AAL PROGRAMME	**PersonAAL**	

PersonAAL
active and assisted living

Deliverable 3.1b

Remote Assistance Demonstrator and Field Trial Plan

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Contributors: **All Partners**

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1 INTRODUCTION

The document describes the specifications of a prototype system that supports remote assistance of elderly persons at home, and how the technology developed in the PersonAAL project is going to be used to improve this application.

The deliverable contributes to Work Package 3, and specifically to the tasks T3.1 – Demonstrator Development and T3.2 – Field Trial Development. It extends and supersedes the deliverable D3.1a [8].

The main goal of the PersonAAL project is to extend the time older people can live in their home environment, increasing their autonomy and assisting them in carrying out activities of daily living by means of intelligent and intuitive web applications.

PersonAAL primarily addresses elderly users who can be starting to suffer from some kind of functional (temporary or permanent) limitations or impairments typical of later age (vision, hearing, motor and/or cognitive). In order to facilitate the daily lives of older people, the PersonAAL platform monitors their behaviour through appropriate sensors and adaptively renders health-related information and quality of life improving suggestions on various devices existing at home through intuitive user interfaces.

Professional and especially informal caregivers, who generally have no specific professional technology training but have an intimate knowledge of the elderly, are our secondary users. The PersonAAL project builds easy-to-use environments exploiting novel metaphors, empowering caregivers to intuitively create, configure and personalise interactive services (e.g. patterns/scripts that could trigger specific events like notifications, warnings, alarms …), to support older users in effectively managing and carrying out their daily tasks.

The outputs of PersonAAL are a platform for adaptation and end user development and three applications.

The platform [1] includes an authoring environment that incorporates accessibility concerns and design for all principles during the web application development, and a run-time support able to adapt and customize previously authored care applications to elderly users, their changing abilities, and their environment and device characteristics.

The applications innovate existing solutions that are in different phases of acceptance and use, namely remote assistance, medication monitoring and rehabilitation physiotherapy.

Remote assistance has already been implemented on a significant scale in many European countries and Santer Reply, through the startup Healthy Reply, already offers a commercial solution to improve the quality of life of chronic patients, by managing continuous out-of-hospital care, using innovative technological systems for taking charge of patients and remote monitoring [2].

The prototype is aimed to show how PersonAAL platform can improve the main features present in a telemonitoring/telecare solution.

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2 PROTOTYPE DESCRIPTION

2.1 Objectives

According to the DoW the Remote Assistance Application should enable elderly users to receive remote assistance and support by both family and care providers directly in their own homes with the goal to improve quality of life and decrease healthcare delivery cost.

Moreover, the system may autonomously provide advice based on monitored activities, vital signs and the agenda of the elderly. For example it could present reminders and give motivational messages for a healthy lifestyle.

The users' physiological parameters will be collected by sensors on peripheral devices (ECG, Accelerometer, etc…), the data are evaluated for potential problems (hearth rate too high, fall), and caregivers or health providers can be immediately alerted if a problem is detected in order to ensure timely support.

As PersonAAL addresses mainly elderly people with medium - high functioning with the goal of preventing decline rather than safety purposes, we include also functionalities related to fitness, well-being and support services rather than just monitoring vital parameters.

The benefits of a physically active lifestyle extend to all segments of the population, including older adults [22]. Research has demonstrated that achieving 10.000 steps per day is associated with important health outcomes and congruous with public health recommendations for physical activity [23].

However, despite these known benefits, older adults continue to lead sedentary lifestyles. For instance, 2009 data indicate that, on a typical week, 60% of adults in Europe are engaged in no physical exercise or sports [24]. To reverse this negative trend, effective interventions promoting physical activity and preventing sedentary behaviour in elderly are needed.

In the application design we consider the requirement analysis findings [3], [4], [5] regarding personalization, transparency and data control, social aspects and openness to different infrastructures and policies. Concerning the security requirements, we refer to the "Privacy and Security in PersonAAL Platform" section in [1].

The application is available in English, German and Norwegian languages.

The UI has been developed using the template "Material Design Lite" [17], a library of components for web developers based on Google's Material Design Philosophy. More complicated UI elements like charts, calendars, datatables and more, are implemented by open source CSS and Javascript libraries for JQuery, such as "Flot" [18], "Fullcalendar" [19], "Circliful" [20] and "Datatables" [21].

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2.2 Functionalities

Based on the end users' feedback about the initial version of the application, [3], [4], [5], [6] we decided to perform some major changes with respect to the initial version:

1) Better focus the application reducing the functionalities and developing further the core aspects.
   We decided to remove the Fitness and Diet suggestions and the Support Services, since there are already commercial applications providing similar solutions.
   We focused instead the application on the Wellbeing aspect, where the use of PersonAAL platform can add value to motivate the user adopting a healthier lifestyle.
2) Adopt a more contemporary, intuitive and less complex web-design.
   We simplified the home page design presenting all the most relevant information through graphical cards, easy to identify and read. More details are available upon request, by selecting the other items in the menu.

The application supports the following main tasks, detailed in the following through the web pages specifications and the UI mock-ups.

For the primary user (elderly person):

- Login
- Wellbeing goals settings and status update
- Planning of the activities
- Health information overview
- Social contacts
- Possibility to receive motivational messages

For the secondary user (caregiver):

- Possibility to receive alert if a problem is detected

The user caracteristics and preferences can be inserted by the user himself or by the caregiver. The personalization rules are edited through the authoring environment described in [1].

The user activities are initially supposed on the basis of the daily and weekly plan.

The user self-report can be used to measure the social activities and evaluate if the user is doing exercise.

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2.3 Demonstrator Screenshots

The Remote Assistant Application is accessible at http://personaal.cloud.reply.eu/

2.3.1 Login

User is asked to insert Username and Login. If the user is not registered yet, he can sign-up and create a new user. The authentication server is the same for the authoring environment and for the three applications, allowing an integration of the services offered.

Figure 1 - Login

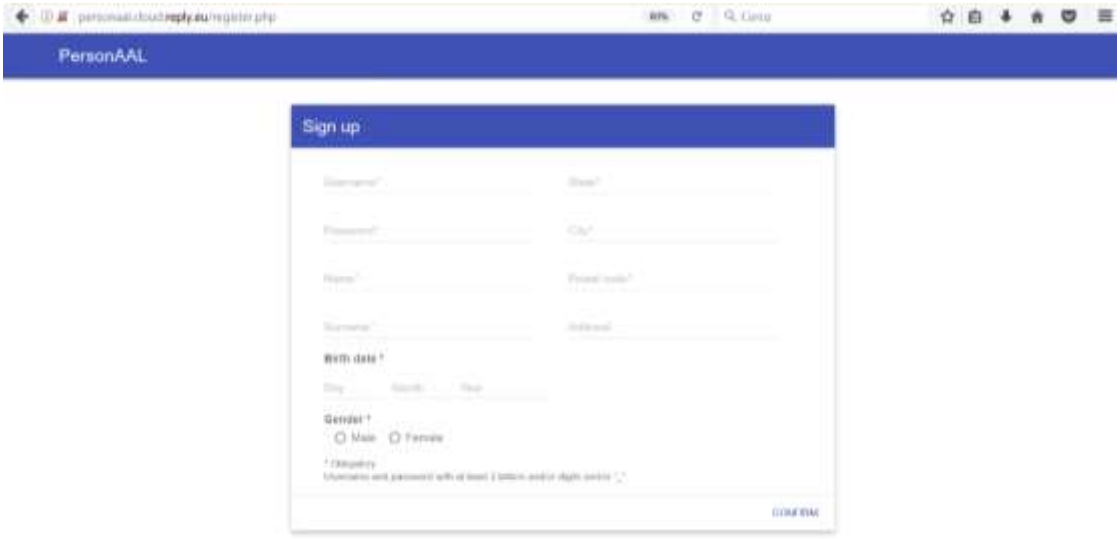

Figure 2 - Registration

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2.3.2 Home Page

The home page presents a dashboard with the summary of user physical relevant parameters:
Weight, BMI, Heart Rate, Respiration Rate, Internal Temperature, as well as the user goals in terms of Steps and Exercise time and the Medication Diary reporting the next planned medication.

