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Usability and Accessibility Evaluation Report

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1 INTRODUCTION

This document reports the usability and accessibility tests conducted to evaluate the prototype of the Rule Editor – the key tool for personalised support to elderly persons with MCI and their care-givers that is going to be developed and tested in the PETAL project (Task 1.3: Usability and Accessibility evaluation - laboratory evaluation).

In this task we have made an in-laboratory evaluation of the Rule Editor as developed by now. The feedback collected and the recommendations for the improvement of the prototype will serve as a base of further research and development to be done in technical WPs. Especially the end-user assessment will mainly consider the usability and accessibility of the Rule Editor in its updated version.

In particular, this deliverable is structured into the following parts: after this introduction (chapter 1) and an executive summary (chapter 2), the report continues with a detailed explanation of the object of the evaluation and the methodology adopted for testing the Rule Editor (Chapter 3).

Chapter 4 focuses on the implementation of usability tests: the field work in general and in detail for each partner involved in the tests, and then ends with a socio-demographic description of the sample that participated in the tests.

Chapter 5 contains the main results of the tests carried out with indications on the duration of the tests, on the rules considered important by the sample, on the usability of the system, and the analysis of the strengths and weaknesses of the system. This chapter also contains the results of the questions on the accessibility of the system.

The last chapter (6) contains the final considerations and the next steps planned to implement the results of the usability tests in the Petal system.

Finally, the annexes (7) contain the questionnaire used to evaluate the tests and the complete list of single answers to the open questions asked in the questionnaire.

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2 SUMMARY OF THE RESULTS OF THE IN-LAB TESTS

This document reports on the usability and accessibility tests conducted to evaluate the prototype of the Rule Editor - the key tool for personalized care for the elderly with MCI and their caregivers that will be developed and tested as part of the PETAL project. The Rule Editor allows users to create trigger-action rules intuitively. A trigger-action rule is a rule that specifies what should be done (action) when a specific situation (trigger) occurs in the current context.

The target group for the test was formal or informal caregivers for older people, possibly with MCI experience. The tests were carried out at Apollis (Bolzano, Italy), Fondazione Santa Lucia (Rome, Italy), Fundatia Ana Aslan International (Bucharest, Romania) and Bartenbach (Aldrans, Austria).

The first part of the tests, which included the vision of the presentation prepared to explain the project's objectives and methodology, the vision of the video on the Rule Editor and a first familiarisation with the platform, lasted about 25-30 minutes. The part related to fulfilling the tasks also lasted about 25-30 minutes and the remaining time was used to answer the questionnaire.

A total of 35 participants were involved in this usability test. The test persons are between 24 and 67 years old, the average age being 47 years. As far as gender is concerned, almost three-quarters of the sample is made up of women. The education level of most test persons is high: more than 80% of the sample has at least high school degree. The sample is made up of 12 formal caregivers (some of them are also informal caregivers), 16 test persons were involved in caring for a family member with MCI on an informal private basis and a total of seven test persons have other experiences of caring work.

Usability was measured by the System Usability Scale SUS. At first sight the results seem not very positive, but we have to consider that the platform is still being developed, that not many triggers were active during the test and that it therefore was difficult for the test persons to judge the overall system. The SUS questionnaire is made for systems already on the market whereas the Rule Editor is still a prototype; therefore, these first results have to be considered in a different perspective, namely as cues to improve the final product.

The comments made orally during the test were generally positive. In many cases, the initial difficulties decreased significantly as soon as the test-persons became familiar with the tool. Overall, the main point of strength assigned to the Rule Editor can be summarized as follows: "It is a platform that offers remote control and offers a certain degree of security of the caregiver towards the elderly who can live longer in autonomy; the platform is easy to use and the structure is logical".

The usability tests carried out have provided us with results on which we can work to further improve the Rule Editor platform.

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3 OBJECT OF EVALUATION AND METHODOLOGY

3.1 The Rule Editor

The Rule Editor enables users to create trigger-action rules in an intuitive manner. A trigger-action rule is a rule that specifies what should be done (action) when a specific situation occurs (trigger) in the current context. The structure of the Rule Editor is composed of a main panel in the central part of the window: it is where the hierarchies of triggers and actions are visualized; a sidebar on the left side, showing the progress currently achieved by the user in the creation of a rule; a horizontal menu in the top-right part of the tool, where some actions are available (Editor, Private Rules, Public Rules, Simulator, Settings, Lang, Logout).

For the **trigger hierarchy**, the dimensions (namely: the elements that appear as roots) are:

1. **User**
2. **Environment**
3. **Technology**
4. **Social**

Please note that, in this document, the basic elements (i.e. the leaves of the hierarchy) are shown in italic and underlined.

User is refined into:

Personal data – Position – Cognitive

Personal data is refined into

Age – Gender – Education

Position describes the current position of the user. It is refined into:

Relative Position – Absolute Position

Absolute Position is for describing the user position in terms of GPS coordinates. It is refined into the following elements, which have an intuitive meaning:

Latitude – Longitude - Altitude

Cognitive specifies aspects associated with the cognitive state of the user. It is refined into the following basic elements:

Self-assessment value – Emotional state – Cognitive state – Training result – Training time – Time since last connection

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2) Environment
Environment refers to all the aspects associated with the environment. It is refined into:

Date and Time – Ambient Attributes

Date and Time refers to the aspects connected with date and time, thus it is refined into:

Time – *Date*

Ambient Attributes refers to aspects associated with the current conditions of the surrounding ambient. It is refined into:

Light level - *Noise level* – *Temperature* – *Humidity* - *Gas sensor* - *Motion*

Each of the above-mentioned leaves has an easy-to-understand meaning.

3) Technology
This dimension covers the technology-related aspects. Up to now it is not further refined.

4) Social
This dimension describes the social relationships meaningful in the current context. Up to now it is not further refined.

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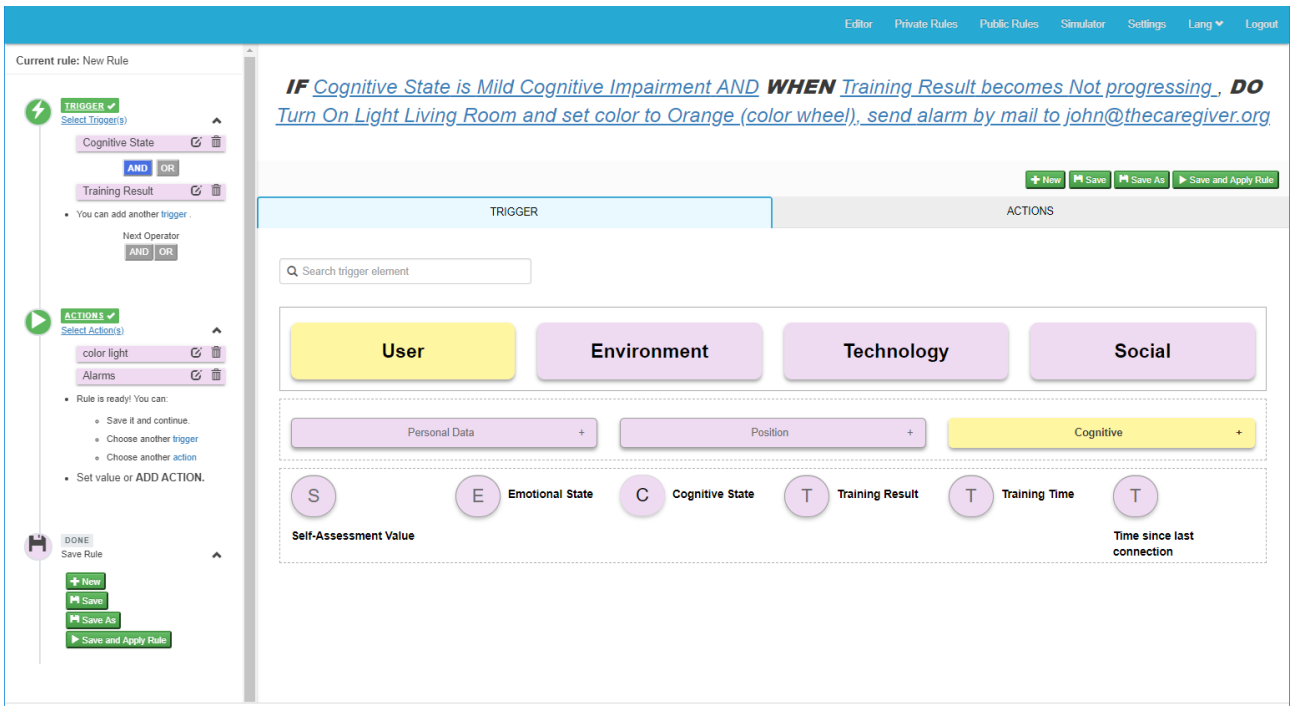

