Deliverable 2.3	
Scenarios of Design Concepts: Storyboarded Interaction and Product/Service Descriptions	
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Project Acronym: *HELICOPTER*
Project full title: *HEalthy LIfe support through COmPrehensive Tracking of individual and Environmental Behaviors*
AAL project number: *AAL-2012-5-150*

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CONCEPT SCENARIOS

Fig 1. Design researchers producing concepts during the brainstorm session.

INTRODUCTION

Following the initial fieldwork phase with elderly users in The Netherlands and Sweden[1], several opportunities areas for design have been discovered around the topics below:
- the elderly relationships with their relatives
- the role of the neighbours
- the subjective perception of sensors
- the reaction to self-tracking
- the personal goals of ageing

Starting from those opportunity areas, design challenges have been crafted by CIID researchers for the upcoming brainstorm sessions. The design challenges have been formulated into "How might we" questions that design researchers reacted upon with new concept solutions.
A big amount of sketched ideas have been created in response to the design challenges and the the most promising ones have been voted for further development (Fig 1).

In the section 1 of this document, we present the 5 design concepts that were developed after the brainstorm session and which underwent a further refinement. Each concept is presented with a scenario and an illustrated storyboard.
A following co-creation session (section 2 of this document) was run involving different stakeholders, like the elderly users and the engineering team, in order to collect feedback and iterate the concept into a final one which could embrace both elderly needs and wishes and also meet the Helicopter technical infrastructure that have been developed in parallel.
The final concept is described in section 3 of this document.
To conclude, detailed blueprints of the different stages of the final design concept have been created with a collaborative effort from the consortium partners, who reviewed them and contributed with their feedback and understanding of the project (section 4).

1. Boffi, L. (2015) People Centered Research. Project deliverable D2.1. Online at: http://ciid.dk/root_ciidwww/wp-content/uploads/2015/03/PeopleCenteredResearch_HELICOPTER1.pdf (Last access: February 2016)

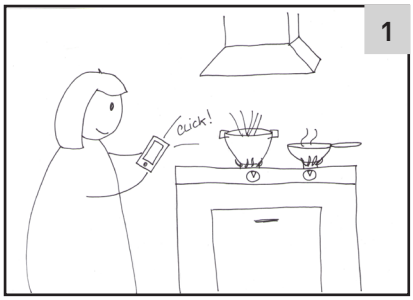
1.1 CONCEPT 1 "FUTURE-SELF"

Keeping yourself aligned with your future-self by a customised sensors network which detects your activities/routines and triggers domestic interfaces to motivate you towards the achievement of your goals.

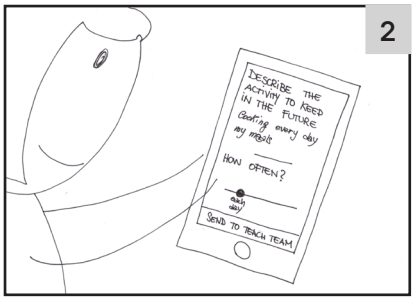
Opportunity area
Sensors to track the achievement of personal goals of the near future (for ex. maintaining the same routines and capabilities while ageing)

Scenario
An elderly person saves personal goals of the near future from his present experience. He takes pictures of activities and routines from the present that he would like to keep on doing while ageing. He writes a quick description of the situation pictured and indicates how often would like to experience that specific activity/routine in the future. Then, the elderly sends the pics+ the description to the Helicopter technical team, in order to receive the home sensors that would help him achieving those goals day by day. The elderly also appoints a personal goal custodian from his/her family members or friends as a person knowing him so well to be able to prompt him with the right advices when sensors reveal a deviation from the goals.
From the pictures and descriptions collected by the elderly, the Helicopter technical team identifies which sensors could match each activity/routine monitoring. A selection of sensors is packed and shipped to the elderly person by the technical team, with a description of each sensor; how each sensor is paired with an activity/routine; and instructions on how/where to place each sensor in the home.
The elderly person receives the packet and starts to install the sensors in the home, thus composing and growing its domestic sensors network by the routines/activities he keeps on saving for the future.
The sensors network constantly monitors if the person sticks to his goals by sensing if the activity/routine is performed at the pace the person has wished to keep on doing.
On the other side, the personal goals custodian can see the data analysis and when the system detects that the elderly behaviours is not leading towards the goals, he can send him a personal advice to motivate him.
The elderly can see if he is aligned with his goals from the Future-self Clock, where a compass like interface visualises the present orientation of the elderly respect to his aimed future. Each morning, when he passes in front of the clock, the person receives advices and reminders to keep achieving his goals. During the day, every time the person feels like getting extra motivation, he can go to the clock and the clock, by recognising the presence of the person starring at it, will visualise the advices.

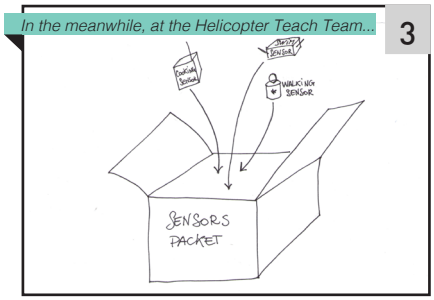
"FUTURE-SELF" STORYBOARD



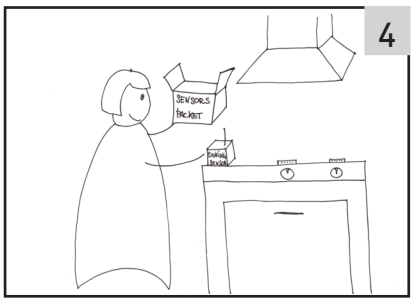
Sara joins Helicopter to get supported in maintaining activities and routines she would like to do also when older. To do that, she needs to take pictures of these activities as goals for her future self.



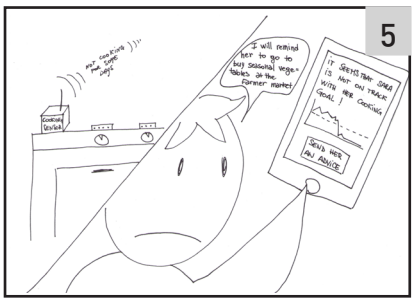
For each activities she makes a little description and specifies the frequency. Then she sends her goals to the Helicopter Teach Team.



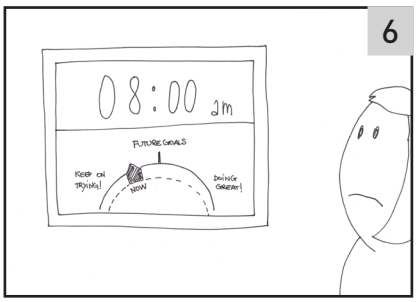
The Helicopter Teach Team prepares the custom sensors for her, with instructions on where to place the sensors in the house and explanations about how they work. The sensors are sent to Sara in a packet.



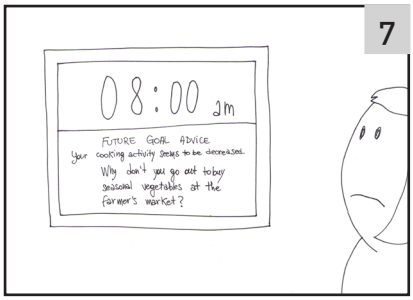
Sara receives the packet and starts to place the sensors around the house as described by the Teach Team on the instructions. The sensors system starts to work, monitoring if she keeps performing her goals as she wishes to do.



The following week Sara happens not to cook much for some days, and the sensor system realizes it. Her son get notified about her mom missing her goal from the Future-self app and decides to send her an advice to catch up.

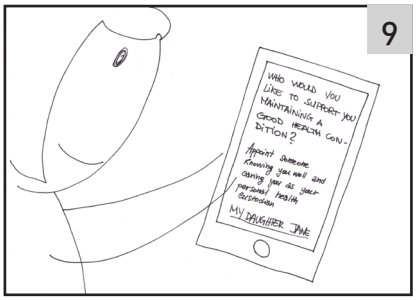


Sara instead can understand how she is doing with her goals from the Future- Self clock, where she sees how well/bad she is aligned with ther future self goals.



If she stares at the cloack, she receives advices on how to achieve her goals. The advices can come from the Helicopter service or her caregiver (her son).

The Helicopter service suggests Sara to complement her goals sensors with the basic health diagnostic sensors that the service can offer, in order to being able to better focus on the achievement of her goals through a good health status.



By deciding to get also the diagnosic sensors, she needs to appoint a person as health custodian. This person will get access to the data collected by the sensors and be notied if particular attention on her health condition is required.

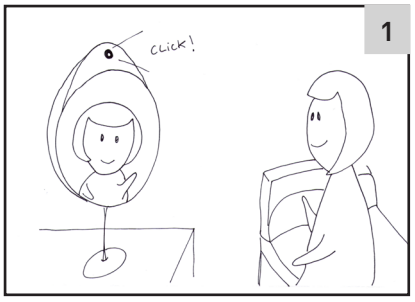
1.2 CONCEPT 2 "SHEALTHY"

Sending selfies of yourself and pair them with health measurements as an update of your health status.

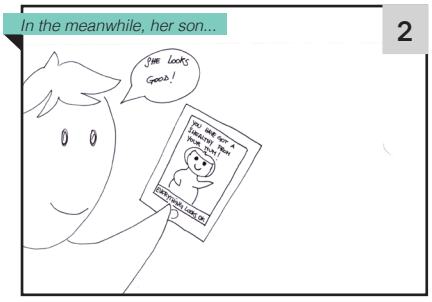
Opportunity area
Sensors monitoring as a remote and intimate way of looking mutually out for distant relatives.