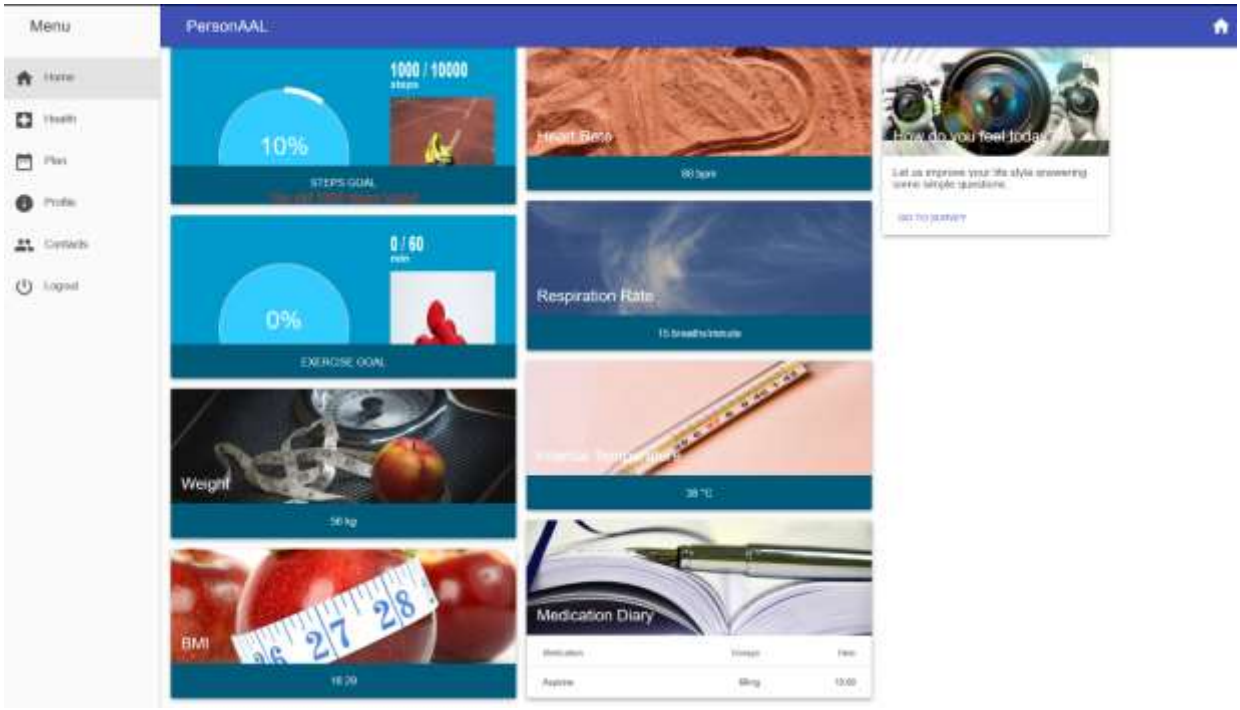

Figure 3 Home page

Moreover, it presents a Survey to collect more information about the user (weight, height and age), his motivation preferences, and some questions directed to provide a self-assessment of frailty index [26].

Knowledge about personal factors influencing physical activity behaviour can be used to tailor physical activity interventions to the individual and to improve long-term adherence to regular physical activity.

We identified four main motivation factors:

- **Wellness:** enjoy the activity itself, relax, satisfaction in reaching personal objectives.
- **Health:** desire to keep good health conditions or to improve them.
- **Social:** enjoy spending time with others, do something with friends, compare with others.
- **Fitness:** desire to lose weight, look better, feel stronger.

Depending on the personal main motivation factor, appropriate individualized strategies to promote exercise can be developed and presented in the Remote Assistant Application.

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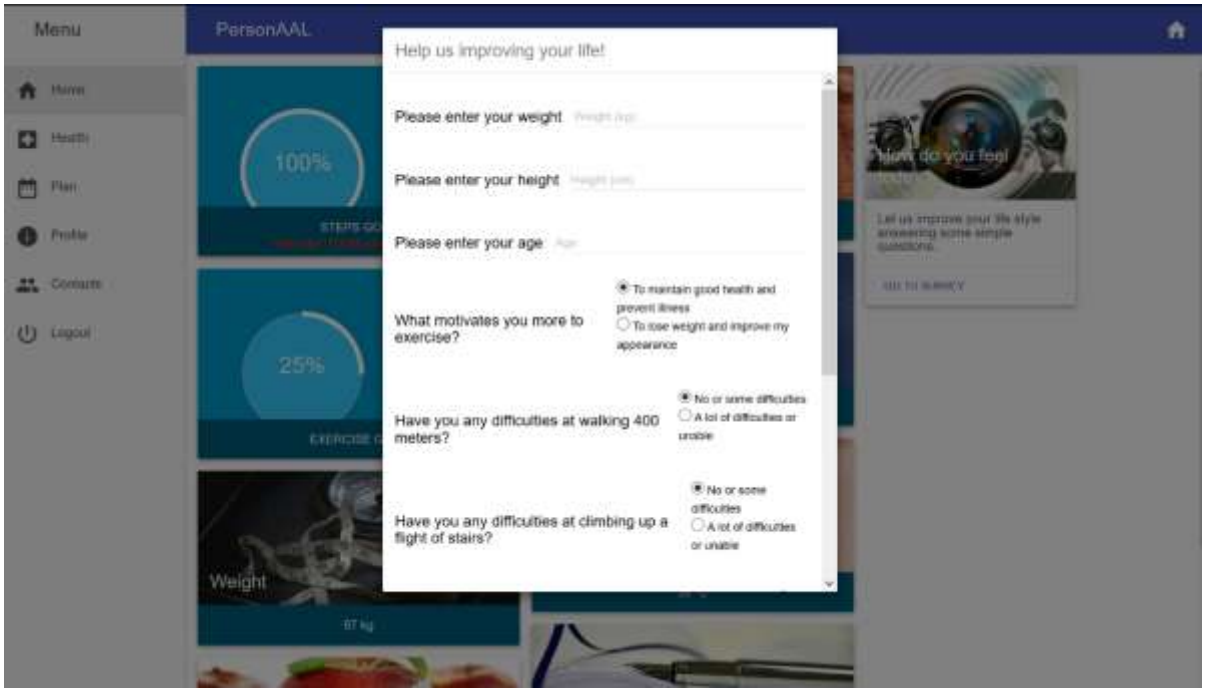