Figure 1: A screenshot of the trigger part of the Rule Editor

For the **action hierarchy**, the dimensions are:

1. **Appliances**
2. **UI Modifications**
3. *Alarms*
4. *Reminders*

Appliances refers to the actions aimed to control the home appliances. They are further categorized according to the house environment:

All - Kitchen - Living Room – Entrance

All refers to all the appliances of the house, up to now mainly lights. Indeed, it is refined into:

All light

Kitchen refers to all the appliances of the kitchen. It is refined into:

Colour Light

Living Room refers to all the appliances of the living room. It is refined into:

Colour Light

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Entrance refers to all the appliances of the entrance. It is refined into:
Colour Light Entrance

UI Modifications refers to the actions aiming at changing the user interface of the application at hand. Mainly it allows for showing/hiding elements in the UI. It is refined into:

Show/Hide Elements

Alarms refers to the specification of alarms. It is a basic element enabling the user to specify the attributes of the alarm (e.g. the text, the notification mode, the number of repetitions).

Reminders refers to the specification of reminders. It is a basic element enabling the user to specify the attributes of the reminder (e.g. the text, the notification mode, the number of repetitions).

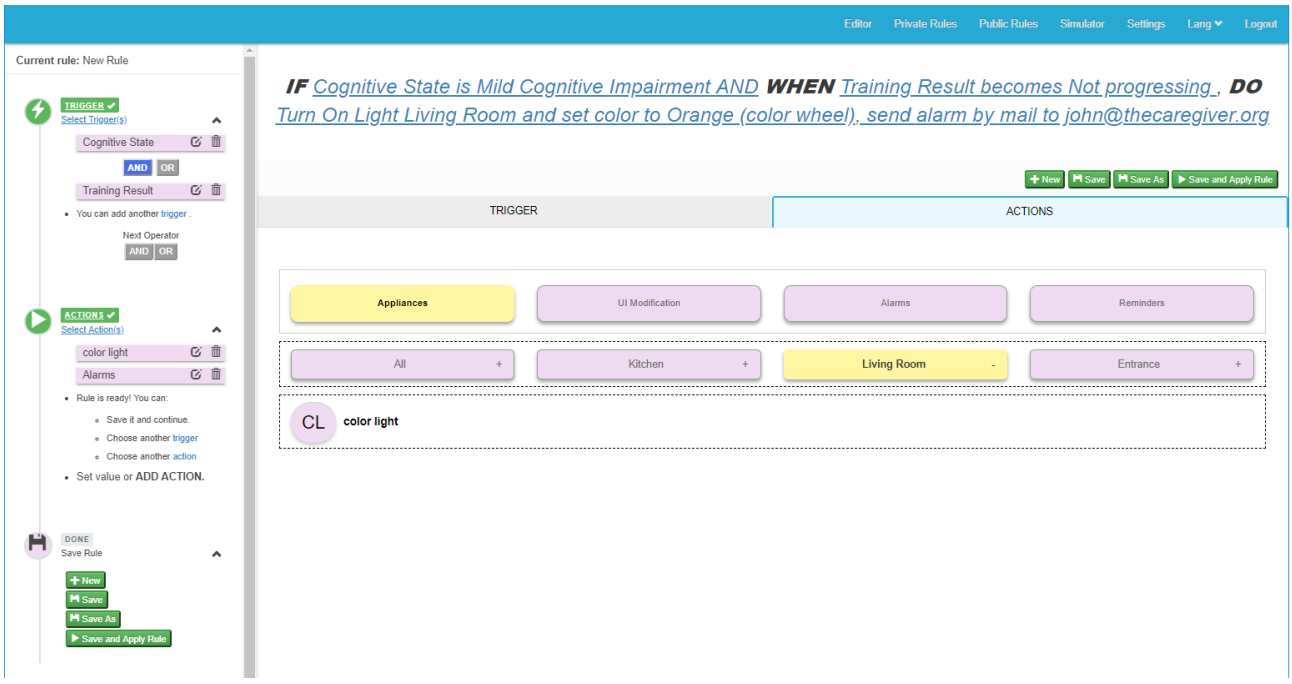

Figure 2: A screenshot of the action part of the Rule Editor

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3.2 Theoretical framework, structure of the questionnaire

The target group for the tests are formal or informal caregivers of elderly persons, possibly with experience regarding to MCI, that have a basic knowledge of web applications.

The questionnaire submitted to the test participants was developed in a shared effort by the project partners.

The first part of the questionnaire collects a few **socio-demographic characteristics** (gender, age, education level, specific qualifications), as well as questions about the **experience** of working with older persons with MCI on a formal or informal level. Finally, it considers the degree of web knowledge and programming knowledge of the test persons.

The next part aims at the **usability** analysis and for this reason it was decided to use a standardized validated questionnaire, the SUS. Developed by John Brooke as early as 1986, the **System Usability Scale (SUS)**[1] is still one of the most widely used methods for recording perceived usability. It is a short questionnaire of 10 questions that should be answered by users to give an initial assessment of the perceived usability of the product. As a result, the tested system receives a value between 0 and 100 points, whereby less than 68 points stand for below-average usability, everything above 68 points is at least good, and 100 points mean "perfect" usability.

The third part of the questionnaire dealing with different aspects of **accessibility** was developed ad hoc for this survey considering eventual barriers for potential users of the Rule Editor, such as age-related lower eyesight or linguistic difficulties.

3.3 Participants

A total of 35 participants were involved in the usability tests of the Rule Editor tool. Participants were recruited through the networks of the four institutions moderating the tests. Participants were required to belong to one of the target groups: formal or informal caretakers of elderly with MCI.

Participants were expected to know how to interact with a browser in a personal computer, but no further expertise was required.

The participants' responsibilities were to attempt to complete a set of representative task scenarios presented to them in as efficient and timely a manner as possible, and to provide feedback regarding the usability and acceptability of the user interface. Participants were not previously aware of the applications being tested.

1 Brooke, J.: SUS: a "quick and dirty" usability scale. In: P. W. Jordan, B. Thomas, B. A. Weerdmeester, & A. L. McClelland (Hrsg.): Usability Evaluation in Industry. London: Taylor and Francis, 1986.

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3.4 Procedure

Participants took part in the usability test to evaluate the prototype of the Rule Editor at the seats of Apollis (Bolzano, Italy), Fondazione Santa Lucia (Rome, Italy), Fundatia Ana Aslan International (Bucharest, Romania) and Bartenbach (Aldrans, Austria).

In each institution there was a person with the role of "facilitator" who had the task of providing overview of the study to participants, assisting and observing how they conducted the test and responding to participant's requests for assistance.

The tests were held in front of a computer and partly by filling out a paper questionnaire, following the procedure below:

- To start the facilitator introduced the Petal project and the tests with a power point presentation that was translated into the languages of the participating countries (Italian, German and Romanian).
- The second step was to present a short video showing the Rule Editor and two examples of programming rules.
- After watching the video, the participants had the opportunity to become familiar with the tool for a few minutes. Each facilitator had previously received from the CNR personalized access data and passwords for each test participant, in order to record and assign the test log data.
- At this point the actual usability test started: all the participants received a list of 6 tasks to be performed using the tool. Only the first task was completed entirely on paper, whereas the subsequent tasks were performed using the tool. The 6 tasks were:
- Task 1: Write in natural language three rules of your choice, which you judge relevant/useful for assisting elderly affected with MCI.
- Task 2: T2.1 Write in natural language a rule of your choice that includes 1 trigger and 1 action; T2.2 Specify (and save) the above rule by using the Personalisation Rule Editor.
- Task 3: T3.1 Write in natural language a rule of your choice that includes 2 triggers and 1 action; T3.2 Specify (and save) the above rule by using the Personalisation Rule Editor.
- Task 4: Specify (and save) the rule below by using the Personalisation Rule Editor: "As soon as the user enters the kitchen and it is between 6 a.m. and 8 a.m. turn on the kitchen blue light for 1 minute".
- Task 5: Specify (and save) the rule below by using the Personalisation Rule Editor: "Should the elderly feel discouraged in case the training result has just shown no substantial progress in his/her cognitive status, the living room light will be turned on white for 10 minutes".