Scenario
Every morning, the elderly gets up and takes a picture of himself through his Shealthy mirror to send to his caregiver as an update of how he feels today. According to his doctor prescription, the photo booth reminds the elderly of the health measurements he needs to take, like blood pressure or glycemia.
The day after, it is actually the day of glycemia measurement, so the mirror prompts the elderly to take the measurement before sending the pic to his caregiver. The mirror will show the result of the measurement on its surface, while the caregiver will receive an email, with the picture and the health measurement taken at the moment of the picture.
The caregiver can also see the historical graph related to the health parameters of the persons and receive warnings if there is the possibility of some disease onset.

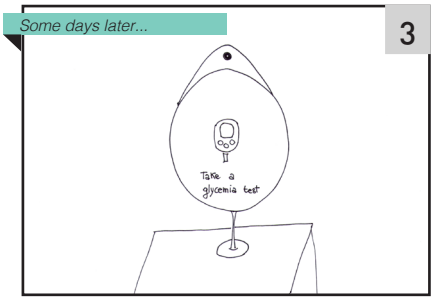
"SHEALTHY" STORYBOARD



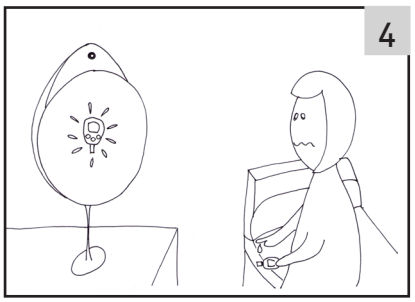
Every morning Sara uses her Shealthy mirror to take a picture to send to her son in order to let him know that everything is fine with her and of course to say hello to him.



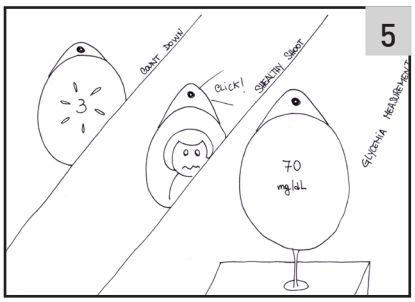
Her son receives her mom's Shealthy and can see that everything is fine with her both from the way she looks in the picture and from the Shealthy app, which gives him the update from the sensors system.



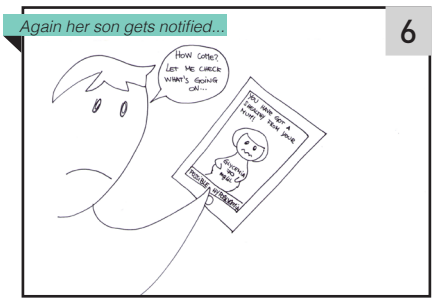
The Shealthy mirror works also as a display and reminds Sara to take medications and tests, as prescribed by her doctor. Today is time for the glycemia test.



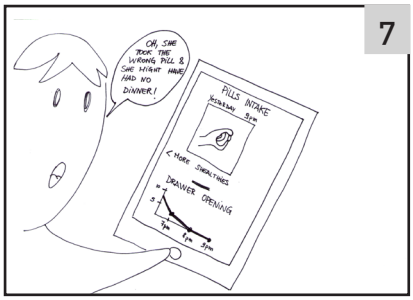
She takes the test as suggested by the mirror. By the way, she is not feeling very well...



The mirror takes the picture at the end of the test and then displays the result of the test, not to influence the way she looks in the picture. The result of the test is not good: glycemia is too low...



The son receives the Shealthy and he can see the result of the test together with the picture. The Shealthy app notifies him that his mom could possibly have hypoglycemia this morning.



To get more information on the situation, the son looks at the sensors analysis from the Shealthy app and realizes that his mom took the wrong pill and didn't have any dinner. Hypoglycemia is happening for sure then!

He calls his mom saying he would run to her quickly to assist her.

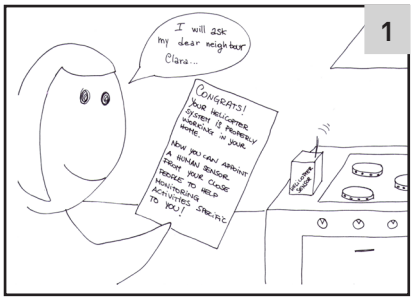
1.3 CONCEPT 3 "HUMAN SENSOR"

Delegating to neighbours or close people the monitoring of behavioural patterns specific to a person.

Opportunity area
Involving the neighbours in the identification of elderly routines that would be meaningful to monitor via sensors for the elderly health and wellbeing.

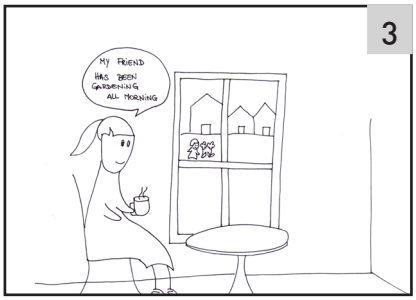
Scenario
By adopting the Helicopter service, the elderly can appoint a close friend or neighbour as his Human Sensor, to complement the Helicopter system with the monitoring of all those specific behavioural patterns that only that close person knows of him and that the sensors couldn't observe due to technical limitations.
First of all, the person acting as the Human Sensor can list on his device a series of routines that, from his observation, the elderly is usually doing in his daily life. The lists will turn into a series of sliders indicating "as usual", "more than usual", "less than usual". The person acting as the Human Sensor logs the information about the elderly from his device and sends it to the Helicopter data hub as he happens to observe the elderly in the neighbourhood.

"HUMAN SENSOR" STORYBOARD

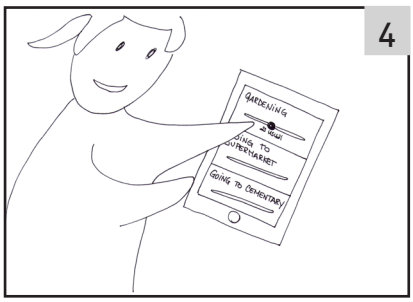


Mrs Sara has received her sensor packet and she is invited to complement her system by appointing a Human Sensor among her close people.

Clara accepted to become Mrs Sara's Human sensors. As a first thing, she lists the routines she knows about her and that she happens to observe.



In her normal daily life, Clara happens to observe activities performed by Mrs Sara, like gardening.



Being Sara's Human Sensor, Clara notifies the system that Sara has performed gardening as usual.

1.4 CONCEPT 4 "3UP"

Delegating to neighbours or close people the monitoring of behavioural patterns specific to a person.

Scenario

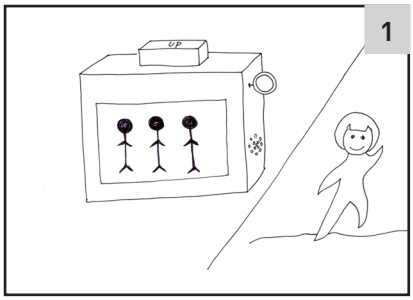
When entering the Helicopter monitoring service, the elderly user gets 3UP. By maintaining his routines and his healthy lifestyle or, on the other side, giving it up, the extra lives increase or reduce.

The elderly can see his extra lives from the UP display. If the sensor system detects deviation from normality over a period of time, the elderly loses a part of his extra lives. He can always try to regain more lives by taking an UP challenge. The UP challenge can be suggested by the Helicopter service, the caregivers or neighbours (like the Human Sensors) and they can be text, audio or video messages to be displayed from the UP display.

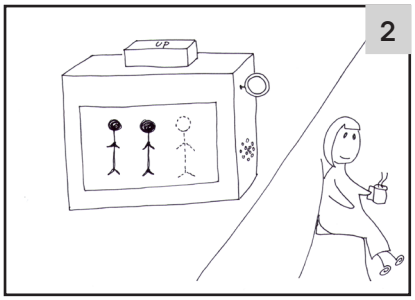
By pushing the UP button on the display, videos or messages suggesting challenges appear. They are from caregivers or from the system itself. When pushing the UP button, a simulation bar will also display the potential amount of life that would be gained in case the challenges was achieved.

To accept the challenge, the elderly will pull the time ring, which will start a count down of 24 hours to achieve the challenge.

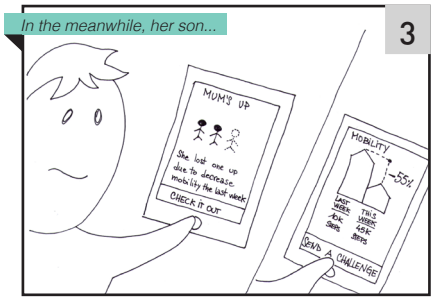
"3UP" STORYBOARD



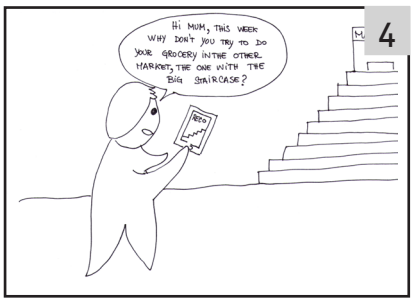
Sara installed the Helicopter sensors system at home. As a feedback from the sensors analysis, she got an UP display visualizing how active and healthy her life is as "extra lives". At the moment Sara has 3 extra lives on the UP display because she is conducting a healthy and active life.



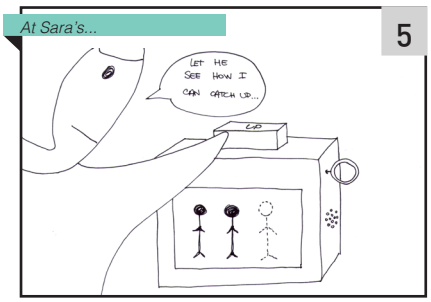
Unfortunately, recently she lost a life on her UP display because she started to move less in her daily life.



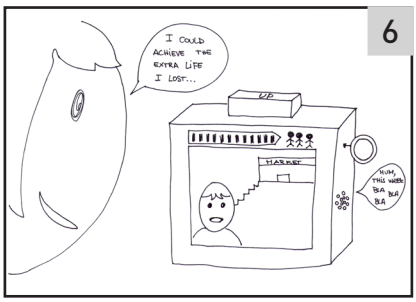
Her son gets notified in his UP App and decided to send her a challenge to help her regain the extra life.