Figure 4 - Survey: Personal data and Motivation

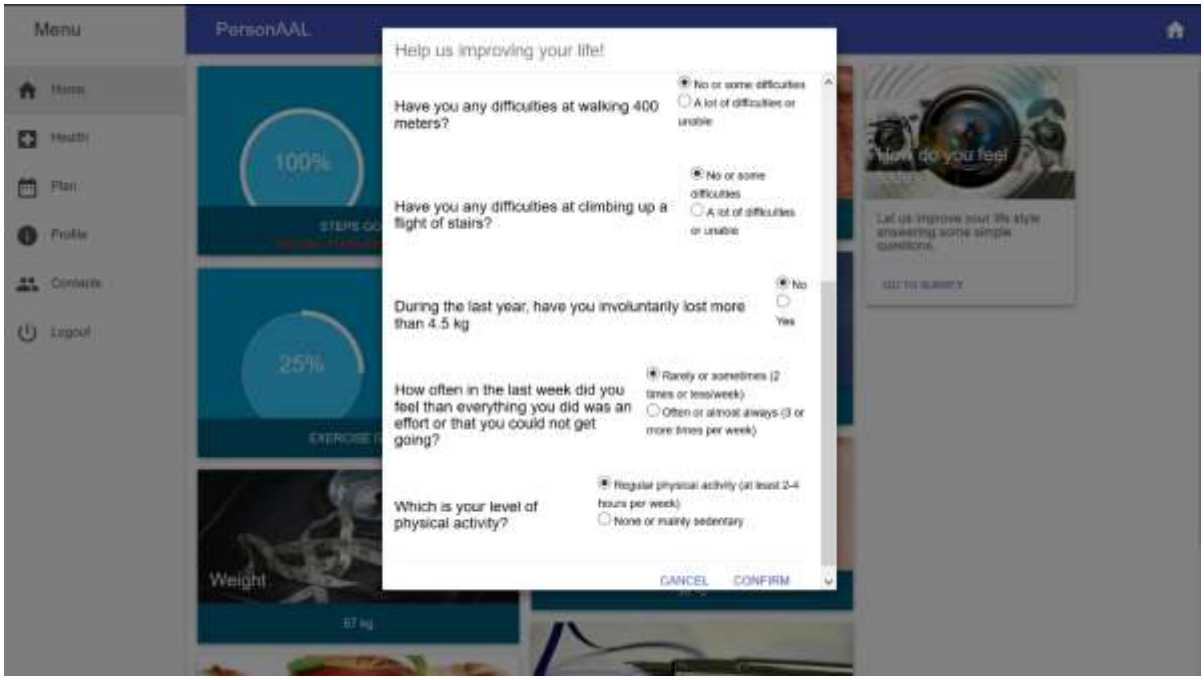

Figure 5 - Survey: FiND questionnaire

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Frailty is described as “the most problematic expression of population ageing” [25]. A person with frailty can experience serious adverse outcomes following even a relatively minor illness. Timely identification of frailty can enable health and social care professionals (HSCPs) to prevent a poor outcome for an intervention (or avoid the intervention entirely) and support the long-term management of people’s health needs. Numerous tools are available to identify frailty. We use the Frail Non-Disabled (FiND) questionnaire [26], a frailty screening tool for self-completion which is designed to differentiate frailty from disability. It has two questions related to physical disability (the ability to walk 400m and climb a flight of stairs) and three on symptoms, signs and conditions generally considered components of the frailty syndrome:

- Weight loss
- Exhaustion
- Sedentary behaviour

2.3.3 Health

This page shows a graph of weight variation and graph reporting the frailty index score according to the information manually inserted by the user in the survey.
Moreover, in case a Plux Chestband is available, the page presents a real-time graph of ECG, Accelerometer (over the three axes) and Temperature.
We also plan to add the possibility to generate a report with relevant measures, which could be sent to the doctor for his analysis.

Figure 6 - Health Page

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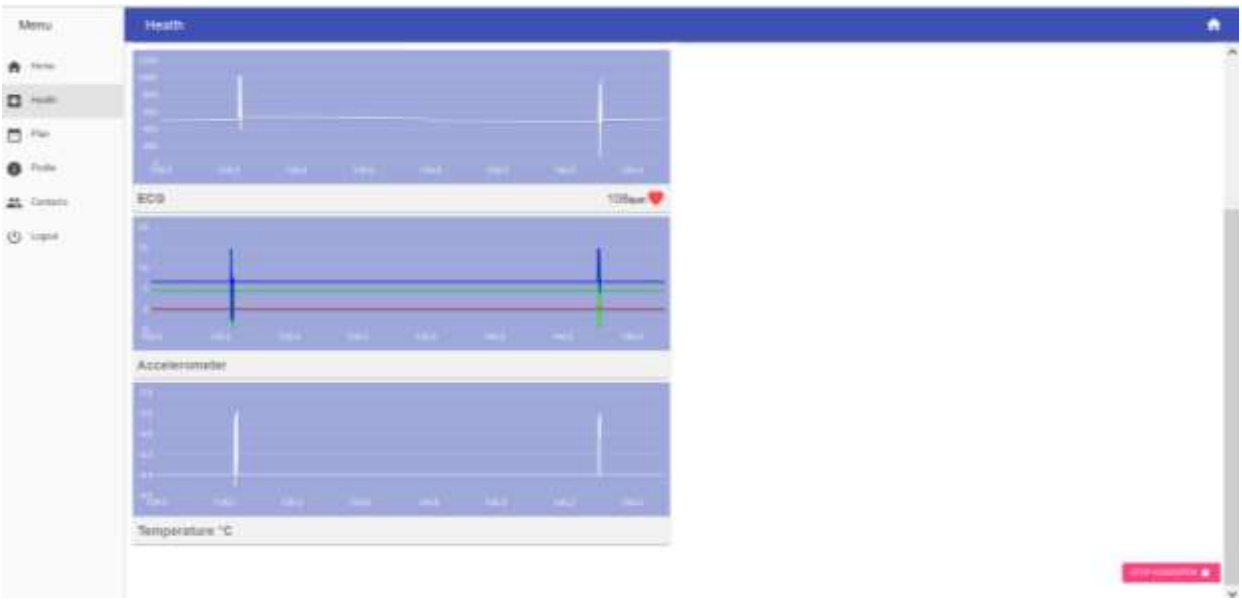

Figure 7 - Health page: Real time sensors acquisition

2.3.4 Plan

This page allows the user to plan his weekly goals, to schedule activities in the current week and to report what's already done. The goals should be in line with the WHO recommendations for exercise for people aged 65 years and older ([8], [9]). In next versions of the application it should be possible to compare goals and results with friends.