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- Task 6: Specify (and save) the rule below by using the Personalisation Rule Editor: "It's more than 1 day that the elderly does not access the cognitive application to perform the assigned exercises: in this case, at 4 p.m. a reminder should be sent to the elderly".

After completing the tasks, the test persons were asked to fill out a short questionnaire on socio-demographic information, knowledge about web and programming, and on the user experience concerning the Rule Editor (see Appendix 1, page 43). Usability was measured by means of a validated instrument: the System Usability Scale SUS.[2] This questionnaire module is a simple ten-item/ five point Likert scale giving a global view of subjective assessment of usability.

The participant's interaction with the Rule Editor applications was monitored by the facilitator seated near the participant. Note takers and data logger(s) monitored the sessions. The test sessions were not videotaped.

Each institution then had to enter the answers of every participant to the questionnaire in an online tool after having translated them into English.

2 Brooke, J. (1996). SUS – A quick and dirty usability scale. Usability evaluation in industry, 189(194), 4-7.

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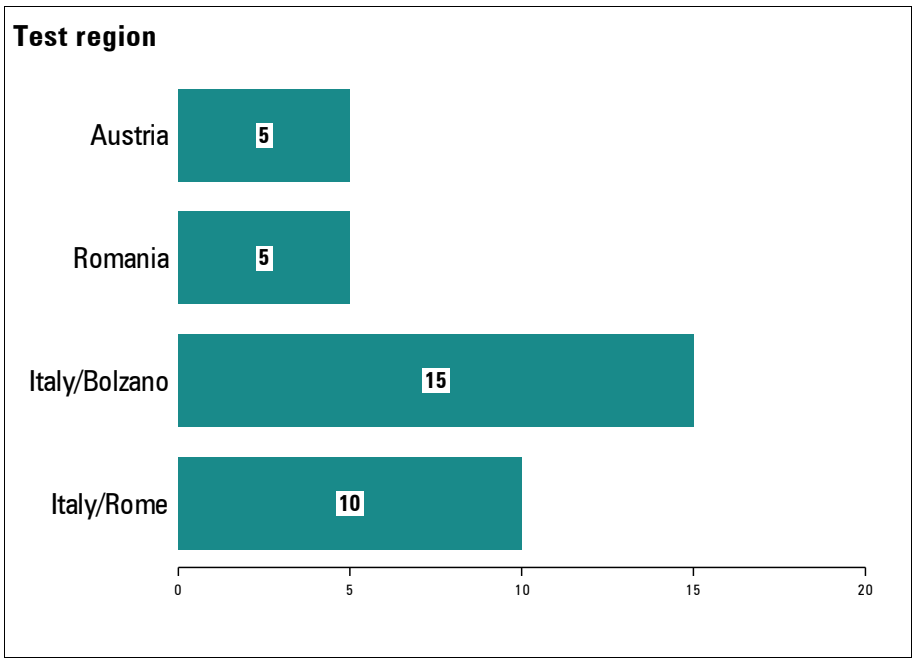
4 REALISATION

4.1 Fieldwork

In total, 35 usability tests were carried out, distributed as follows (see figure below):

- 25 in Italy: in detail 15 in Bolzano (by Apollis) and 10 in Rome (by FSL);
- 5 in Romania/Bucharest (by ANA)
- and 5 in Austria (by Bartenbach).

In Bolzano 8 interviews were conducted in German and 7 in Italian.



4.1.1 Ethics

All persons involved in the usability test were required to adhere to the following ethical guidelines:

> *This survey is completely anonymous and subject to the European and National privacy regulations. Individual participant's names may not be used in reference outside the testing session. Your data will be used exclusively for statistical purposes.*

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4.1.2 Fieldwork in Austria

Bartenbach carried out a total of 5 usability tests. Five subjects were selected based on personal contacts. Four persons worked or still work in the field of geriatric care or are currently caring elderly people with MCI. One person had no background in the field of elderly care.

The tests took place between 24.7.2018 and 27.8.2018 in Tirol. Three female and two male participants did the test-tasks. The age of the participants ranged between 24 years and 58 years. All tests were performed in German language, although the translation of the Rule Editor was not complete. However, in sum the participants understood the intention of the Rule Editor.

The following resume can be drawn:

- Task 1: all participants had no difficulties and no additional help needed. The tasks were done quickly, and the Trigger-Action rules were clearly formulated.
- Task 2,3,4: Due to the lack of translations of some trigger/action options the test-persons had to adapt their rules to the corresponding options. Depending on the used browser and the used screen resolution of the monitor the "save rule" button was not visible without scrolling down to the end of the screen. Two persons need help to find the "save-rule" button.
- Task 6: This rule seems to be difficult for most of the subjects. They needed more clarification/information and support by the instructor. In addition, date-time-pickers are suggested as an improvement.

All persons had no difficulties to fill out the questionnaire at the end of the test. Afterwards, the answers of the questionnaire were transferred into an online version by the instructors and the results can be found in chapter 5.

Although the expected time to complete the whole test session was 45 minutes, all the participants needed significantly more time - all persons around 1 ½ hours.

Some interesting comments of the five subjects were:

- Program is not yet sufficiently translated
- Many features (both triggers and actions) are not yet implemented.
- Total duration planned with about ¾ hour was way too short.
- Overall people think, that the Rule Editor is a pretty good idea, but German version does not work well at the moment
- The Editor is pretty good, but there is still a lot of work left to implement everything and pack it in a suitable form.

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Overall it can be summarized, that the subjects understood the logic of "if this then that" rules and possible combinations of trigger and actions. After some exercise with the editor the test-persons got very interested into rule creation and created rules with "enthusiasm". Some improvements, especially in translations are needed and the overall time for using the Rule Editor the first time was underestimated and should be taken into account when planning the field trials.

4.1.3 Fieldwork in Italy/Rome

In Rome, the usability tests of the PETAL Rule Editor were carried out between July 26th and August 7th 2018 at Fondazione Santa Lucia. All the tests were administrated by a specialised psychologist trained on the content and purpose of PETAL project and regarding the scope and the structure of the test usability. The entire process was supervised by the Dementia Area Coordinator (Dr. Banaj). The recruitment process involved the personnel of the Center for Cognitive Disturbance and Dementia (CDCD) and informal caregivers. The platform was tested by ten subjects (2 male and 8 female) aged 35-68 years old.

The usability tests were performed on individual appointments consisted of four phases. The first phase included the description of the project and the Rule Editor platform through the support of a PowerPoint presentation. A particular focus has given to trigger- action language and its use in Rule Editor. Furthermore, a video tutorial has showed about practical examples of inserting rules in the Rule Editor. In the second phase, more creative than the previous one, we asked to each participant to think about some rules in natural language, where at least one consists of two triggers and one action. After this, we asked them to insert those conditions in the Rule Editor as explained by the tutorial (third phase). Finally, reaching the end of our appointment, we asked them to fulfil the Questionnaire IN-LAB Test (fourth phase). Before performing the questionnaire, all caregivers were informed of the anonymous use of the data in full respect of privacy. The fulfilled questionnaires were collected and the data obtained were entered in the online data management.

Generally speaking, the first impression was very good and all participants showed interest in our project. Anyway, some concerns were highlighted during the third phase of the test usability that can be useful to implement the platform. In first instance, almost all the subjects have considered as important aspects feeding, taking of drugs and gas leaks. Additionally, some rules have not found a link within the Rule Editor (e.g., if temperature is too high open the window, check the duration in which a condition does not appear, how to verify that after the alert the elderly actually took the medicine). Only one subject has highlighted doubt on the patients' privacy, in addition to arouse alarmism in conditions that are not#. Regarding gas sensors, it would be useful to allow the device to close the valve and not only to signal that the

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gas is open, since a remote caregiver might not access it promptly. Only few participants found the use of rule-editor a bit difficult defining it not very intuitive, but the initial difficulties decreased significantly as soon as they became familiar with the tool.

In conclusion, the Usability tests in FSL balance was positive and with some improvements it can be an easy-to-use platform both for people with and without good computer skills.

4.1.4 Fieldwork in Italy/Bolzano

The fifteen usability tests of Bolzano were carried out between July 25th and August 30th 2018. Two thirds of the tests were carried out at the seat of apollis in Bolzano-Bozen and one third in Brixen-Bressanone. The figure of the facilitator was held by an employee of Apollis.