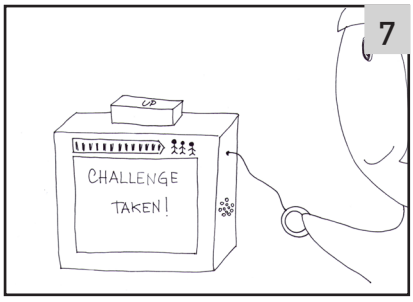
He records a video message to her with a challenge to do to help her improving her mobility score.



Sara would like to improve her situation and regain the life. She pushes the button of the UP display to browse the challenges available.



A challenge is displayed and the UP display also shows the amount of life she would regain taking that challenge.



To take the challenge, she pulls the ring, which will work as a timer for her to complete the challenge.

1.5 CONCEPT 5 "SENSOR WAND"

Sensors and its functioning as a domestic presence and a familiar behaviour

Opportunity area
Sensors and its functioning as a domestic presence and a familiar behaviour.

Scenario
From time to time, the elderly can perform a check up of the sensors in his home, to see if they are properly working. The elderly, together with his sensors receives a screening wand. By putting the wand close to a sensor, the wand lights up, indicating that the sensor is working properly.
In case the elderly detects some malfunctioning in any sensor, he can call the Helicopter care team.

"SENSOR WAND" STORYBOARD

From time to time Sara goes around the house and does a screening of all her sensors with her sensor wand in order to be sure that they are functioning.

By putting the wand close to the sensor, the wand lights up to indicate that the sensor is working properly.

2.
CONCEPTS CO-CREATION

2.1 "FUTURE-SELF" CO-CREATION

PART A# Co-creation with elderly users

We asked potential elderly users of the Helicopter system in Italy, Sweden and The Netherlands to save goals for their future for things they would like to keep on doing or being part of when older. They would need to take a picture for each goal, describe it and indicate how often they would like to keep on doing the described activity.

The respondents came up with very personal goals, ranging from cleaning activities in the house to entertainment ones around the city they live in. Some elderly enjoyed so much to do these goals setting activity that they said that they would like to keep on doing it in the future as well.

A set of cards was made out of the collected goals with the picture and description for each goal. The set of cards was used in the co-creation session of the Future- Self concept with the tech team.

PART B# Co-creation with the engineering tech team

We asked the Helicopter tech team (the engineers from University of Parma) to select cards related to a person from the goals set of cards and build paper prototypes of custom sensors for monitoring that specific person's goals.

The participating engineers managed to envision different kind of sensors for the elderly represented in the cards, broadening the range of sensors used at the moment in the Helicopter project.

Despite the peculiarity of the elderly goals, they came up with different solutions to meet all of them, from acoustic sensors to detect whether or not an elderly was keeping on vacuum cleaning the house, to an accelerometer in the rolling pin to detect if the elderly was keeping on doing hand made pasta.

They had to build paper prototypes and state how the sensor would work, where it should be placed, if it would have to be plugged , etc.

2.2 "SHEALTHY" CO-CREATION

Co-creation with the engineering tech team

We asked the participating engineers to describe how the Shealthy service could be integrated in the current Helicopter technical structure by matching each storyboard frame with a sketch of its technical functioning.

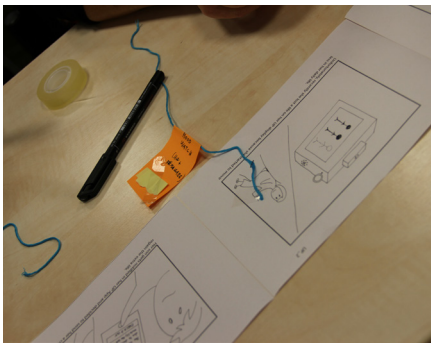
All the three teams of participants agreed on the fact that the Shealthy concept could be integrated in the current Helicopter technical structure.

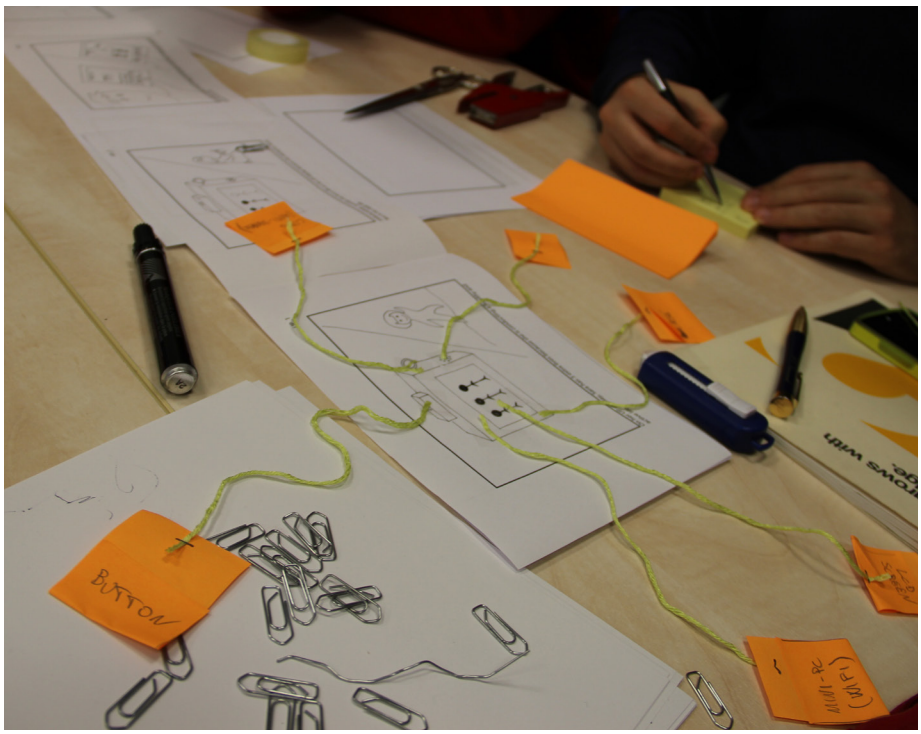
Regarding the technology to be used to build the mirror, one team would build it from stracth starting from a LCD screen; another team would use a mirror- screen tablet; the third team would simply use a tablet with several apps installed on it to run the mirror functionality, the health tests, etc.

2.3 "3UP" CO-CREATION

Co-creation with the engineering tech team

The tech team was asked to sketch the software and hardware components of the 3UP service devices. Yellow stands for software component, orange for hardware.





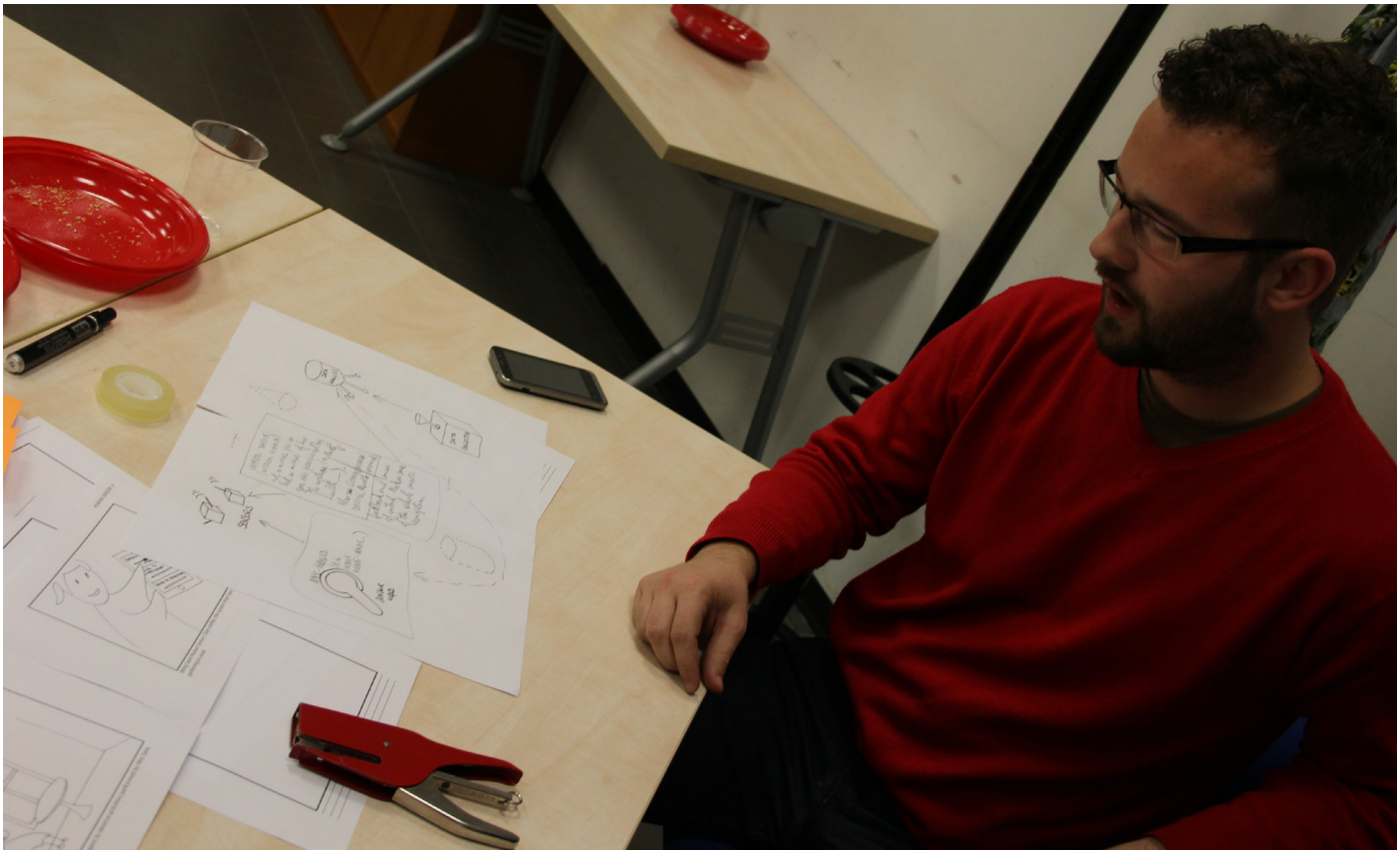
The participants found hard to differentiate between the software and hardware components because they are always very intertwined in any device. According to the participants, two were the main devices needed for the 3Up concept: the 3UP display and also the wearable sensor that one team built previously when co-creating the Future- Self concept.

