SAfety of elderly people and Vicinity Ensuring – SAVE

Test Case Report – D2.3

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AAL Programme

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1. Test cases procedures and General info on SAVE Services

Test Cases encompass sets of test inputs, execution conditions, and expected results developed for a particular objective, in this case to verify the attainability of the e-Health System Requirements.

Each Test Case contains:

- **Unique Test Case Identifier (TID):** used for tracing the respective test case throughout the entire project;
- **Description:** it is mentioned the set of steps and / or inputs, the execution conditions and preconditions (where is the case) required in order the particular functionality to be tested;
- **Expected Results:** what is expected to come out from the Functional Model seen as a black box based on the respective inputs, execution condition, etc.
- **Actual Results:** the recorded real results which came out from the tests and will be recorded in the Test Checklist; if a test pass the acceptance criterion, then it will be recorded 'Pass', otherwise it will be recorded 'Fail'.

Acceptance Criteria: Satisfied capability according to expected results; Statement executed at least 20 times.

System requirement is a statement that identifies the functionality that is needed by a system in order to satisfy the users' requirements.

System requirements are a broad and also narrow detailed statements that the customer makes in order to achieve their requirements.

System requirements are based on the stakeholders 'needs and requirements (e.g., stemming from users, companies etc.)

1.1. The eHealth Monitoring Service

The eHealth Monitoring Service is able to assess biometric information in terms of measuring people's unique physical characteristics. The biometric info is to be used as an add-on to the existent data acquired by caregivers or volunteers for gaining a more comprehensive image on their supervised elderly people.
The eHealth Monitoring System has the scope to acquire biometric sensors data by different wireless and wired eHealth sensors, to automatically collect data on-site and transmit the data via Wi-Fi to a router modem in the area of a LAN (Local Area Network) and further via Internet to the cloud server of the project.
The eHealth Monitoring system is using wireless and wired interfaces for sensor data acquisition (in current version: temperature, oxygen saturation, blood pressure, spirometry) together with a cloud-based platform and a TFT display for both remote and on-site data monitoring.
The eHealth Monitoring System is not considered a medical device, nor intended for medical diagnosis, cure, mitigation, treatment, advice or prevention of disease.
To operate the device, it must be connected to a wireless network.

1.2. The Well-being assessment service

The well-being service consists in assessing intraindividual variability across reaction time (RT) tasks performance and the corresponding galvanic skin response (GSR). Intraindividual variability, according to literature, is considered a risk factor predictive of successful ageing, implicitly well-being, and it is significant in assessing individuals whose disorders are mild.
The Well-being system is using wireless and built-in sensor data acquisition, together with a cloud-based platform for both remote and on-site data monitoring and consists of two major components, as Choice Reaction Time (CRT) and Galvanic Skin Response (GSR) system components.
Visual choice reaction time (CRT) tasks performance has been widely analysed to measure age-related declines in processing speed.
A GSR (Galvanic Skin Response) smart ring is used for measuring electrodermal activity accurately in a convenient, wearable form able to provide data in real time.
The Well-being system is not considered a medical device, nor intended for medical diagnosis, cure, mitigation, treatment, advice or prevention of disease.
To operate the device, it must be connected to a wireless network.
If the subject presses the wrong button, the system will wait for the correct button to be pressed. If during the CRT measurement there is no reaction from the subject for two minutes, the measurement is invalidated and the system restarts.

2. System Requirements and TEST CASES- eHealth Monitoring Service

Table 1. System Requirements among the overall e-Health Service Requirements.

These System Requirements were elaborated and accepted by end-users during co-design sessions.

SR. Nr.	Service Requirement (SR)	SR Type
SR1.	The eHealth service shall be able to monitor blood pressure.	Functional Requirement
SR .2	The eHealth service shall be able to monitor oxygen saturation.	Functional Requirement
SR 3.	The eHealth service should be able to monitor temperature.	Functional Requirement
SR 4.	The eHealth service shall be able to monitor heart rate.	Functional Requirement
SR 5.	The eHealth service shall be accessible from the cloud.	Interface requirement
SR 6.	The eHealth service shall use at least Bluetooth 4.0.	Interface requirement
SR 7.	The eHealth service should have a maximum weight of 1.5 kilo.	Physical Constraints
SR 8.	The eHealth service shall monitor the lung capacity via spirometry test.	Functional Requirement
SR 9.	The eHealth service should work randomly but independently according to the user needs.	Adaptability requirements
SR 10.	The e-Health sensors should be stored in a case.	Functional requirements
SR 11.	The e-Health service should be mobile/portable, so that the end-user (elder) could use it in different house-rooms.	Functional requirements
SR 12.	The e-Health sensors should be wearable.	Functional requirements
SR 13.	The e-Health sensors should be wireless or wired if do not produce inconvenience in use.	Functional requirements
SR 14.	The e-Health service should offer to the end-user the option of displaying or not on the	Functional requirements

	screen on-site the values of the monitored parameters.	
SR 15.	The e-Health Cloud service should notify the volunteers/caregivers if the values of the monitored parameters are different from the standard ones on their smartphone/smartwatch/PCs.	Functional requirements
SR 16.	The e-Health service should offer an autonomy of minimum 5 hours of use	Functional requirements