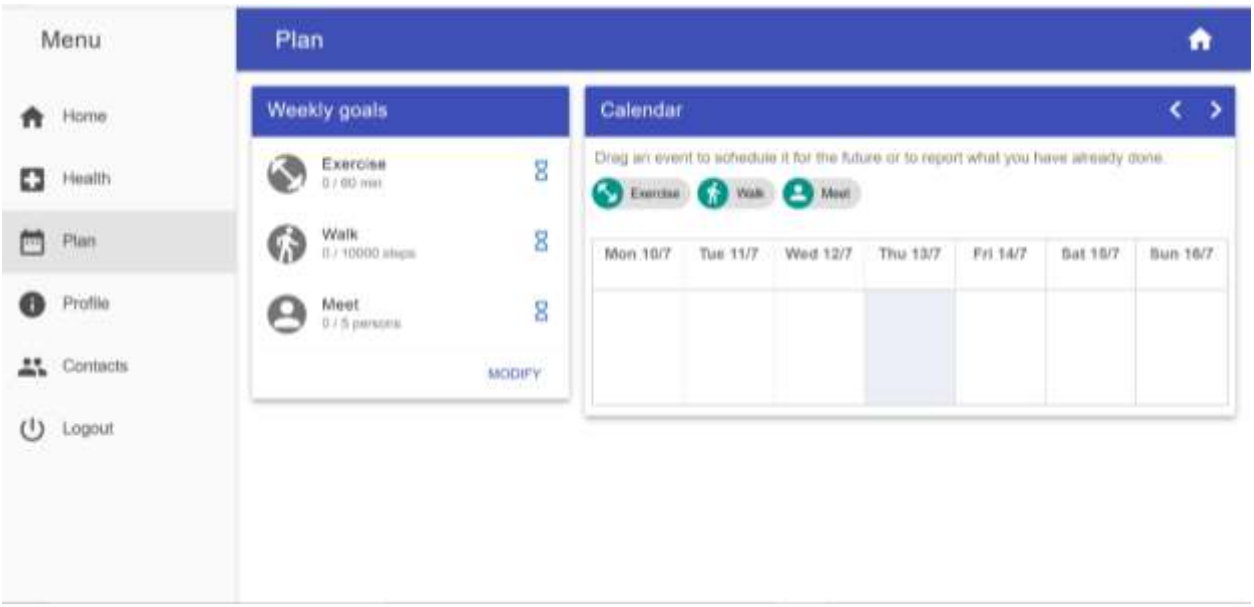

Figure 8 - Plan

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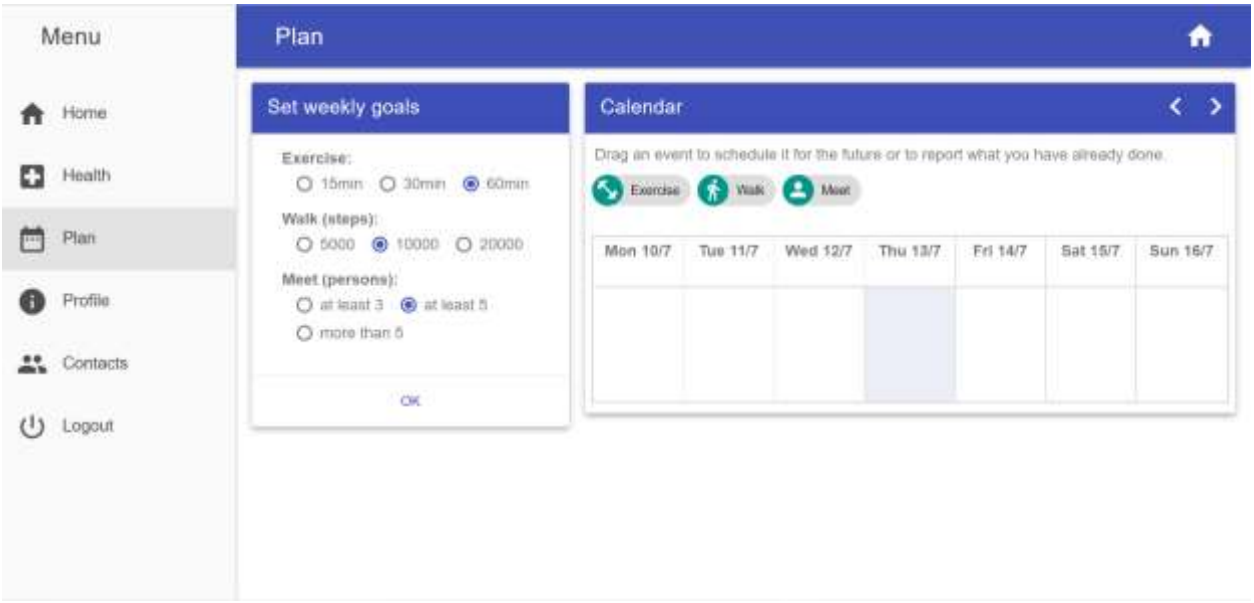

Figure 9 - Plan: Set goals

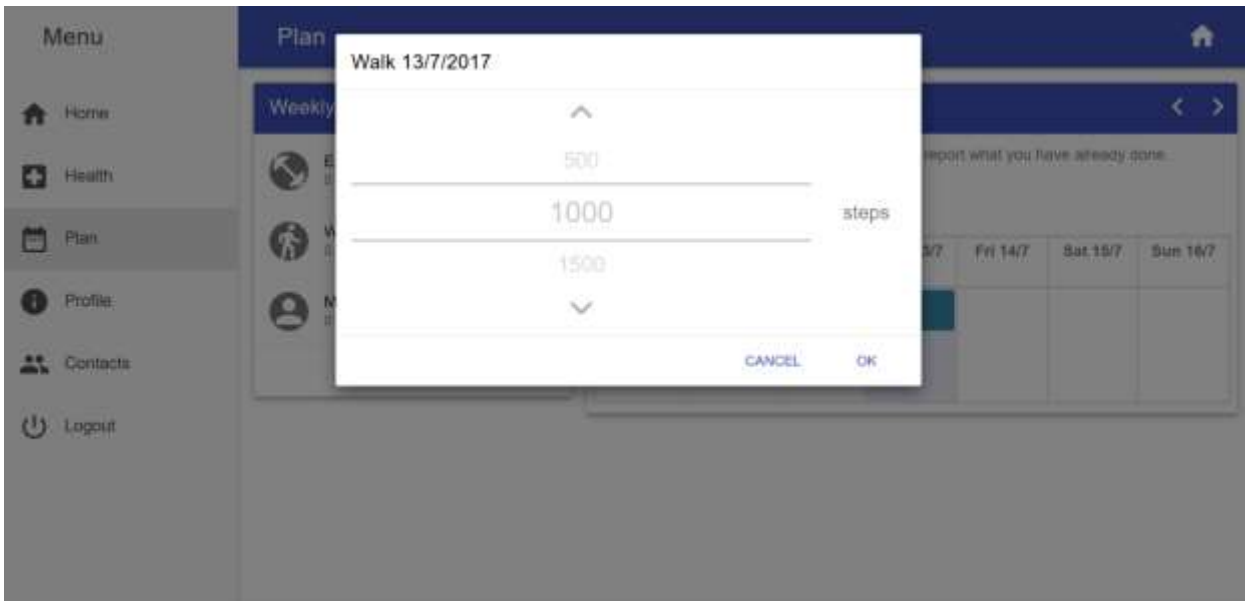

Figure 10 - Plan: Schedule event

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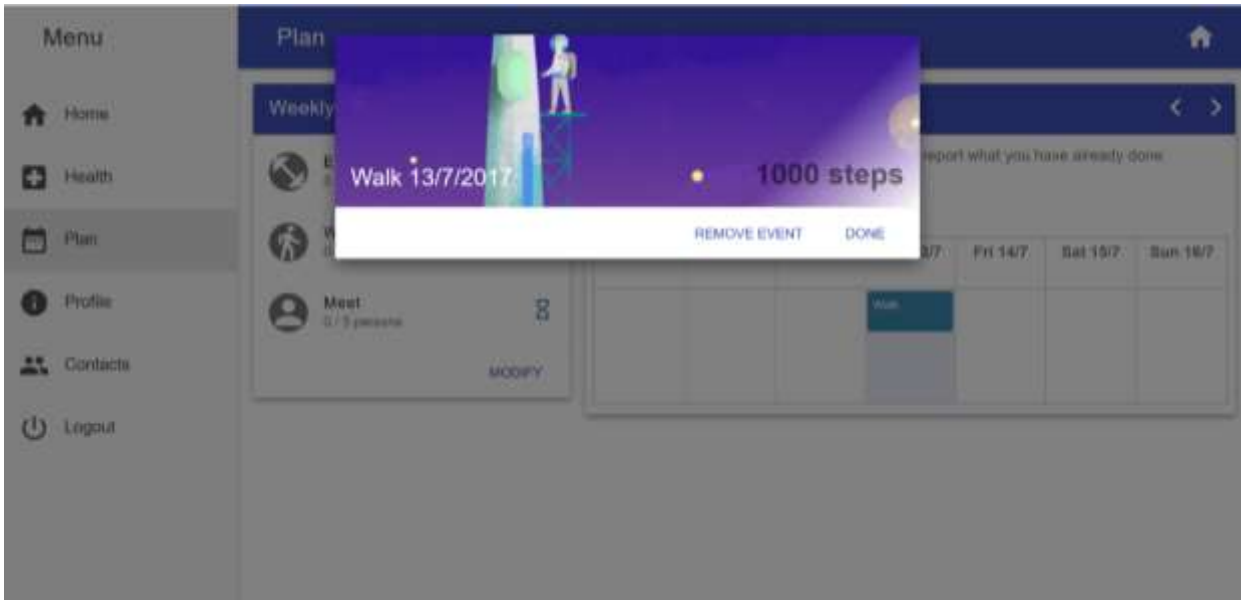