Two teams thought of the 3UP display as a stand alone interface to be built from scratch, the other team instead envisioned it as a tablet running a specific app.

2.4 "HUMAN SENSOR" AND "SENSOR WAND" CO-CREATION

Co-creation with the engineering tech team

As a final activity, the tech team was asked to map how the Human sensor and Sensors wand would work with the existing Helicopter structure and the other Helicopter concepts which were just presented. They were provided with an unfinished map to fill in.



The three teams agreed on the fact that all the 5 concepts could be integrated into the existing structure of Helicopter. They conveyed that the 5 concepts brought back those aspects of the project which were not been covered yet, such as releasing advices and inspiring motivation for the elderly to keep an active and healthy lifestyle.

About the Human Sensor, one group stressed the fact that the data introduced by the neighbour cannot be considered so frequent as the data obtained by the "normal" sensors, so a particular weight to the data coming from the Human Sensor should be given at the moment of the data analysis, leading to a predictive result.

The Sensors Wand would present various technical challenges, so an idea could be to bypass the problems by turning the physical wand object into an app for the tablet.

3.
FINAL CONCEPT

THE HELICOPTER FINAL CONCEPT

After collecting the stakeholders feedback to the 5 design concepts, it was clear that from the point of view of the co-creation participants the different concepts could be all integrated into one big overarching design solution. Most participants reported that each one of the 5 concepts was describing a different stage of what the Helicopter service could be.

This is the reason why we went for a following reiteration of the 5 ideas with the aim of integrating them into a bigger concept which could cover the whole Helicopter service experience.
We identified 7 different stages: 1. Getting engaged; 2. Sensors Selection; 3. Human Sensor; 4. Sensors notification; 5. Motivations/advices; 6. Automatic triage; 7. Checking on sensors (Fig. 2).

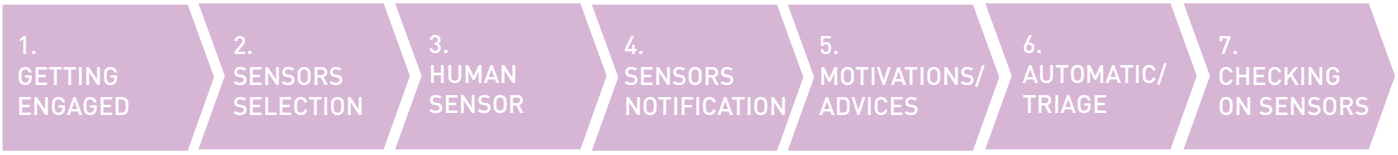
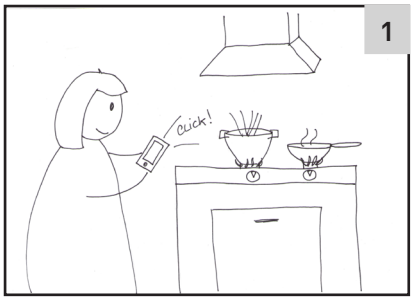


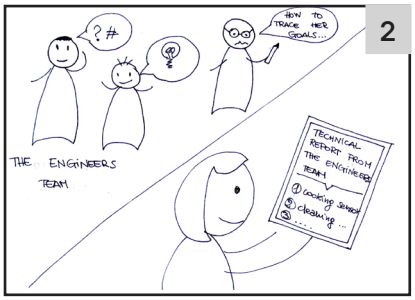
Fig 2. The different stages of the final concept.

In the Helicopter final concept, we introduced the metaphor of the "domestic sensors landscape" and we envisioned that each sensor could represent and be shaped as a character of a landscape. The sensors would be spread around the house and shown as part of the home landscape without any need to be hidden away.

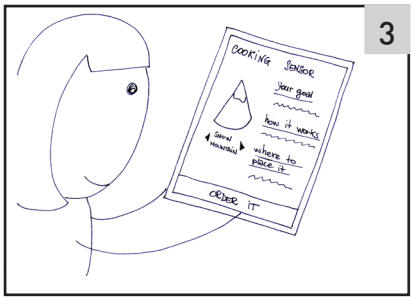
1. GETTING ENGAGED



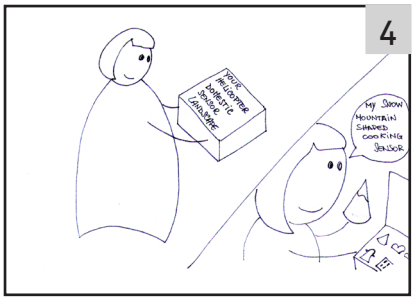
Sara joins Helicopter to stay healthy while ageing and get supported in maintaining activities and routines she would like to do also when older. To do that, she needs to take pictures of these activities as goals for her future self, such as cooking, using the Helicopter application on her device.



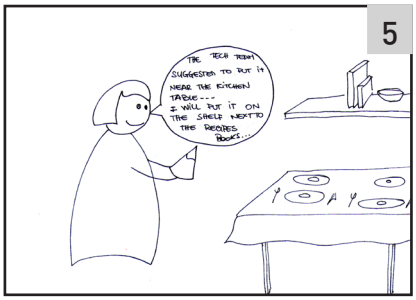
Based on Sara goals list, the Helicopter engineers team comes up with novel sensors to track her personal activities and sends Sara a technical report about the suggested sensors to compliment her Helicopter system with. Sara can access the report on her Helicopter device as well.



Sara can choose the shape of the sensors as landscape characters from her Helicopter app for both the sensors received in the technical report list (which are linked to her future- self goals) and the health monitoring sensors that come by default with Helicopter.

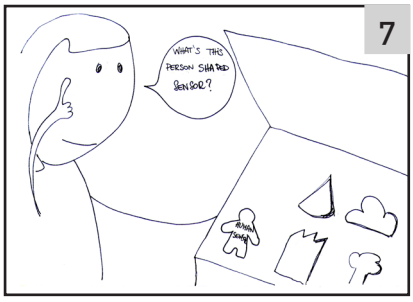


She gets the box of sensors delivered at home.

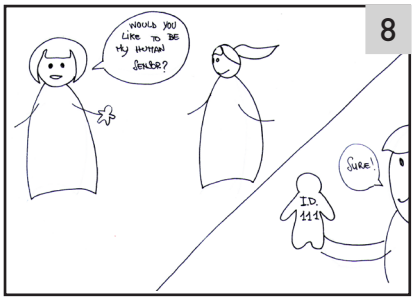


She starts installing her sensors system by populating her home with her landscape characters shaped sensors, following the instructions provided by the technical team.

In a later stage, the Helicopter installer will visit Sara to finalise the installation and have the sensors working properly.

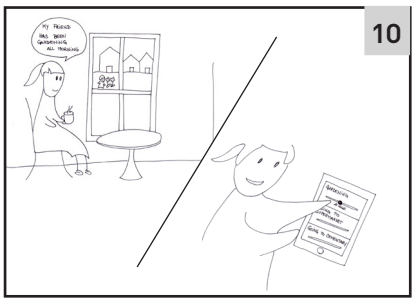


In the sensors box, Sara finds a special "person- shaped sensor". The instructions explain that she can give it to a close neighbour knowing her routines, who would help monitoring her activities from far.

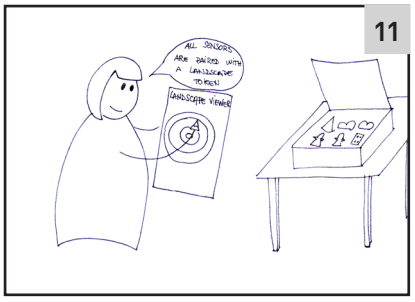


She decides to give it to her neighbour Rita. Rita could download the dedicated Helicopter Human Sensor app on her device and pair it with Sara by introducing the ID code reported on the person-shaped sensor.

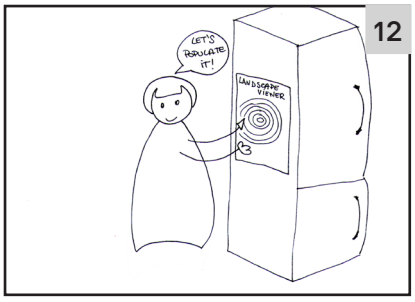
The app invites Rita to list the activities she is aware that Sara engages in and that she frequently happens to see her performing from far.



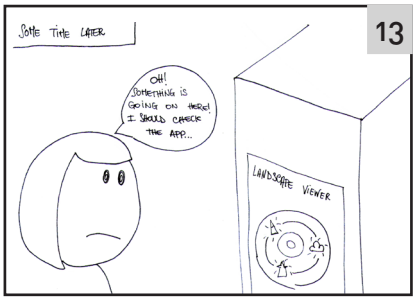
When Rita happens to see Sara performing any of the activities she listed, she can report it on the app. The information will be gathered in the Helicopter data collection unit and then processed together with all the other data coming from conventional sensors.



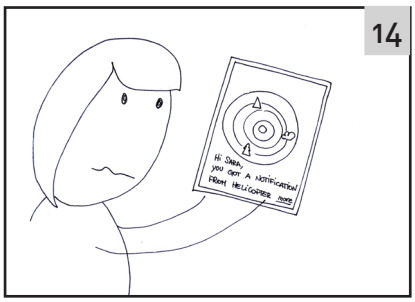
In the sensors box, Sara finds also a token paired with each sensor and a poster to attach on the refrigerator. The tokens are magnetic and have the same shape of their twin sensor.