The recruitment of test persons took place through different channels: personal contacts of the facilitator or of colleagues, people working in hospitals or in facilities for the elderly, family caregivers who were presented to us by contact persons. In Bolzano/Bressanone the tests and interviews were conducted in one of the two official languages of the Province of Bolzano – Alto Adige: Italian or German. At the end of the tests, each person received a small gift as a thank for the time spent for the usability-test (a jar of honey from a small South Tyrolean producer).

The collaboration was very good, only a few people showed a certain resistance in solving the tasks, most began to take taste towards the end of the test, as soon as they had reached a certain familiarity with the tool. Concluding considerations about the tasks, with some critical issues are:

- task 1: In general, this task was carried out by the participants with speed and short discussions;
- Task 2 and 3: These tasks have also been carried out quite smoothly. Some people have had difficulty finding the "and" and "save" command.
- to solve task 4 the tool did not provide the possibility to insert a time interval (as requested by the test);
- in task 5 many people were sceptical about the possibility of detecting the emotional state of the elderly;
- in task 6 many people would have preferred to be able to enter the notification time directly from the action (not from the trigger).

Moreover, due to the limited activation of settings, people have had some difficulties in understanding the overall potential of the Petal system.

On the whole, the reactions were positive especially as regard the logic of the instrument and the importance of implementing intelligence technologies in the care of

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the elderly with mild cognitive disorders. The structure of the trigger and action are clear to the users.

The following two photos were taken during one of the tests in Bolzano-Bozen.

Figure 1: During the usability test in Bolzano-Bozen

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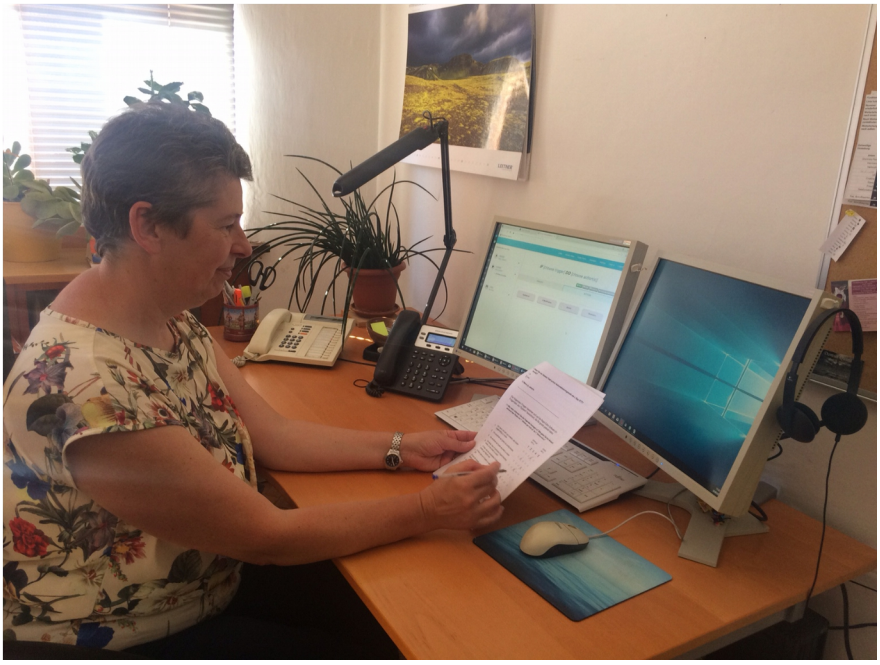

Figure 2: During completion of the questionnaire

4.1.5 Fieldwork in Romania

In Romania we carried out the usability test in the Department of Geriatrics and Gerontology of ELIAS University Emergency Hospital in Bucharest. The test took place on 29th August 2018. There were 5 formal caregivers that attended and tested the platform, previously being presented for a second time both the project and the operating principles of the platform. At the presentation there were also patients, doctors and nurses as well who attended and express their views and beliefs regarding the project.

The recruitment process was facilitated by the personnel supervisor of the clinic who gathered the qualified personnel for the meeting. Both presentation and practical activities were carried out by one member of ANA and the language in which the whole process developed was Romanian.

The general impression regarding their interaction with the platform was a positive one, from the perspective of both the coordinator of the test and also the users. Although their IT background varied from beginner to advanced, all agreed that such a platform represents a major step forward for the healthcare system.

Regarding the tasks, the conclusion are as follows:

- task 1: this task was carried out with minimal difficulties and helped the user to get used to the Rule Editor

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- task 2 and task 3: these tasks were easily performed as well; lifting up the level of difficulty proved useful for a more comprehensive understanding of the Rule Editor.
- task 4: for this task the users spent a bit more time as the rule was consistently more complex than the previous ones.
- task 5: the aspect of detecting as well as adapting to the state of the elderly raised some inquiries among users; however, if truly achieved, they agreed that this will represent the main advantage of this platform.
- task 6: one aspect that was mentioned regarding that task is that a notification should be sent to the caregiver as well; but as it is only a mock test, they managed to create and save this rule in an average amount of time.

What is more, one drawback of the in-lab test was that the platform did not offered all of its option so that the caregivers could get a clearer and more accurate view on its real potential.

To sum up, as mentioned before, the feedback was a positive one, the Rule Editor was described as logical, clear, intuitive and easy to use as well.

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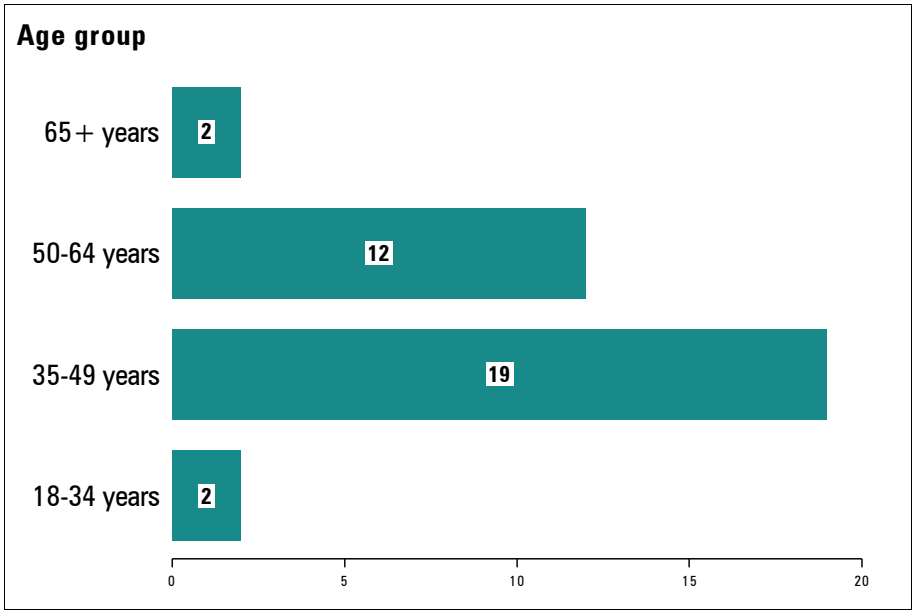
4.2 Description of the sample

The sample is aged between 24 and 67 years and the average age is 47. Most of the respondents can be found in the age group of 35-49 years.