Figure 11 - Plan: Report activity done

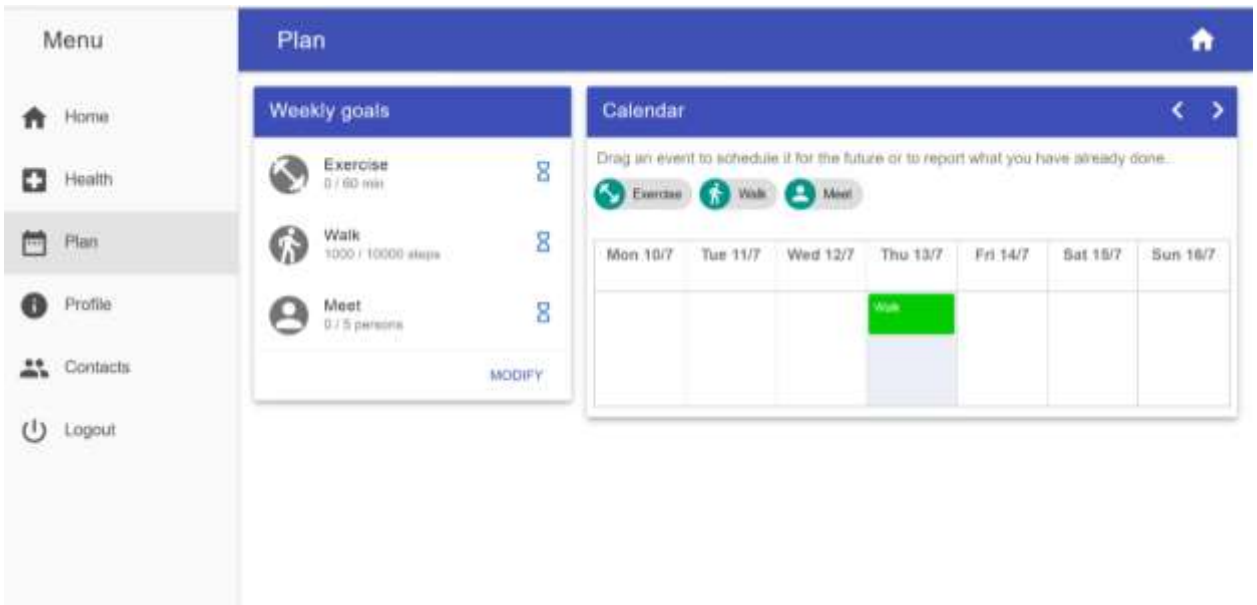

Figure 12 - Plan: Schedule with inserted events

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2.3.5 Profile

This page allows the user (or the caregiver) to modify the personal data inserted at registration time and add interests, that can be used for example to add personalized news in the home page.

Figure 13 – Profile

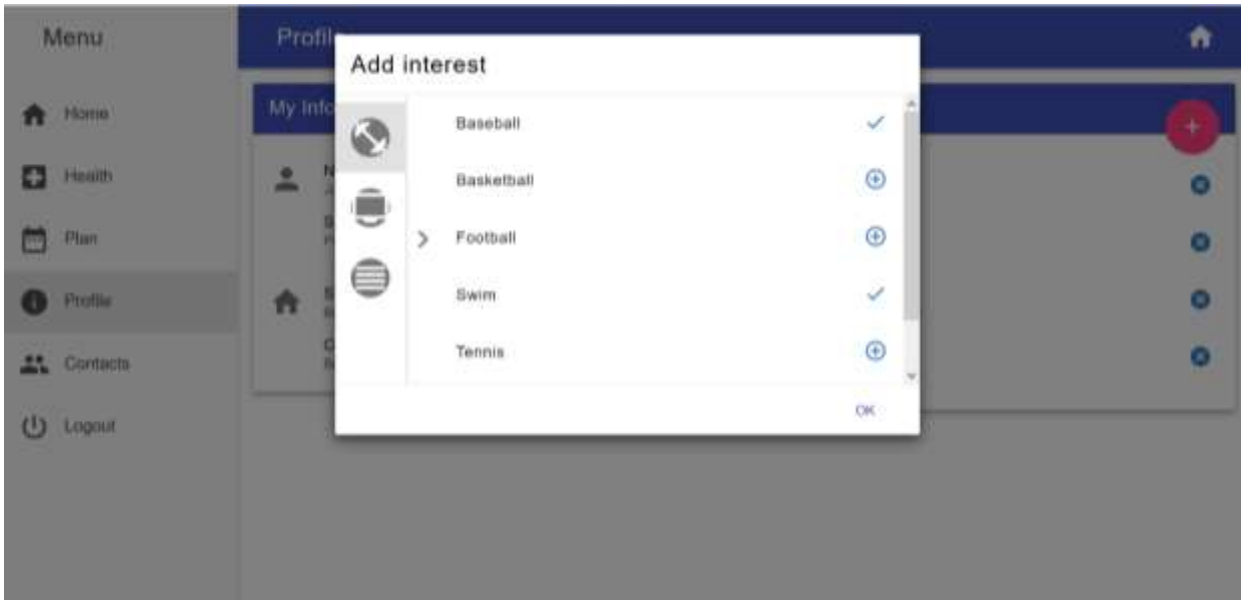

Figure 14 - Profile: Add interest

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2.3.6 Contacts

This page allow the user to add personal contacts and to visualize the current status of his contacts.