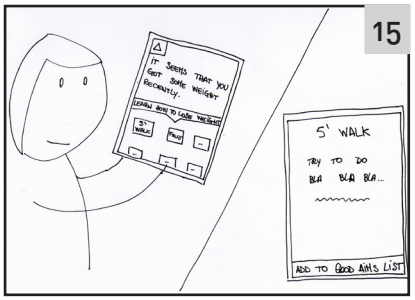
The tokens are to be placed on the poster, building a domestic and peripheral sensors display.



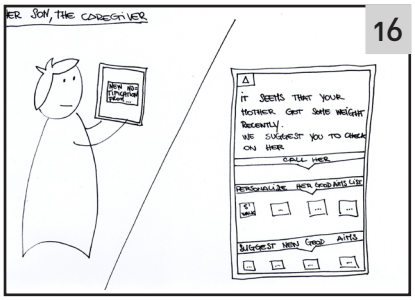
When the sensor landscape wants to notify Sara about an unhealthy behaviour or a diagnostic suspicion, the related tokens light up on the poster.



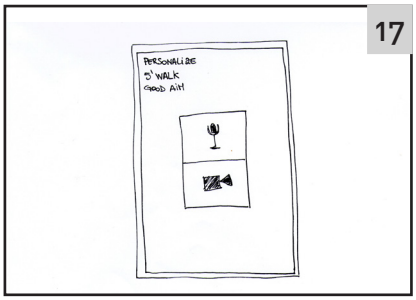
After Sara notices that the tokens lighted up, she can go to her tablet and check on the Helicopter app what this notification is about.



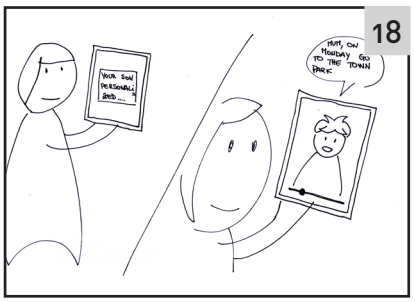
Sara goes to the app to read about the sensors notification details. It seems she got weight recently, so the app suggests her a series of advices on how to lose weight. She adds the advices she prefers in her personal "Good aims list".



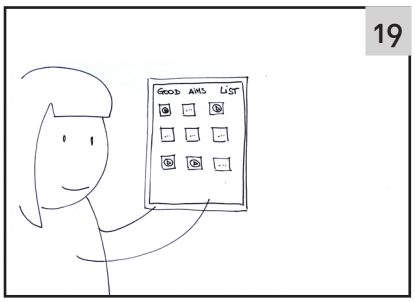
In the meanwhile, her son gets also notified about Sara gaining weight recently. He uses the Helicopter app for the caregivers. The app suggests him to check on her in person or call her. Moreover, the app encourages him to personalise the "good aims" Sara collected in her personal "Good aims list" or to suggest new ones.



Her son personalises the "5' walk good aim" that Sara collected in her list by recording her a video message.

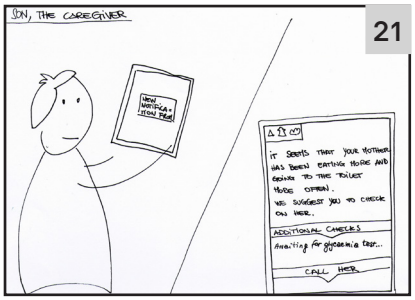


Sara receives the personal advices from her son on her app.



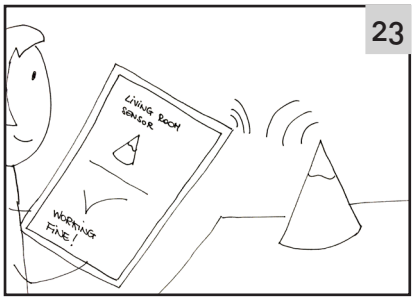
Sara's "Good aims list" gets personalised by her son quite regularly. Her son records new contextualised goals for her in order to prompt Sara to behave healthy.

Sara receives another notification on the poster and goes to the app to read about the notification details. It seems she has been eating more and going to the toilet more often. The app invites her to take additional health check, such as a glycaemia measurement.



In the meanwhile, her son gets also notified about Sara eating more and going to the toilet more often on his Helicopter app for caregivers. The app suggests him to check on her in person or call her. Moreover, the app lets him see the results of her glycaemia measurements. In case, it would eventually suggest him to bring her to the doctor.

Sara from time to time likes to perform a check on her sensors to be reassured that everything is working properly.



By going physically near to each sensor with her NFC tablet and pair her tablet with the sensor itself, she can get the information about the proper working of the each sensor.

4.
SERVICE BLUEPRINTS

WHAT IS A SERVICE BLUEPRINT

A service blueprint is a visual tool that helps to specify a service or design concept. Every element and interaction of the service is mapped out as a logical sequence in time and context.
The following are the reasons why we design service blueprints during a service development:
- to visualize all the possible actors involved and interactions
- to let service gaps emerge
- to let service overlapping emerge
- to let unforeseen relationships among different actors emerge
- to refine/ reiterate the concept with the different partners/stakeholders

In the figure below (Fig. 3), we summary how a blueprint is structured, while in the following pages different blueprints related to subsequential phases of the Helicopter service are mapped out.

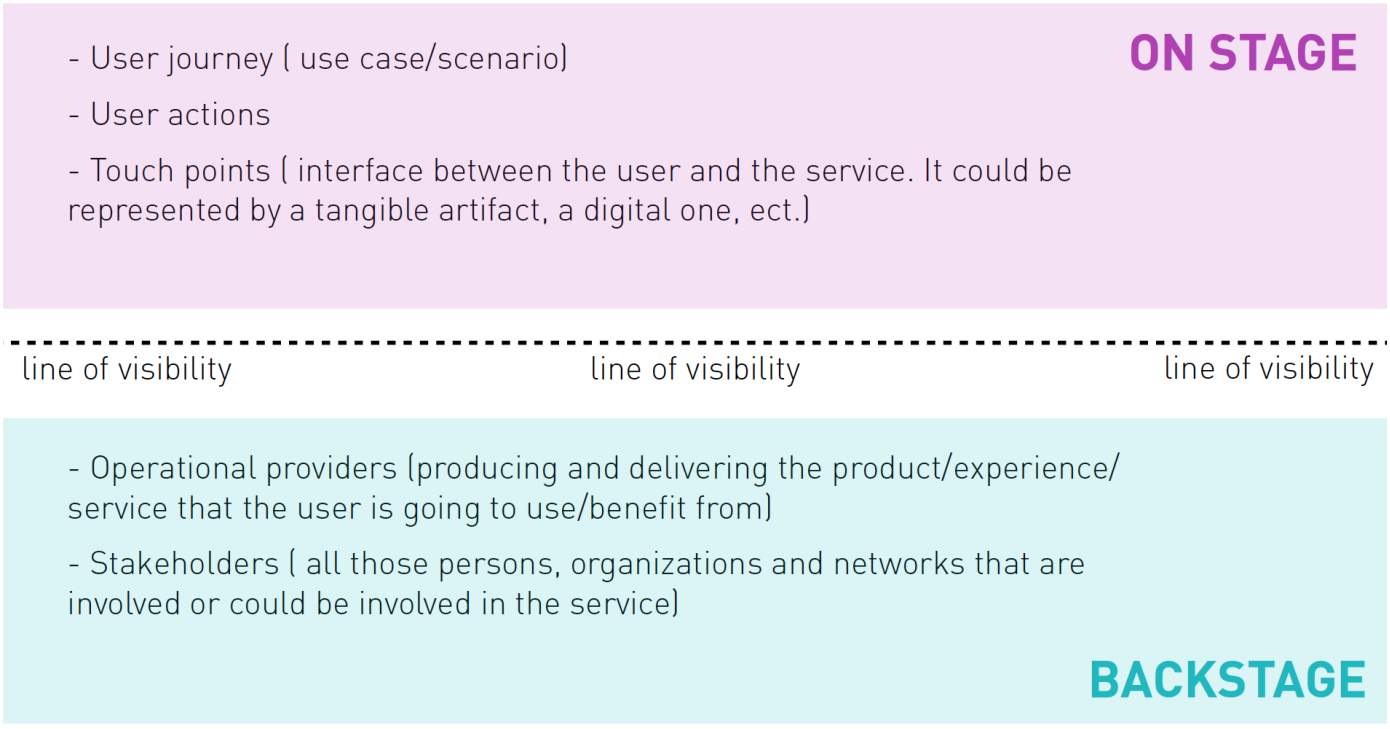
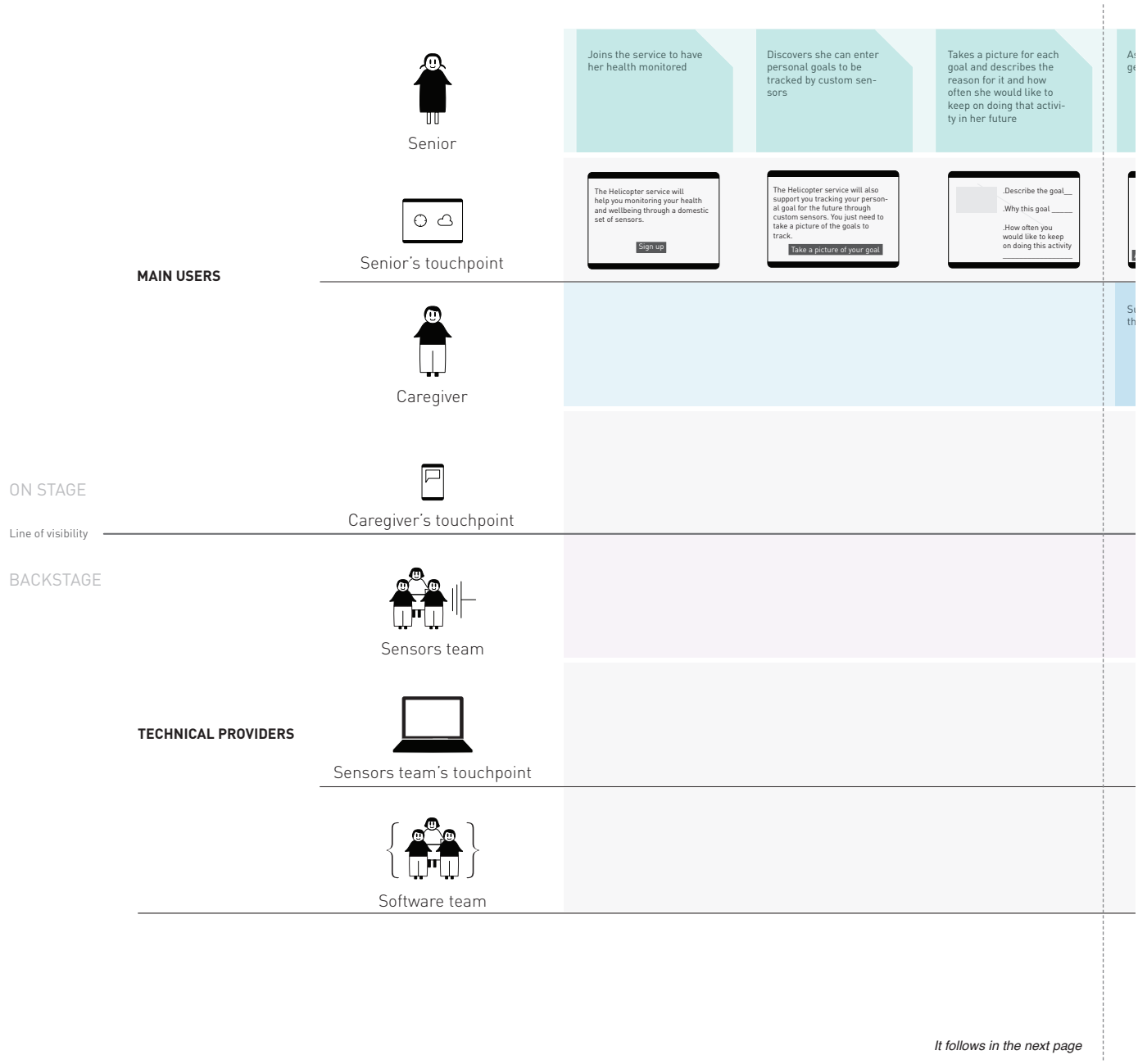