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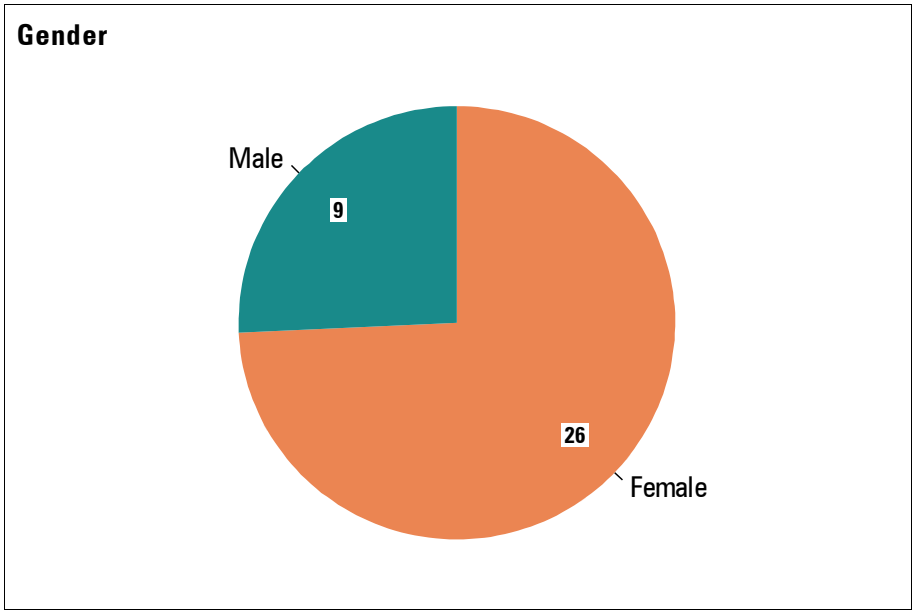
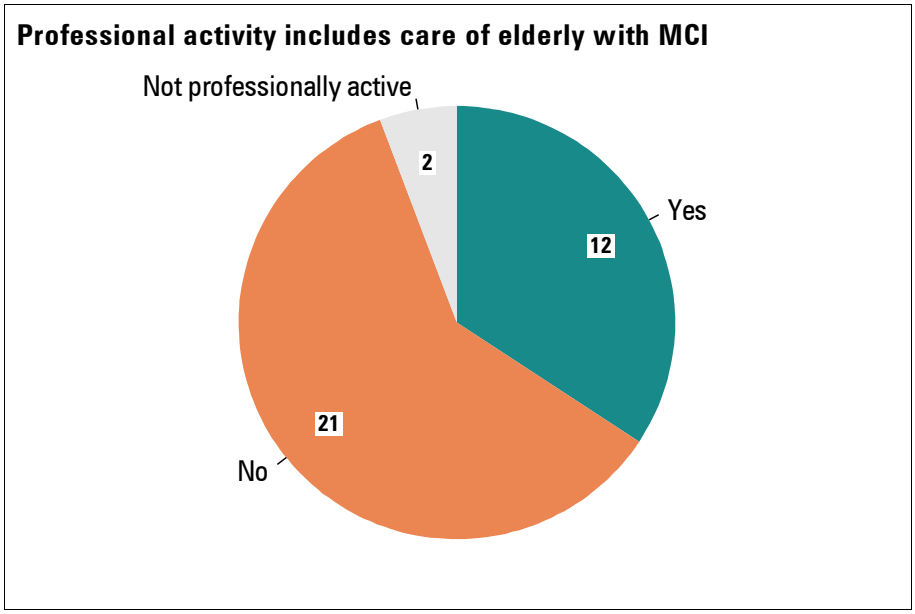
Regarding gender, almost three-quarters of the sample is made up of women (74%), the remaining quarter of the sample is made up of men.



About one third of the sample consists of persons whose current professional activities include the care of elderly people with mild cognitive impairment (MCI).



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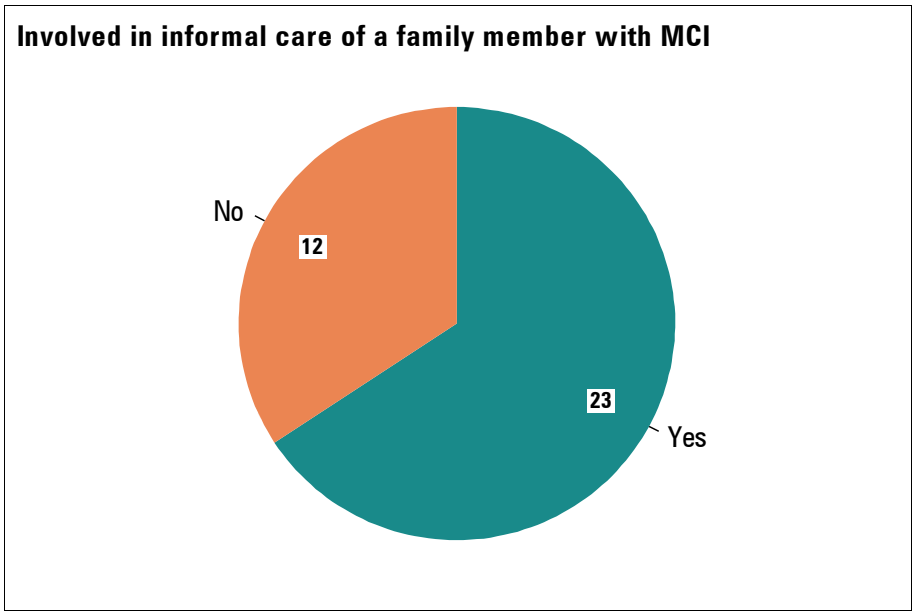
Eight participants also have a professional qualification for the care of elderly people.

As many as two thirds (65%) of the sample is involved or has been involved in the past in the care of a family member or another elderly person with MCI on a private (informal) base.



A typology of people interviewed was formed on the basis of their own experience in care work with elderly people with MCI: it emerges that 12 people are formal caregivers (some of them are also informal caregivers), 16 people have been involved in the care of a family member with MCI on a private informal base and altogether seven people have other experience of care work.

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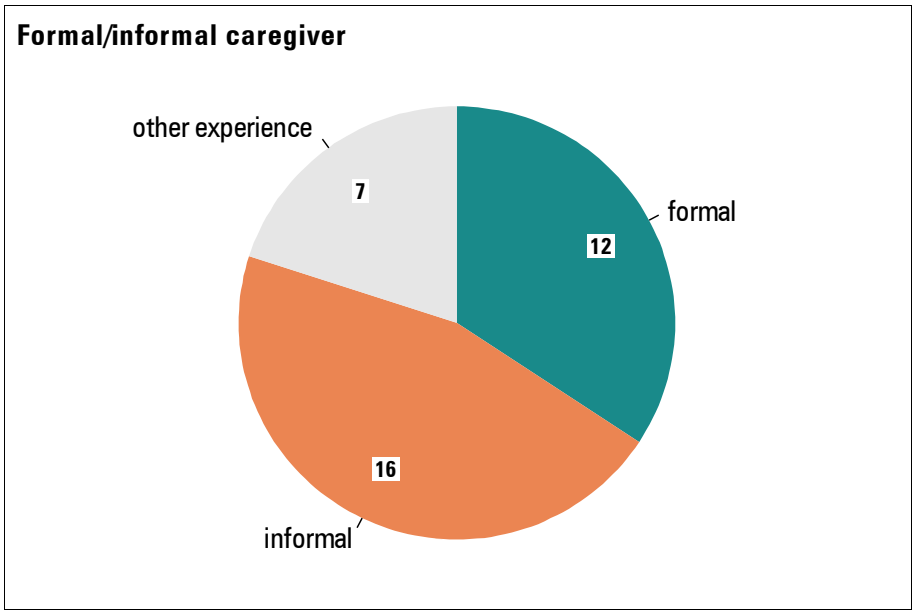
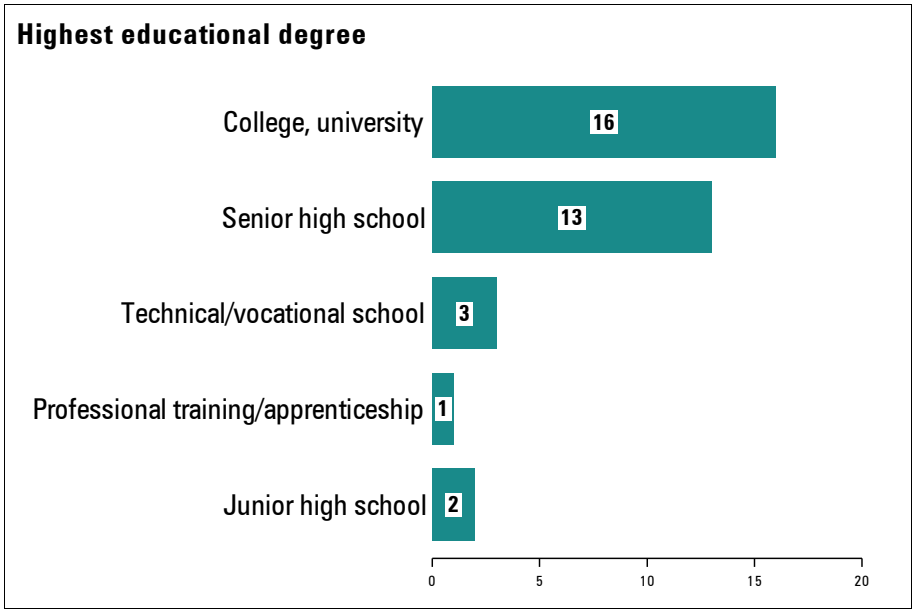


The education level of the sample is very high: more than 80% of the sample have at least the senior high school degree. In detail, 13 persons have a general qualification for university entrance (senior high school) and 16 have an academic title of college or university.