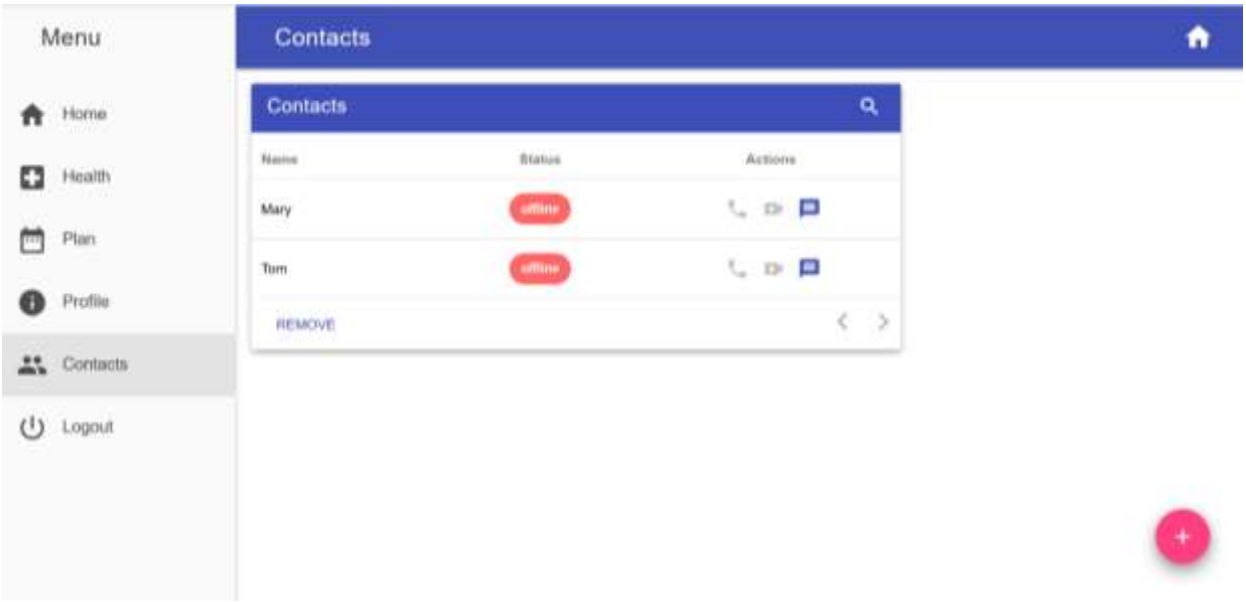

Figure 15 - Contacts

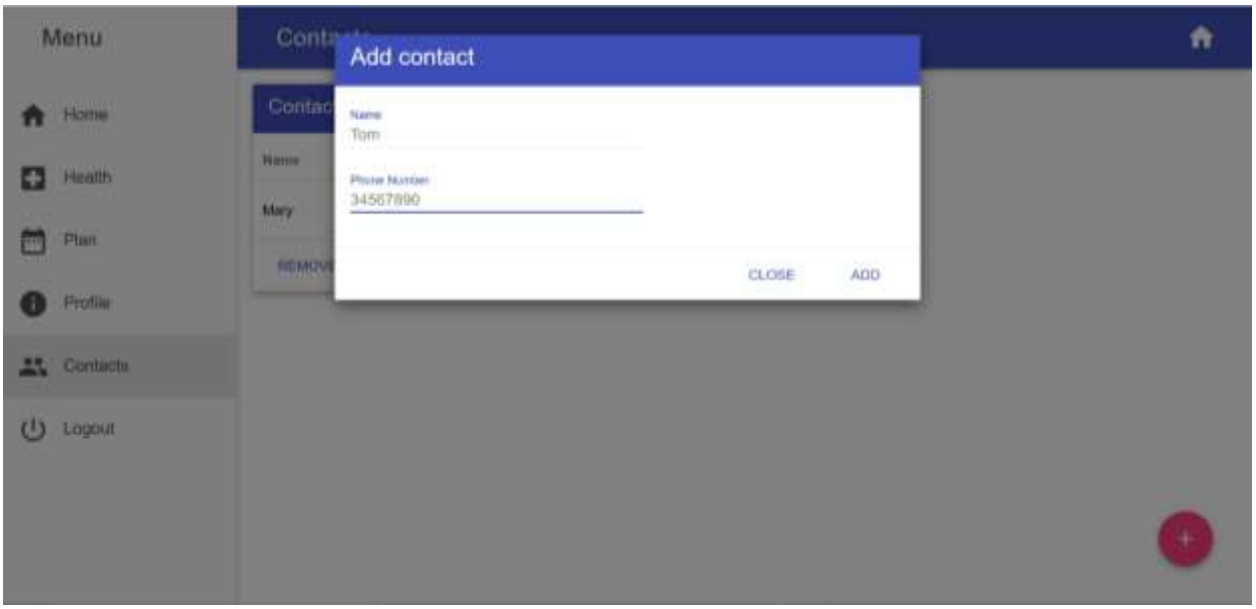

Figure 16 - Add contact

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2.4 Personalization through Trigger-Action Rules

This section describes how we use the PersonAAL Platform [1] to provide the user with personalized assistance, customized on his/her individual needs, requirements and characteristics through the specification of trigger-action rules ([11], [12], [13]).

For this application we identify an initial set of trigger-action personalization rules, listed below and grouped in five main categories. For each category an example is provided.

2.4.1 Improve pages readability depending on user characteristics and surrounding environment

- ***IF Age is more than 70, DO Increase Font Size***

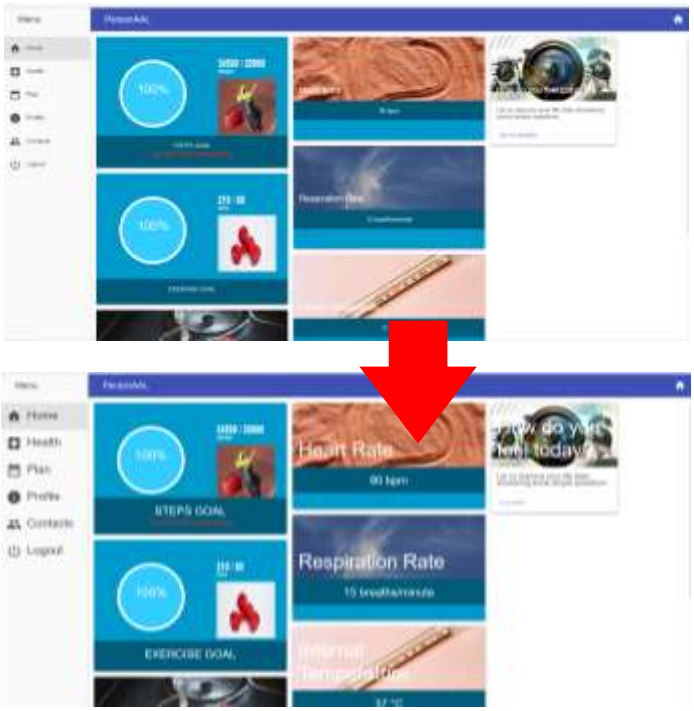

Figure 17 - Increase Font Size

Other similar examples are rules to change background or font color:

- *IF Light Level is less than 5, DO Change Background Color*
- *IF View Ability is colour blind, Do Change Font Color*

2.4.2 Adapt pages content according to the device in use and current situation

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- ***IF Motivation is equal to health, DO Show questionnaire, Show Health Element, Hide Fitness Element***

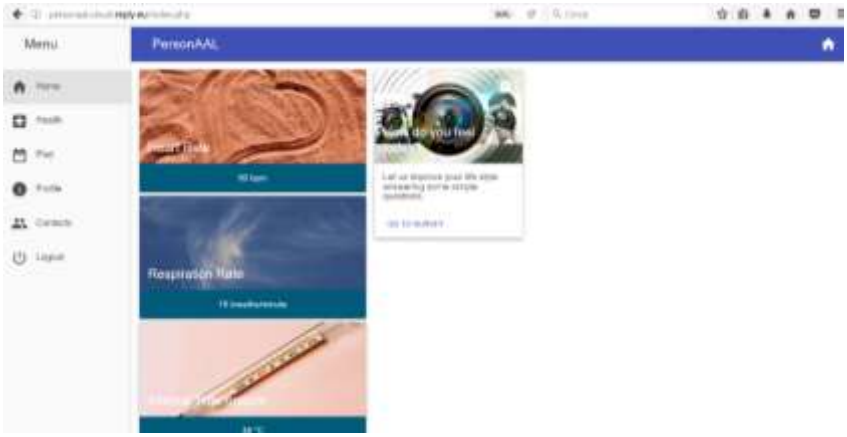

Figure 18 - UI Modification: Motivation Health

- ***IF Motivation is equal to fitness, DO Hide Health Element, Show Fitness Element, Show questionnaire***

Figure 19 - UI Modification - Motivation fitness

Other similar examples realize UI modifications depending on the device in use:

- IF Device category is smartphone DO UI Modification Content (mobile)
- IF Device category is PC DO UI Modification Content (desktop)

2.4.3 Send personalized reminders and motivational messages to user

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- ***IF Daily steps are less than 10000 AND Time is equal to 16:00 DO send a reminder by notification to <username> (Your daily steps are below the goal…)***