Figure 3. How a blueprint is structured

1. GETTING ENGAGED

GOALS
- Signing up to the service
- Requesting costum sensors to track future- self



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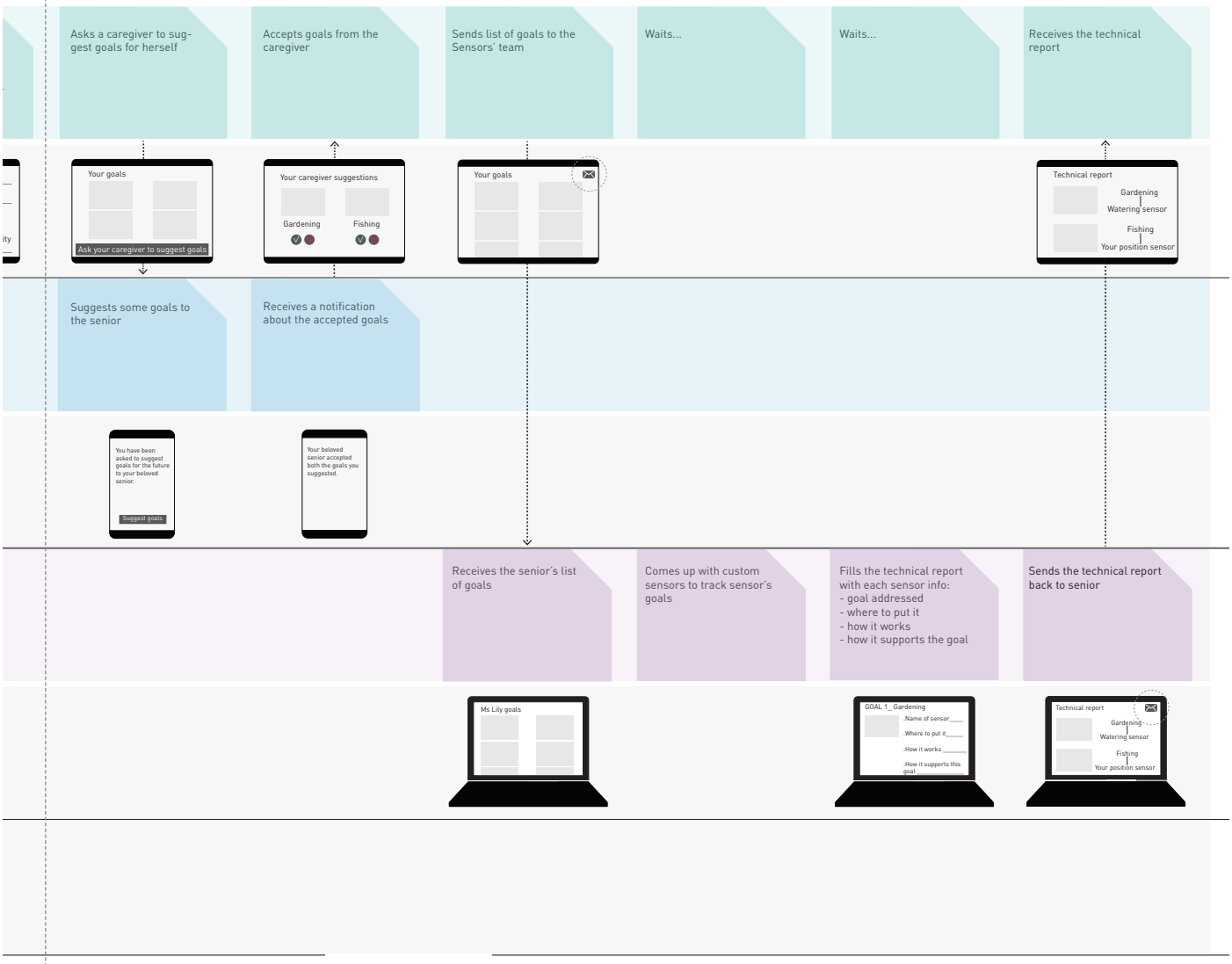

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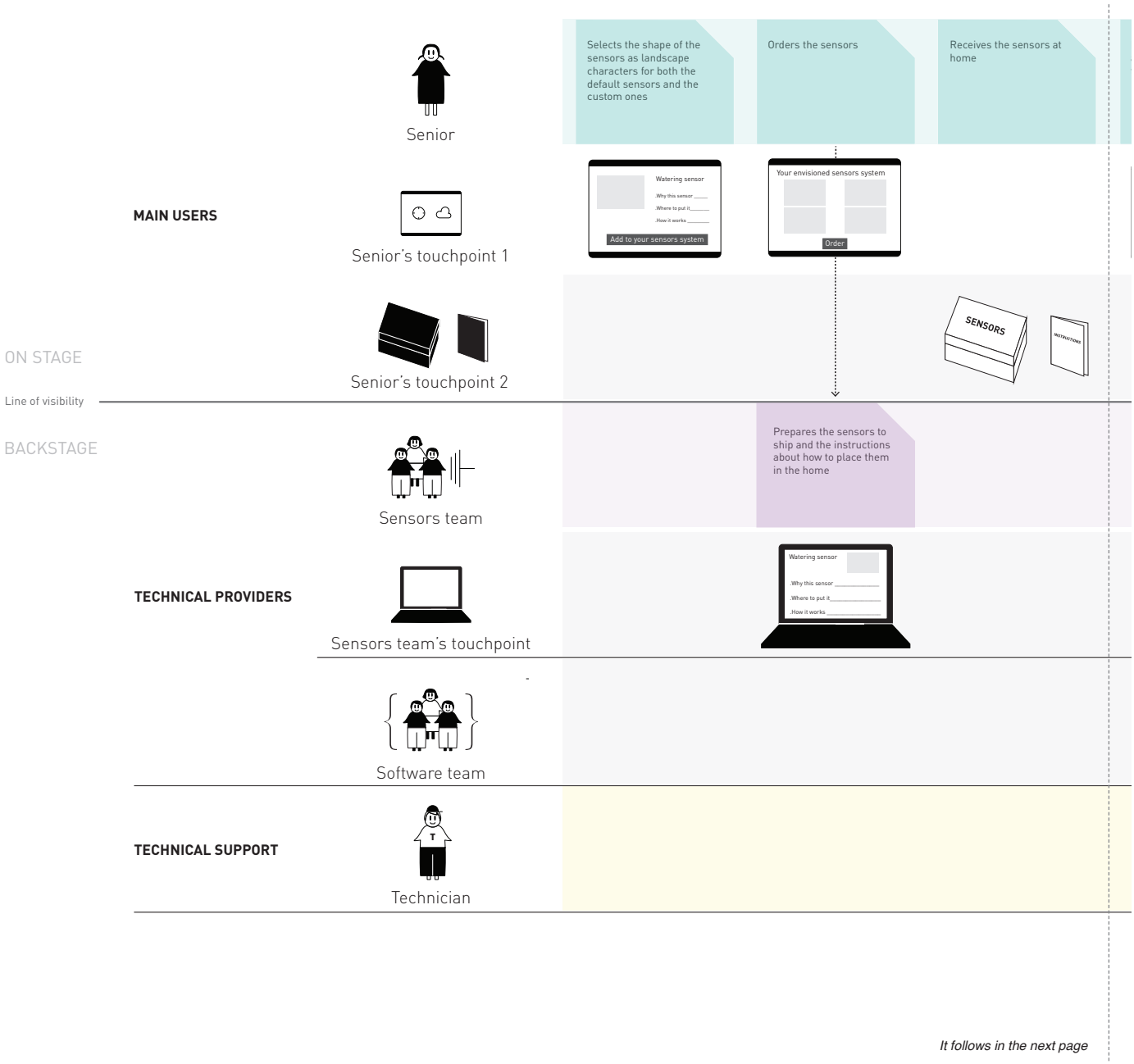
1. GETTING ENGAGED