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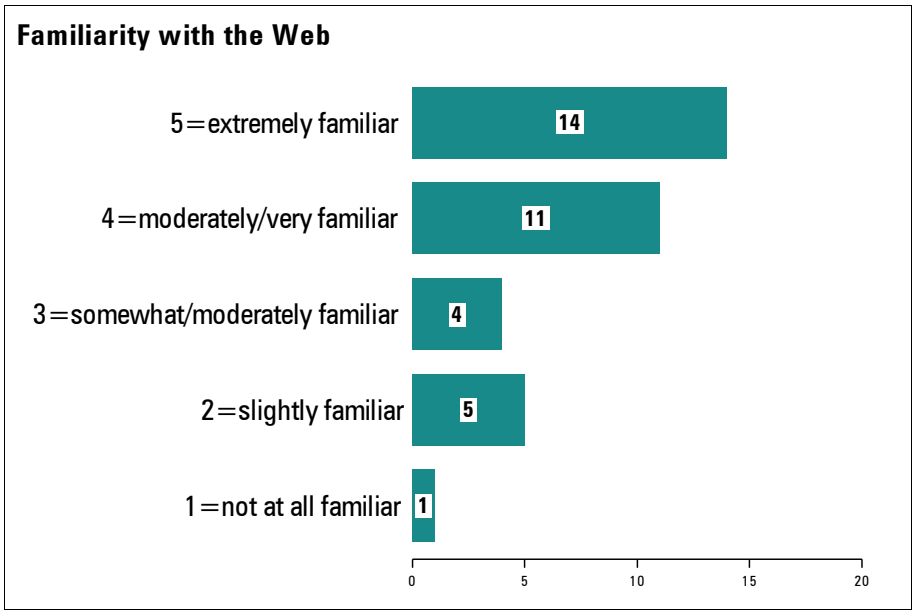
Familiarity with the web and programming experience

A large majority of the test persons say they are well familiar with the web: 14 people say they use the web many times every day and are sure to master almost any usual task (filling in information, proficiently use email, purchase objects online, do advanced search on the web). Another 11 participants judge their familiarity with the web as moderately, meaning that they use the web (at least every day), can send email with attachments, can fill in forms and can do some research on the web. However, there are still 10 persons who judge familiarity with the web as moderate, slightly or not existing (1 case).



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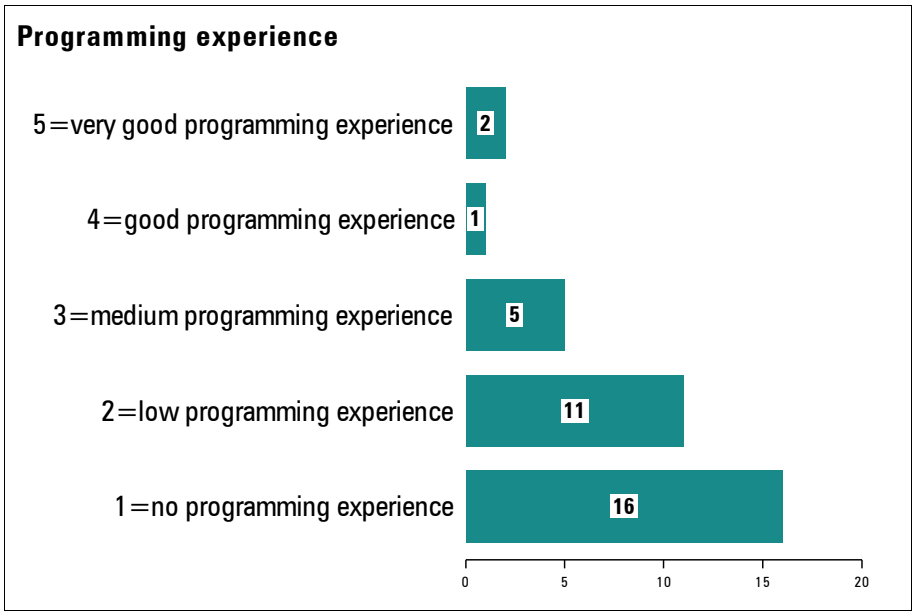
Experience with programming is a different matter: only two participants claim to have "very good" programming experience and one other judges his programming experience to be "good". Another 5 participants state to have medium level experience. The vast majority of the test persons declare to have only low programming experience (11 persons) or not to have any experience (16 persons). These results are in line with the selection criteria for our sample, because good programming skills were not required and not even desirable as the Petal system is designed to be used by people who do not have advanced computer skills.



The tools supporting personalisation based on dynamic events (like e.g. IFTTT) seem almost completely unknown and not used: only one person has already used such a tool.

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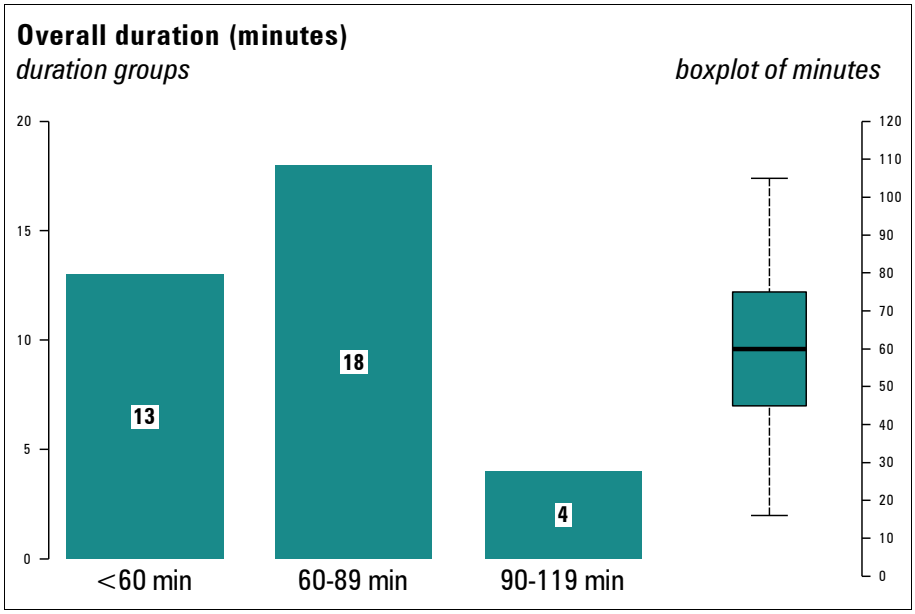
5 RESULTS

The following paragraphs contain the main results of the usability test and the answers regarding the usability of the Rule Editor, as well as the remarks about the strengths and weaknesses of the application, concluded by the assessment of different accessibility aspects.

The first part of the test, which included viewing the presentation prepared to explain the objectives and the methodology of the project, watching the video on the Rule Editor and a first familiarisation with the platform, lasted about 25-30 minutes. Performing the tasks of the actual test also lasted about 25-30 minutes and the remaining time was dedicated to answer the questionnaire.

5.1 Description of task fulfilment

On average the in-lab tests required altogether about one hour, the maximum duration was 1 hour and 45 minutes.



As described in paragraph 3.4, the actual test consisted in performing six tasks. The facilitators who accompanied the tests took note of the time that the individual participants needed for each of the tasks. The results show that the longest tasks were number 1 and number 6.