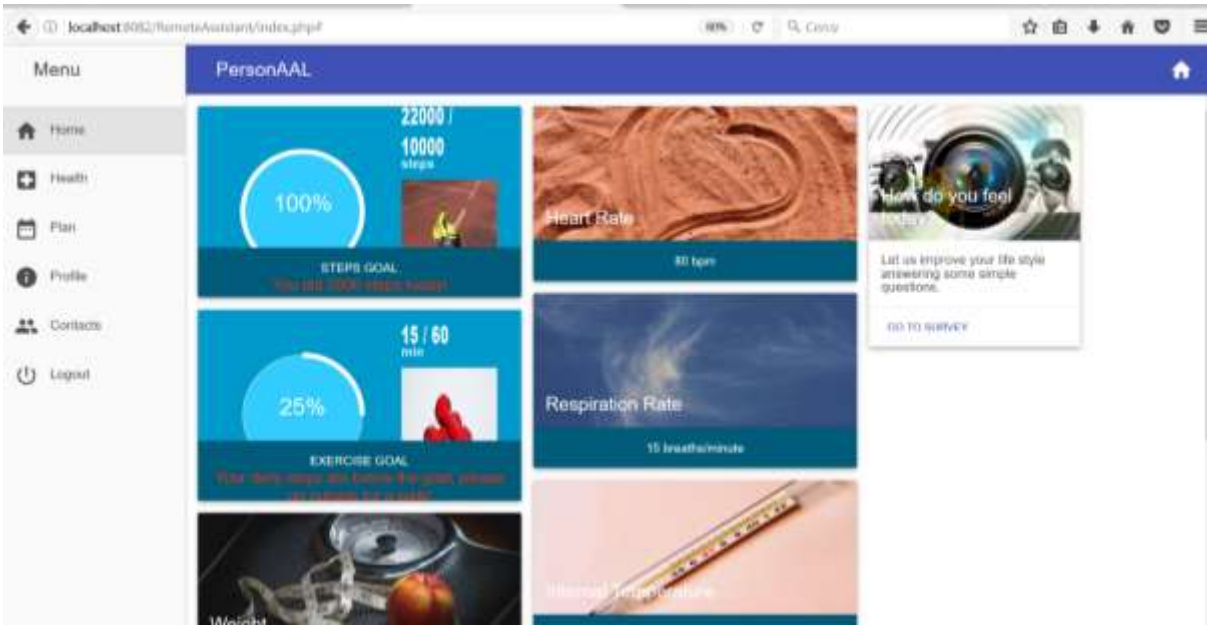

Figure 20 - Motivational Message

Other similar examples show reminders about medications to take, or daily actions required.

- IF Time is 12, DO send a reminder by notification (Would you like some recipe suggestion for a good menu?)
- IF Social Events is less than 1, DO send a reminder by notification (Would you like to call some friends?)
- IF Time is 9, DO send a reminder by notification (You have to take a medication in one hour. Make sure you don't forget to take it.)

The motivational messages can be generated dynamically by the Persuasion Module.

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2.4.4 Show alarm on screen or send alerts to caregiver if user behavior appears not normal

- ***IF Body Temperature is more than 38 , DO send a alarm by sms to screen***

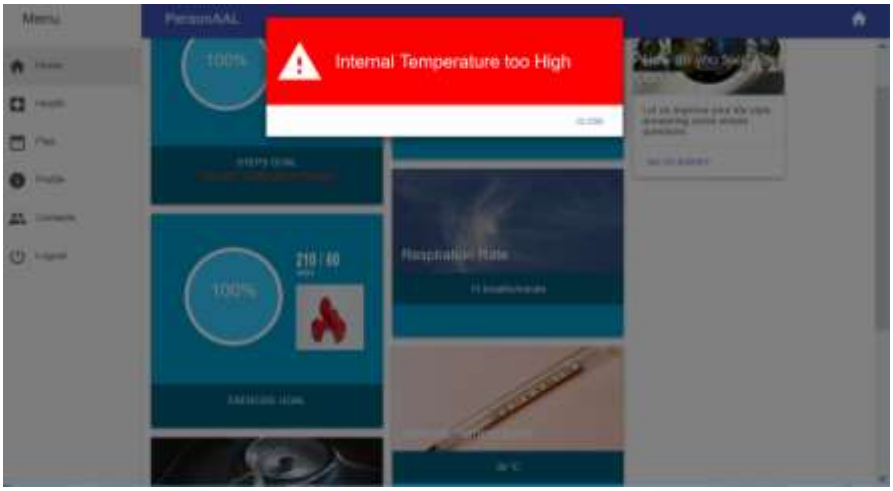

Figure 21 - Alert message

Other similar examples show alerts on screen or send sms to caregiver in case physical parameters assume unusual values.

- IF Heart Rate is more than 130, DO send a alarm by sms to screen (Heart rate too high)
- IF User Posture is equal to laying down, DO send a alarm by sms to caregiver (please call <username>)

2.4.5 Appliance activation depending on user context

- ***IF User is prone, DO Turn On and set Bathroom light color to White***

Figure 22 - Light activation

Turn on light or change color depending on user position.

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2.5 Sensors and Context detection

2.5.1 Biosignals measures

For the biosignals measures we use the **integrated chestband** developed by PLUX based on BITAlino toolkit and described in detail in [7].

BITalino is a low-cost, easy-to-use, versatile and scalable hardware platform for biosignals acquisition and wireless transmission in real-time, which includes sensors to measure several biometrics signal useful to monitor user health status [14].

Figure 23 - BITalino toolkit

The measures used by the Remote Assistant application are:

- The Respiration rate;
- The ECG, which is showed in real time in the health section and used to extract the heart rate parameter;
- The Accelerometer, which is used for the Step Count and for Posture detection.
- The Body temperature sensor.

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2.5.2 Personal characteristics

The user characteristics and preferences are inserted by the user himself or the caregiver through the Profile page.

The Survey allows to identify the Motivation measure and to calculate the Frailty score [26].

In order to have an overview of what activities the elderly participate in, and to understand if the person needs intervention regarding level of activity, we would consider using the Occupational Questionnaire [15].

The **Body Mass Index (BMI)** is calculated as a person's weight in kilograms divided by the square of height in centimeters.

$$BMI = weight(kg)/(height(cm))^2$$

BMI can be used to screen for weight categories that may lead to health problems as described below.

- Underweight = <18.5
- Normal weight = 18.5–24.9
- Overweight = 25–29.9
- Obesity = BMI of 30 or greater

The **Target Heart Rate and Estimated Maximum Heart Rate** are based on the Centers for Disease Control and Prevention indications [16].

$$\text{maximum age-related heart rate} = (220 - age)\ bpm$$

Moderate-intensity physical activity requires that the heart rate remains between 50 and 70% of maximum heart rate, while for vigorous-intensity physical activity, a person's target heart rate should be 70 to 85% of his or her maximum heart rate.

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3 FIELD TRIAL PLAN

3.1 Objectives and Measurements:

The field trial plan will be conducted jointly for the platform and for the three applications, with the objective to measure:

- *User acceptance and comfort level*: collected through questionnaires: comfort level, perception of being controlled or in control, perception of added value, security of information, limited installation and maintenance required at the consumers house, usability comparison with/without personalization, persuasion/behaviour analysis.
- *User activity:* involves mainly measurements: usage time, event logging (use of different functionalities, number of rules, and number of errors).
- *Social support effectiveness:*

The feedback will be collected both in Switzerland and in Norway, ideally involving 8-12 users in each site.