2. SENSORS SELECTION

GOALS
- Selecting sensors shapes
- Installing the sensors



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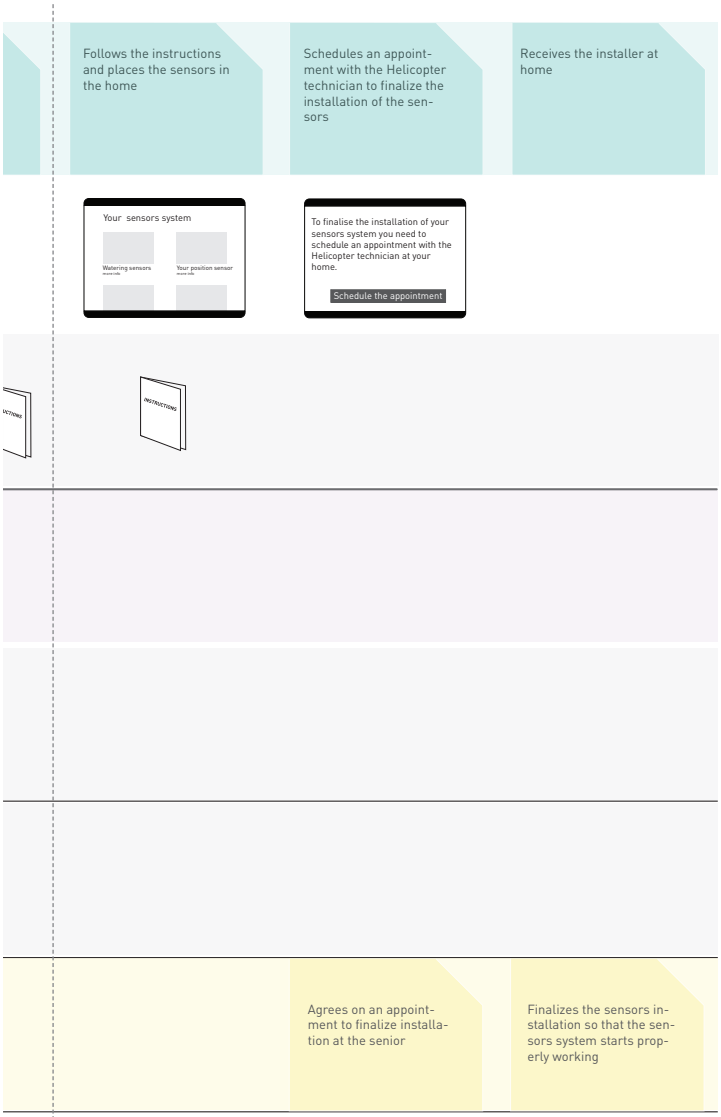

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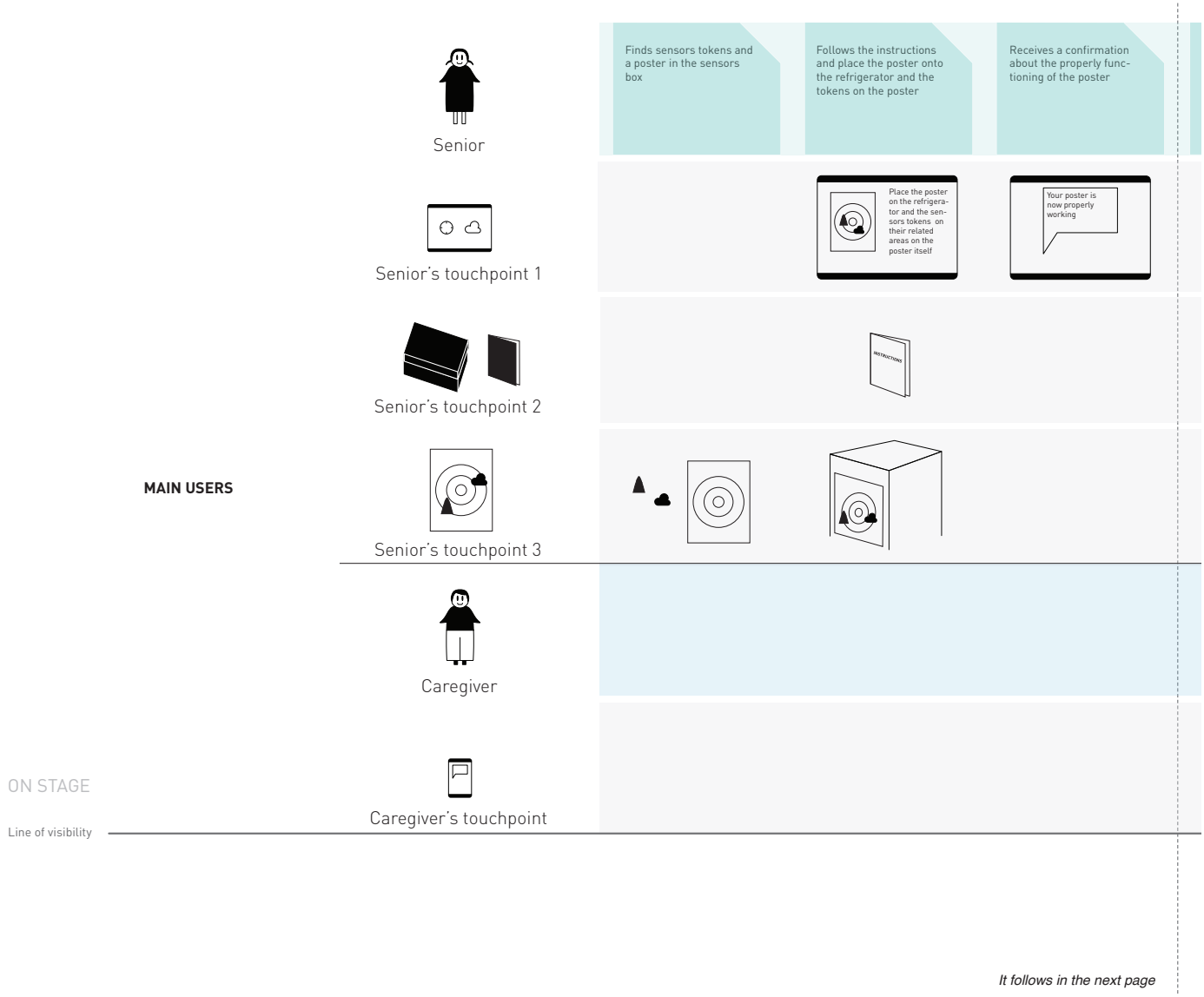
1. GETTING ENGAGED
2. SENSORS SELECTION
3. HUMAN SENSOR
4. SENSORS NOTIFICATION



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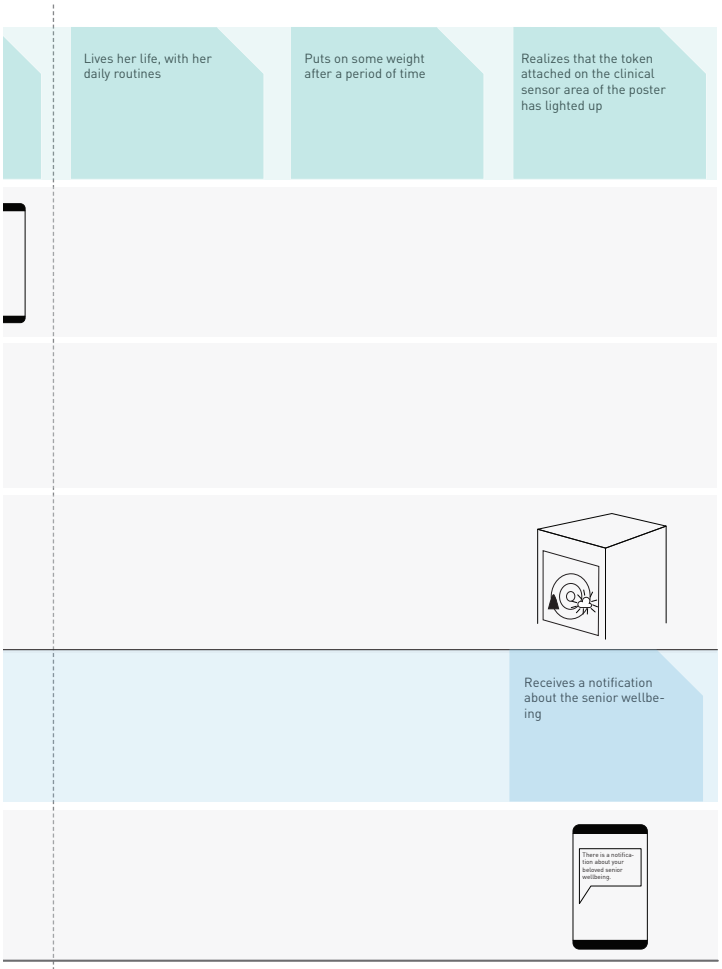
GOALS
- Receiving a diagnostic suspicion
- Contacting the nurse



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1. GETTING ENGAGED	2. SENSORS SELECTION	3. HUMAN SENSOR	4. SENSORS NOTIFICATION	5. MOTIVATIONS/ ADVICES