Task 1 consisted in writing down three rules in natural language, which the persons judged relevant/useful for assisting elderly persons affected with MCI. The average

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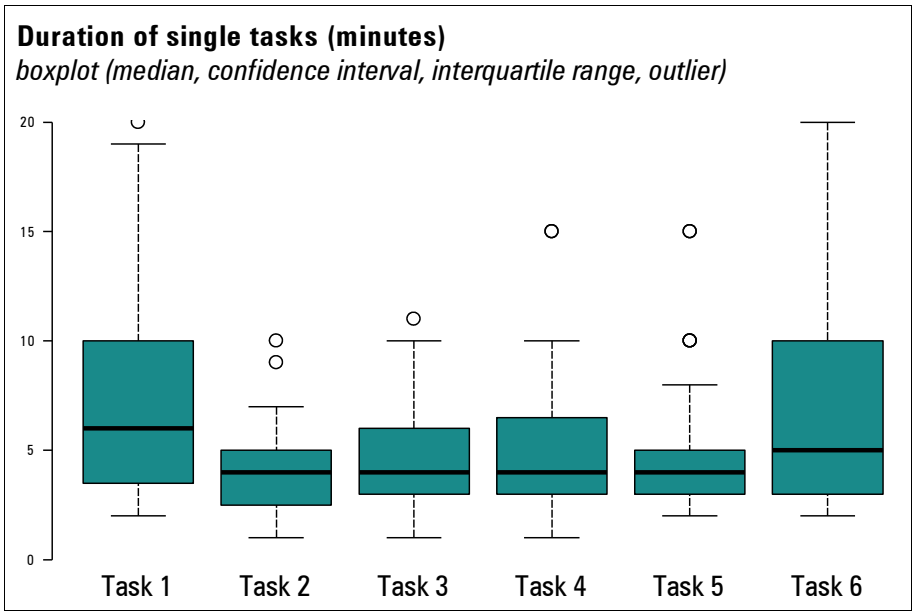
duration to perform this task was 7 and a half minutes. Task number 6 also had a similar duration, requiring almost 7 minutes.

Tasks 4 and 5 were carried out in just over 5 minutes, task number 3 in just under 5 minutes and the task number 2 in about 4 minutes.



5.2 The rules thought up by the test persons

The first task was to formulate three rules, which the test persons, based on their experience, considered to be important for people with MCI. The rules defined by the respondents were classified into broad categories, in order to better analyse on which topics the answers were focused.

The rules have been codified in two different ways:

- the first taking into account the type of device or action triggered by the rule,
- the second according to the category of needs addressed by the rule.

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For the first classification, the following categories have been identified:

	The rules referred to …	Number of answers
1	Lighting	23
2	Gas/smoke/stove sensor	15
3	Medication	15
4	Reminding some appointment	10
5	Alarm in the event of a fall	10
6	Entry door monitoring	9
7	No movement	4
8	Emotional status	2
9	Other topics	17
	Total	105

Table 1: Categories of rules thought up by respondents

As many as 23 rules had to do with lighting, for example:

- *"IF User is in front of entrance, DO Turn On All Light in the house";*
- *"When the elderly exits home and if lights are on, turn off the lights";*
- *"If the user gets out of bed between 10 pm and 7 am, turn on the lights".*

15 people have formulated rules for reminding the elderly to take their medication (at a given time) and also 15 to start an alarm in case of smoke / gas in the home of the elderly. Some examples are given below:

- *"If the blood pressure tablets were not taken in the morning, make red light in the bedroom and living room";*
- *"If the user does not take the medicine at the appointed time, send him a message";*
- *"If the medicines are not taken at the scheduled time, send a signal to the caregiver".*

A further 15 rules referred to the alert in the event of a gas or smoke leak, for example:

- *"Forget about switching off the stove - smoke sensor - alarm"*

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- *"If the System detects smoke then sends alarm to 112 and to the caregiver"*
- *"When the oven is on since more than 70 minutes, turn off the oven".*

10 people said they would like to receive an alert if the elderly person fell. For 10 people it would be important to remind older people of appointments, such as:

- *"If he has a medical examination, remind him to go to the doctor"* or
- *"Reminder of daily walk"*.

Other aspects mentioned are the monitoring of the front door, the monitoring of activity/non-activity in the home and other situations that can be viewed in the annex. The annex contains all the rules formulated by the test persons and the reference category assigned to each of them.

The rules formulated by the test persons were also codified in a second way, not considering the resulting action but analysing the need behind the rule that should be covered. In some cases, it was ambiguous but we tried to define a few basic categories that contained the major categories of needs. The identified needs are:

- **Physiological needs**: All needs regarding the regularity or quality of physical activities like eating, drinking, sleeping or the treatment of illness and injury.
- **Safety and security needs**: Many rules have referred to safety and security aspects. This is particularly true for the elderly who have to stay at home, live completely alone or spend most of the time without the presence of other persons.
- **Social needs**: Due to health problems or lack of ability to go out, many elderly persons often reduce social gatherings and spend much time alone. Older people need opportunities to get socially involved with family, friends and community.
- **Comfort, well-being, supporting independent living**: This type of needs includes devices and procedures that can simplify the management of daily life, for example: sensors that turn on/off the light at certain times or as a result of movement, turn on/off the heating or air conditioning. In this group we have also included rules on remembering certain appointments, for example with the doctor, or receiving an input to go for a walk or remembering to take the keys before leaving the house.

The largest proportion of the rules expressed (42) deal apparently with safety requirements, knowing that the elderly person is in a safe environment that as soon as a fall, or a gas leak occurs or if no movement is detected for a certain period of time, the caregiver is immediately notified or a sensor / control is started that for example turns off the gas outlet or that the entrance door is closed.

36 rules refer to aspects related to the general well-being of the person, to enhance his or her comfort or support an independent life: this is largely an intelligent lighting of the various rooms of the house. In a couple of cases it is a question of inviting the

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person to adopt healthy behaviour, such as taking a walk and remembering any appointments.

The third group in order of frequency refers to physiological needs (24): reminding people to eat, drink, take their medication at a certain time, get enough sleep.

Social needs have been mentioned explicitly only a couple of times.

Type of Needs	Number of rules
Safety and security needs	42
Comfort, wellbeing, supporting independent living	36
Physiological needs	24
Social needs	3
Total	105

Table 2: Type of needs arising from the analysis of the rules

5.3 Usability – Results of SUS

After having completed the tasks the test persons were asked to fill out a short questionnaire: Usability was measured by the System Usability Scale SUS. This questionnaire module is a simple ten-item/ five-point Likert scale giving a global view of subjective assessment of usability.

The answers to the individual SUS items are presented in the next figure.

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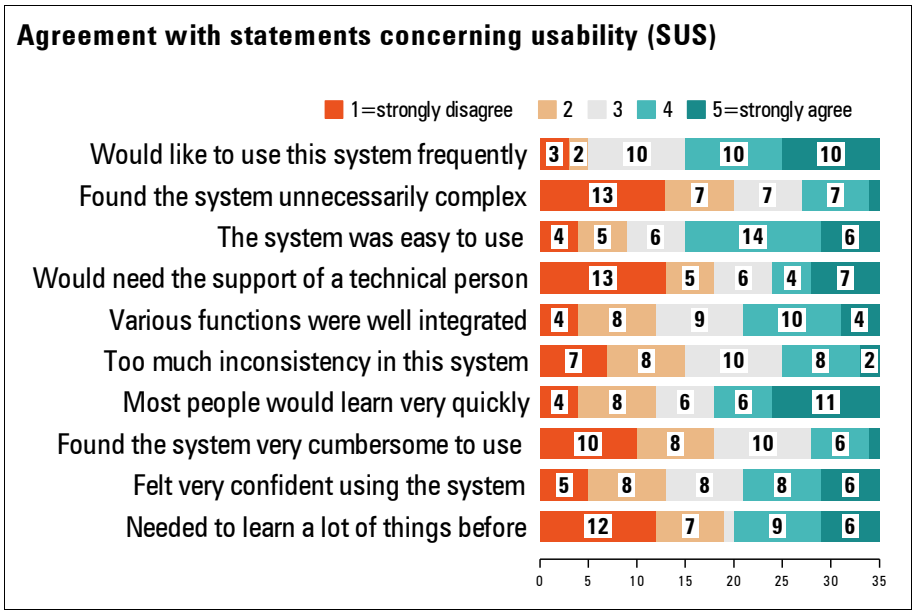
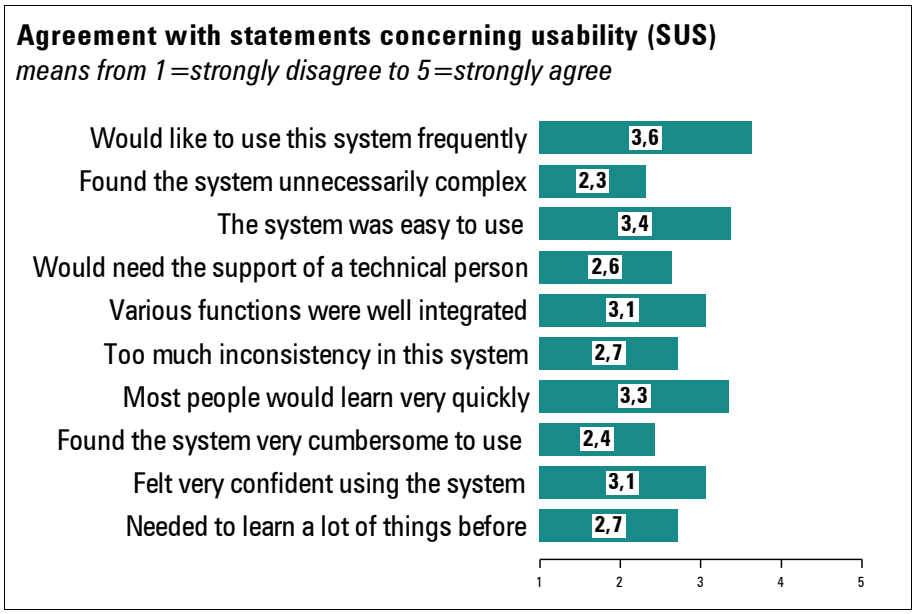


The next figure shows the average value of the responses.



