Access should be secured by password/code/etc. The Administration system should give her opportunity to customize her monitoring system for each senior (selection of features needed in the monitoring system) so she wouldn't be overwhelmed with data in monitoring system – which she is using every day. Pelosha should help her, not irritate her.

ANNEX A CONSENT FORM

PELOSHA project

Financing: European Commission & [NAME OF THE NATIONAL CONTACT POINT]

Coördinator: University Hospital of Geneva, Switzerland

Duration: 2019-2020

Consent Form

Dear sir/madam,

You are kindly invited to take part in the development of the PELOSHA system. This activity is part of the European research project PELOSHA. Before you agree on participating, it is important to read carefully this consent form and understand the procedure. If you have any questions or remarks, do not hesitate to let us know.

1. AIM OF THE PROJECT

The aim of the PELOSHA project is to develop a system for assist the senior to be independent.

2. GOAL OF THE INTERVIEW

The purpose of the interview is to better identify the features to include in the PELOSHA system to permit the senior to be independent.

3. PROCEDURE

In the interview will be ask some questions, you cannot answer to our questions if you want. This interview is audio recorded with your consent. The interview will take about one hour.

4. VOLUNTARY PARTICIPATION

You are asked to participate in in the interview on a voluntary basis. You can withdraw at any point in time without explanation.

5. RISKS

No risks to expect.

6. ADVANTAGES

You have not direct advantages for you. But your personal experience and opinion are valuable input. This information is the basis for further R&D activities in the field of independent living and assistive technologies.

7. ANONIMITY AND PRIVACY

Directly identifying information is removed from the data and replaced by a code, in order to guarantee anonymous data analysis and representation. Confidential data will be stored in a safe or locked file cabinet, and handled only by authorized staff members.

Information from the evaluation will be used for internal reports. Some outcomes might be used for PELOSHA dissemination and Journal or Conference publications as well.

8. CONTACT DETAILS

For more information about your rights as participant, for further questions or in case you are unsatisfied about the way the user session is executed, you are free to contact the following researchers:.

[Name – organisation – email@email.com]

Responsible for execution of user session in [country].

Example: Laetitia Gosetto – HUG – Laetitia.Gosetto@hcuge.ch and [?]

9. CONFIRMATION

If you are still interested to participate in the PELOSHA interview, please check the boxes below, and confirm your participation with your full name, date and signature on the bottom of the page.

1 I have carefully read this document. I had the opportunity to ask for clarification, and I confirm that I understand all the information. ☐

2 Based on the information, I agree to participate voluntarily in the interview. ☐

3 I agree that data about the use of my answer, can be used for research / the development of the platform and for earlier described communication. ☐

4 I agree that the interview is audio recorded. ☐

Date

Signature