3.2 Requirements

3.2.1 End users

The end users will be required to use the application and sensor kit in their homes for a period of time sufficient to gather useful information. They should then:

- Be available for 6-8 weeks testing in house.
- Be available to wear the sensor chestband at least once a week for the health check and while doing their exercises.

The personal information will be collected through web forms and sensors according with the best current security and privacy practices, will be anonymized where possible and stored only for the time required to provide the service.

Before enrolling in the field trial, participants will be informed of all aspects that are relevant to the subject's decision to participate and will be required to sign a written informed consent according to guidelines from the fields of medical ethics and research ethics. Moreover, they will be allowed to dropout at any time if they wish to.

3.2.2 Hardware requirements

In order to test the Remote Assistant Application, the hardware required is as follows:

- Plux chestband, including sensors to measure respiration rate, hearth rate, body temperature and accelerometer.

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- Laptop PC or Android Tablet with Internet Browser, WiFi and Bluetooth, to access the Web application. The Android tablets compatible with the chestband and suggested for Bluetooth communication stability and overall performance are as follows:
  - Samsung Tab E 8'' (T375)
  - Samsung Tab E 9.6'' (T560)
  - Samsung Tab A 8'' (T350)
  - Samsung Tab A 9.7'' (T550)
  - Samsung Tab A 7'' (T280)
  - Samsung Tab A 10.1'' (T580)
  - Samsung Tab S2 8'' (T710 / T719N)
  - Samsung Tab S2 9.7'' (T810 / T813N)

- WiFi router.

3.3 Timeline

The hypothesis and ideas driving the plan are listed below:

- Field test will last from 1 Oct ’17 to 30 Set ’18.
- Allow 3 months (Oct – Dec ’17) for for application rework after Usability and Accessibility tests completion, integration and on site preparation.
- Leave 2 months (August and September ’18) for analysis of results and implementation of final version of application.
- Each user should test for at least 6 weeks
- Involve 8-12 users per site (Switzerland and Norway)
- Consider to have 4 full sets of hardware equipment (based on the costs).
- Allow some rework time to improve the applications and platform between the different test sessions.

We plan three rounds of tests:

- First round with friendly users, focusing on **User acceptance and Comfort level**. The users will be required to fill a (for example) weekly feedback form reporting their experience.
- Second round focusing on **User activity**. The user access to the different functionalities of application will be logged and analyzed. We will anyway focus on qualitative analysis as we don’t have the numbers for statistical analysis.
- Third round focusing on **Social activity**. In order to have more testers and to evaluate the social activity there could be some users with full equipment and others only subscribing to the application.

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Site	Nov '17	Dec '17	Jan '18	Feb '18	Mar '18	Apr '18	May '18	Jun '18	Jul '18	Aug '18	Set '18
			User Satisfaction		Usage/Effectiveness			Usage/Effectiveness (social activity/persuasion)			
CH	Preparation work		2 users		2 users		2 users	2 users with full equipment + up to 4 with partial equipment			
NOR	Preparation work		2 users		2 users		2 users	2 users with full equipment + up to 4 with partial equipment			
Results analysis and Rework											
App version			2.1		2.2			2.3			3.0

Figure 24 - Remote Assistance Application Field Test Plan

The application will evolve as follows during the third year of the project:

V2.1:
- Incorporate the feedbacks from usability and accessibility evaluation;
- Performs the registration and login through the Authentication Server;

V2.2:
- Integrates the recommendations from the User Satisfaction test round;
- Incorporates behavior analysis;
- Includes logging mechanisms;

V2.3:
- Integrates the recommendations from the User Activity test round;
- Incorporates social support;

V3.0:
- Integrates the recommendations from the Social Activity test round;
- Final version of the application

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4 CONCLUSIONS

We described the main features of the Remote Assistance Demonstrator (section 2), and how it is improved through the PersonAAL platform.

Compared to other approaches which offer predefined levels of application customisation, this solution allows adding new personalisation possibilities not foreseen at design time.

The Demonstrator has evolved from the early stage prototype described in [8], and it has been improved based on end users' feedback collected during the validation tests.

The final involvement of the users will take place in a field trial evaluation, as planned in section 3.

End users are going to participate in each step during the whole process of development, in order to improve their comfort and motivation, and so to broaden effective use of the developed platform and applications.

Our methodology is characterised by a strong focus on the users' needs and a modular approach, in order to ensure a high level of usability and flexibility. We consider both such factors as key aspects for high user's acceptance of our system and its successful placement in the market.

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5 REFERENCES

[1] D1.1b - Architecture Specification (Final), PersonAAL 2017.
[2] Ticuro Reply: https://www.reply.com/ticuro-reply/en/
[3] D2.1b – Older Adults Requirements Analysis, PersonAAL 2017.
[4] D2.2b – Informal Carers Requirements Analysis, PersonAAL 2017.
[5] D2.3b – Healthy Workers Requirements Analysis, PersonAAL 2017.
[6] D2.4b – Usability and Accessibility Evaluation Report, PersonAAL 2017.
[7] D1.5a – Integrated Platform, PersonAAL 2017.
[8] D3.1a – Remote Assistant Application, Early Prototype. PersonAAL 2016.
[9] World Health Organization. Global recommendations on physical activity for health. Geneva: World Health Organisation, 2010.
[10] Physical activity is medicine for older adults, D. Taylor, Faculty of Health & Environmental Sciences, Health & Rehabilitation Research Institute, AUT University, Postgrad Med J 2014, http://pmj.bmj.com/content/90/1059/26.full
[11] Authoring Context-dependent Cross-device User Interfaces based on Trigger/Action Rules, G.Ghiani, M.Manca and F.Paternò, MUM 2015.
[12] End-User Personalization of Context-dependent Applications in AAL scenarios, G.Ghiani, M.Manca, F.Paternò and C.Santoro, MobileHCI '16
[13] Towards a Platform for Persuading Older Adults to Adopt Healthy Behaviors, C.Azevedo, C.Chesta, J.Coelho, D.Dimola, C.Duarte, M.Manca, J.E.Nordvik, F.Paternò, A.M.Sanders, C.Santoro, Proceedings of the Personalization in Persuasive Technology Workshop, Persuasive Technology 2017, Amsterdam, The Netherlands, 04-04-2017
[14] BITalino toolkit documentation: http://www.bitalino.com/
[15] Occupational Questionnaire, N.Smith G.Kielhofner and J.Hawkins Watts, 1986.
[16] Target heart rate and Estimated Maximum Heart Rate http://www.cdc.gov/physicalactivity/basics/measuring/heartrate.htm
[17] "Material Design Lite" CSS and JS library: https://getmdl.io/index.html
[18] "Flot" CSS and JS library: http://www.flotcharts.org/
[19] "Fullcalendar" CSS and JS library: https://fullcalendar.io/
[20] "Datatable" CSS and JS library: https://datatables.net/
[21] "Circliful" CSS and JS library: http://circliful.pguso.de/
[22] Physical Activity Guidelines Advisory Committee: Physical activity guidelines advisory committee report. Washington DC: U.S. Department of Health and Human Services; 2008.
[23] Tudor-Locke C, Bassett DR., Jr How many steps/day are enough? Sports Med. 2004;34:1–8
[24] Eurobarometer: Sport and Physical Activity. Sport and Physical Activity. 2010, Special Eurobarometer, 334/Wave 72.3
[25] Clegg, A. et al. Frailty in Elderly People. Lancet 2013; 381: 752–62
[26] Cesari, M. et al A Self-Reported Screening Tool for Detecting Community-Dwelling Older Persons with Frailty Syndrome in the Absence of Mobility Disability: The FiND Questionnaire PLoS ONE 2014

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