Table 2. Test Cases

Test ID	Capability to be tested	Description	Expected Results	Actual Results	Traceability
TID1	The eHealth sensors shall be able to monitor blood pressure, display on screen and transmit on site via local server.	Turn on e-Health platform Place blood pressure sensor on the arm Press turn on button on blood pressure sensor check for device pairing with e-Health platform Check if the cuff is swelling Wait for the measurement to complete Check parameters on the screen Check if the data was sent to the server cloud	Blood pressure value acquired, displayed on screen locally and sent via local server	PASS/FAIL	SR1
TID2	The eHealth service shall be able to monitor oxygen saturation display on screen and transmit on site via local server.	Turn on e-Health platform Place oxygen saturation sensor on the finger Press turn on button on oxygen saturation sensor check for device pairing with e-Health platform Wait for the measurement to complete Check parameters on the screen Check if the data was sent to the server cloud	Oxygen saturation value acquired, displayed on screen locally and sent via local server	PASS/FAIL	SR2

TID3	The eHealth service should be able to monitor temperature display on screen and transmit on site via local server.	Turn on e-Health platform Plug in the temperature monitor sensor in the dedicated jack Check if temperature device is connected Place temperature monitor sensor on the skin Wait for the measurement to complete Check parameters on the screen Check if the data was sent to the server cloud	Temperature value acquired, displayed on screen locally and sent via local server	PASS/FAIL	SR3
TID5	The eHealth service shall be able to monitor heart rate display on screen and transmit on site via local server.	This operation can be performed using blood pressure monitoring device or oxygen saturation monitoring device The test steps to be performed will be TID1 or TID2, according to the device used	Heart rate value acquired, displayed on screen locally and sent via local server	PASS/FAIL	SR3
TID6	The eHealth service should have a maximum weight of 1.5 kg	Place all sensors in the e-health dedicated box Place the box on the scale to check the system weight	Weight under 1.5 kg	PASS/FAIL	SR7
TID8	The eHealth service shall monitor the lung capacity via spirometry test display on screen and transmit on site via local server.	Turn on e-Health platform Plug in the device with e-Health platform in the dedicated jack Press turn on button on spirometer sensor Blow in the special tube kit	Lung capacity value acquired, displayed on screen locally and sent via local server	PASS/FAIL	SR8

		Wait for the measurement to complete Check parameters on the screen Check if the data was sent to the server cloud			
TID11	In normal functionality conditions (3 times a day with all sensors, on screen display and data sending) system has 10 hour autonomy	Press the turn on button on the power bank Connect and use one sensor at a time with the e -health platform Measure the battery after the procedure Calculate the number of hours of autonomy	Autonomy in normal functionality conditions minimum 10 hours	PASS/FAIL	SR 16

3. System Requirements and TEST CASES - Well-being assessment service

These System Requirements were elaborated and accepted by end-users during co-design sessions.

Table 3. System Requirements among the overall Welbeing Service Requirements.

SR. Nr.	Service Requirement (SR)	**SR Type**
SR1.	The Wellbeing service shall be able to record choice reaction time	**Functional Requirement**
SR 2.	The Wellbeing service shall be able to record galvanic skin response	**Functional Requirement**
SR 3.	The Wellbeing service shall be able to provide a random display of colours on the trichromatic led	**Interface requirement**
SR 4.	The Wellbeing service shall be accessible from the cloud.	**Interface requirement**
SR 5.	The Wellbeing service shall be able to connect to WiFi.	**Interface requirement**
SR 6.	The Wellbeing service should have a maximum weight of kilo 1.5kg.	**Physical Constraints**
SR 7.	The Wellbeing service should work randomly but independently according to the user needs.	**Adaptability requirements**
SR 8.	The Wellbeing system should be stored in a case.	**Functional requirements**
SR 9.	The Wellbeing service should be mobile/portable, so that the end-user (elder) could use it in different house-rooms.	**Functional requirements**
SR 10.	The Wellbeing sensors should be wearable.	**Functional requirements**
SR 11.	The Wellbeing sensors should be wireless	**Functional requirements**
SR 12.	The Wellbeing system s	
SR 13.	The Wellbeing Cloud service should notify the volunteers/caregivers if the values of the monitored parameters are different from the standard ones on their smartphone/smartwatch/PCs.	**Functional requirements**

Table 4. Test Cases

Test ID	Capability to be tested	Description	Expected Results	Actual Results	Traceability
TID1	The **Wellbeing** sensors shall be able to monitor choice reaction time and transmit on site via local server.	Turn on **Wellbeing** platform by pressing the button on the right-hand side for 3 seconds The device will automatically connect to the internet A green light will blink fast to show that the device is on and ready to use The trichromatic led will start a random colour and wait for the subject to press the corresponding button There is one target light (**BLUE**) and two distractor lights (**RED** and **GREEN**) If the LED light is **BLUE**, the subject should press the button on the right If the LED light is **GREEN** or **RED**, the subject should press the button on the left Every session will be 2 (two) minutes long When the session is over, the **BLUE** light will blink Check if the data was sent to the server cloud	Number of correct pressed buttons for each colour, mean reaction time and standard deviation	PASS/FAIL	SR1

TID2	The **Wellbeing** service shall be able to monitor galvanic skin response	Place the moodmetric ring on the finger Turn on **Wellbeing** platform by long pressing the button on the right-hand side The device will automatically connect to the internet A trichromatic led will blink fast to show that the device is on and ready to use The moodmetric ring will automatically connect to the wellbeing platform The ring will monitor the galvanic skin response for 5 minutes and provide an index (MM index) The higher the index, the greater the stress Wait for the measurement to complete Check if the data was sent to the server cloud	MM index	PASS/FAIL	SR3

4. Conclusion

Test cases are designed to be able to verify system components, features and services in order to be able to be deployed by any person, including persons outside the development team.