ON STAGE

Line of visibility

BACKSTAGE

MAIN USERS

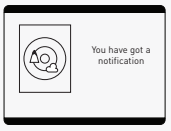
Senior

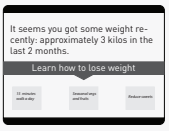
Opens her tablet after realizing that the magnets on the poster lighted up

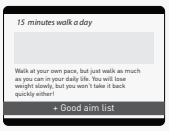
Reads the notification and the good aims that the app suggests her to correct her behaviour and improve wellbeing

Selects a/some good aims and add them in her good aim lists

Senior's touchpoint







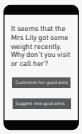
Caregiver

Receives on his device a notification about the Helicopter system

Is invited to check on Mrs Lily first by phone or in person and to customize the good aims that the senior added in her list or to suggest new ones

Decides to customize a good aim already present in the senior list

Caregiver's touchpoint



TECHNICAL PROVIDERS

Software team

HEALTH PROVIDERS

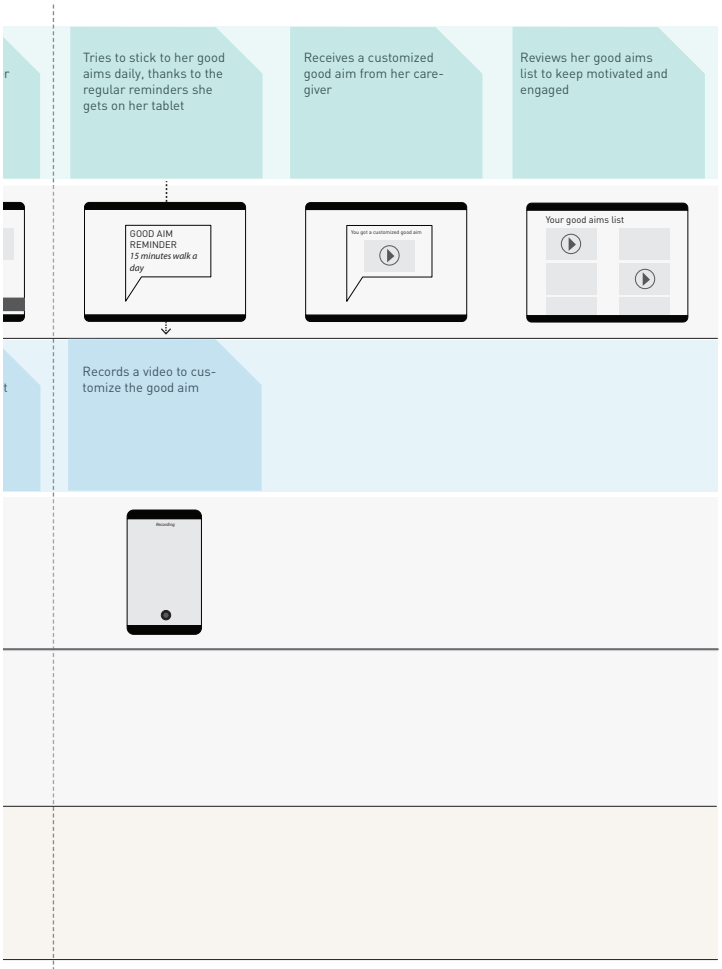
Have been consulted and have issued lists of advices to be included in the app for each unhealthy behaviour/condition that the sensors system could detect

Medical advisors

It follows in the next page

NS/

GOALS
- Adding good aims to the own list
- Having the caregiver customizing senior's good aims



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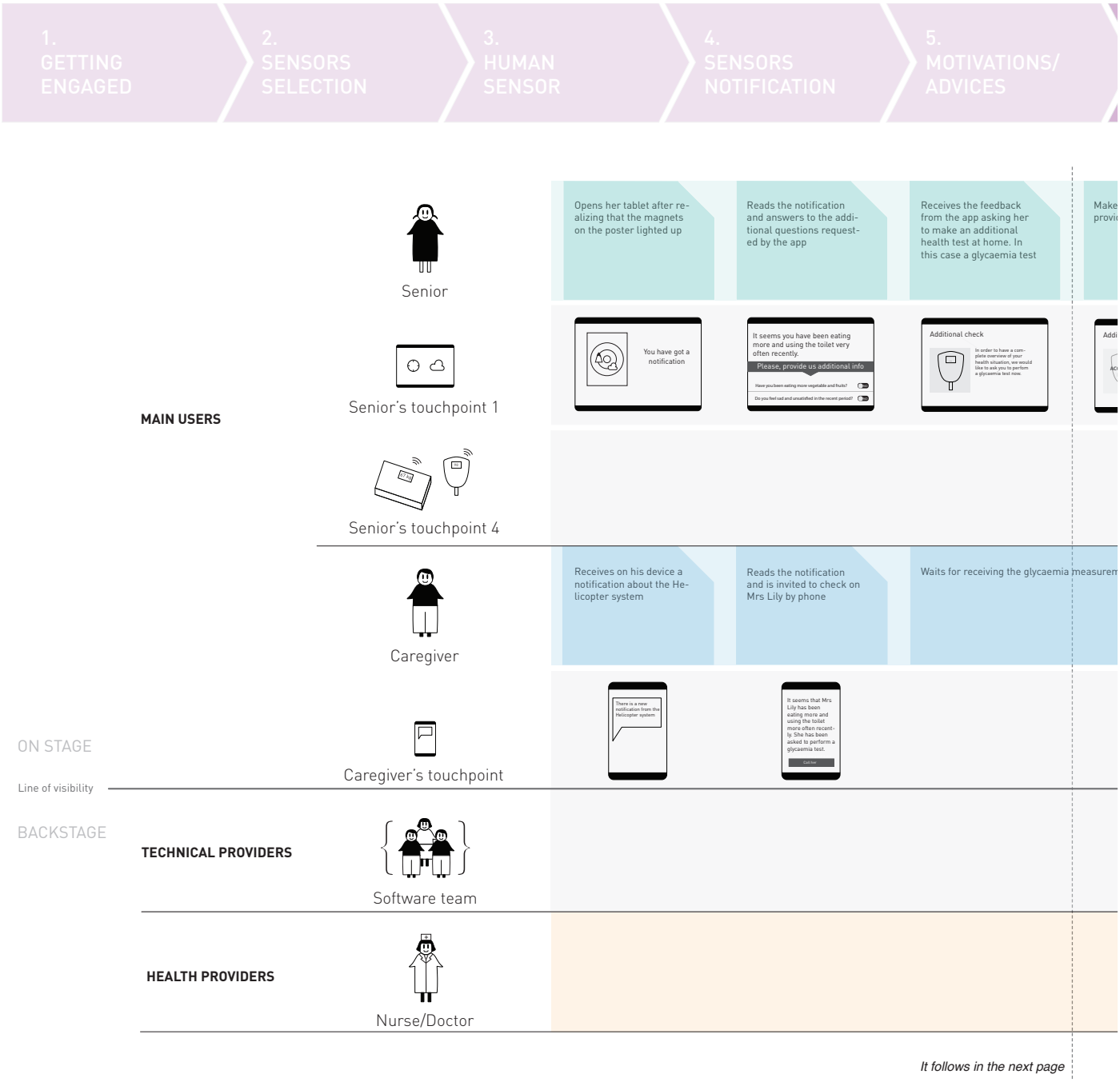

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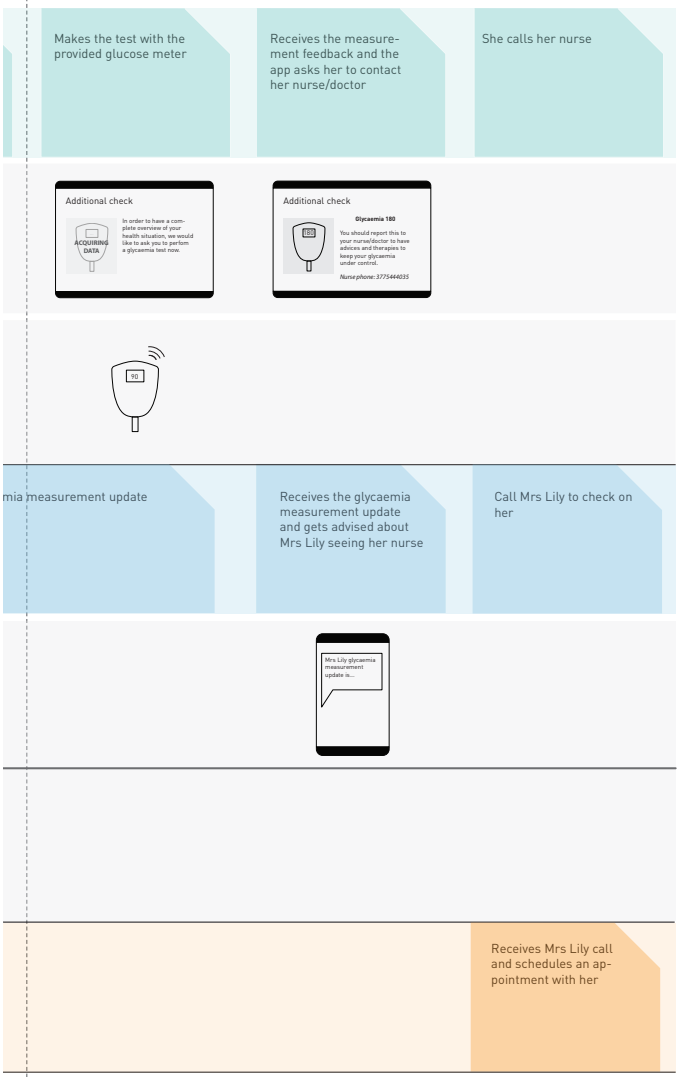
6. AUTOMATIC/ TRIAGE

GOALS
- Receiving a diagnostic suspicion
- Contacting the nurse



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