The average SUS score for all the participants that answered the 10 questions is 59, the median 62.5, which are both lower than the threshold of SUS score value for

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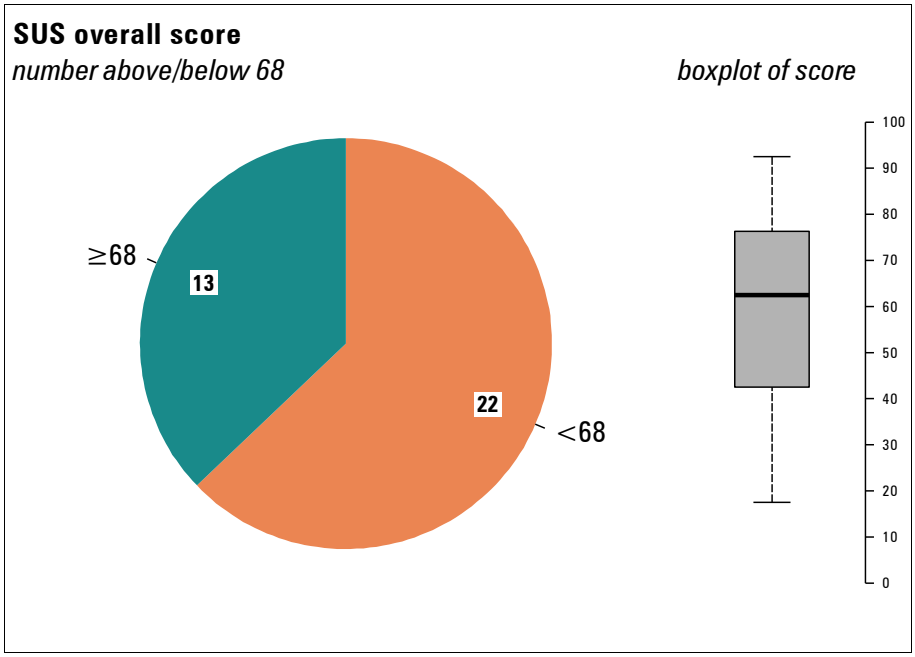
attesting good usability, namely 68. For 13 test persons the Rule Editor reaches a value equal to or above 68, for 22 persons a lower value.



At first sight, these results seem not very positive, but we have to take into account that the tested platform is still in the process of development. For that reason, several triggers were not yet active causing some difficulty for the test persons to judge the usability of overall system.

The comments made orally during the test were generally positive. As SUS is thought for systems already on the market and considering that the Rule Editor is still a prototype, these first results are to be considered in a different perspective, namely as cues to improve the final product. In that perspective the results can be judged even as quite encouraging.

The following two tables indicate the average SUS value crossed with a series of demographic variables. Even if the subgroups are quite small and therefore the differences are not really significant, some interesting patterns emerge.

With regards to the country in which the tests were carried out, it emerges that the sample interviewed in Austria was much more critical than the sample interviewed in Romania or in Italy. Also the composition of the sample by age seems to have some influence: persons under 50 years judge the Rule Editor in average slightly better than the age group "50 years and more".

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Also the level of school education seems to have a certain influence: persons with a university education judge the tested application better than those with a lower formal education (see table 3).

		SUS overall score	Basis
		mean	cases
TOTAL		59,1	35
Gender	**Female**	58,2	26
	Male	61,9	9
Test region	**Austria**	35,5	5
	Romania	68,5	5
	Italy/Bolzano	66,3	15
	Italy/Rome	55,5	10
Language	**German**	54,8	14
	Italian	60,0	16
	Romanian	68,5	5
Age group	**18-49 years**	60,6	21
	50 + years	57,0	14
Highest educational degree	**Technical school or lower**	45,8	6
	Senior high school	60,2	13
	College, university	63,3	16
Formal/informal caregiver	**formal**	59,8	12
	informal	56,6	16
	no experience	63,9	7

Table 3: Average SUS values and socio-demographic variables

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Similar to some socio-demographic variables, also computer skills influence the evaluation of usability. Those who use the web many times every day and are familiar with practically all tasks (extremely familiar) feel more confident in using the Rule Editor than those who use the web only sporadically. The SUS questionnaire receives higher average marks even among those who have at least a minimum of programming experience (see table 4).

		SUS overall score	Basis
		mean	cases
TOTAL		59,1	35
Familiarity with the web	**not at all/ slightly/ somewhat familiar**	51,8	10
	very familiar	57,3	11
	extremely familiar	65,9	14
Programming experience	**no programming experience**	47,5	16
	low programming experience	66,4	11
	medium/good/very good progr. experience	59,1	8

Table 4: Average SUS values and computer skills

5.4 Qualitative analysis of strengths and weaknesses

The questionnaire also included a part where respondents could mention three positive and three negative aspects of the Rule Editor. 28 persons answered the question on the positive aspects of the Rule Editor with a total of 60 suggestions.

The main points of strength of the Rule Editor can be summarized in four relevant aspects: it is a platform that offers remote control and therefore is useful and offers a certain degree of security for the caregiver towards the elderly who in this way can live longer independently, it is easy to use, the structure is logical and the platform also allows to customize the rules based on the personal needs of the elderly with MCI (see table 5).

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	Positive aspects of the Rule Editor	Number of answer
1	The platform allows remote control of the elderly, is useful and increases security	20
2	The platform is easy to use	13
3	The platform allows a high degree of customization (individual setting, personalisation)	10
4	The platform is logical structured	7
5	Other issues	10
	Total	60

Table 5: Categories of positive aspects

The question about the negative aspects of the Rule Editor was also answered by 28 persons who made a total of 59 comments. In this case, the answers were concentrated on the following aspects:

The most frequent criticism addressed various difficulties that emerged during the usability tests (due to various problems related to non-intuitiveness, difficulty to use for persons with little familiarity with programming, …).

The second critical aspect is related to the fact that during the tests not all options present in the UI were active and that therefore people had difficulties in understanding the potential of the system and raised doubts about its usefulness.

The third group of answers refers instead to the graphic design and the general layout and some specific items (see table 6).

The category "other answers" sums up various observations not related to the categories listed above; it contains interesting answers such as:

- "*Certain functions (rules) should already be pre-installed and changeable. It is easier for the users, otherwise they would have to come up with everything themselves. At the moment it's more of a programming than a personalizer*" or
- "*It is not clear how the sensors perceive the conditions of the elderly*".

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	Negative aspects of the Rule Editor	Number of answer
1	The platform is difficult to use	18
2	Too few options activated, important triggers were missing	13
3	Layout, graphics, fonts, clock display	12
4	Translation problems	5
5	Other issues	11
	Total	59

Table 6: Categories of negative aspects

Both the responses on the positive and relative aspects are fully reported in the annex to this report.

Finally, the questionnaire had an additional open question to collect more suggestions on how to improve the system: 19 persons answered this question. In addition to some observations that had already been expressed previously (on translation problems, on graphics in general and on the few triggers activated for the tests), some test persons expressed some interesting considerations that are reported below:

- *"It would be important for the user to know where to go with the rule setting, or where are my limits when using the program."*
- *"Possibility to send reminders for example daily (even without trigger)"*
- *"If a reference person is not reachable / occupied, then who receives the alarm? Health and social care worker must support user and reference person in the selection and evaluation of the home-setting."*

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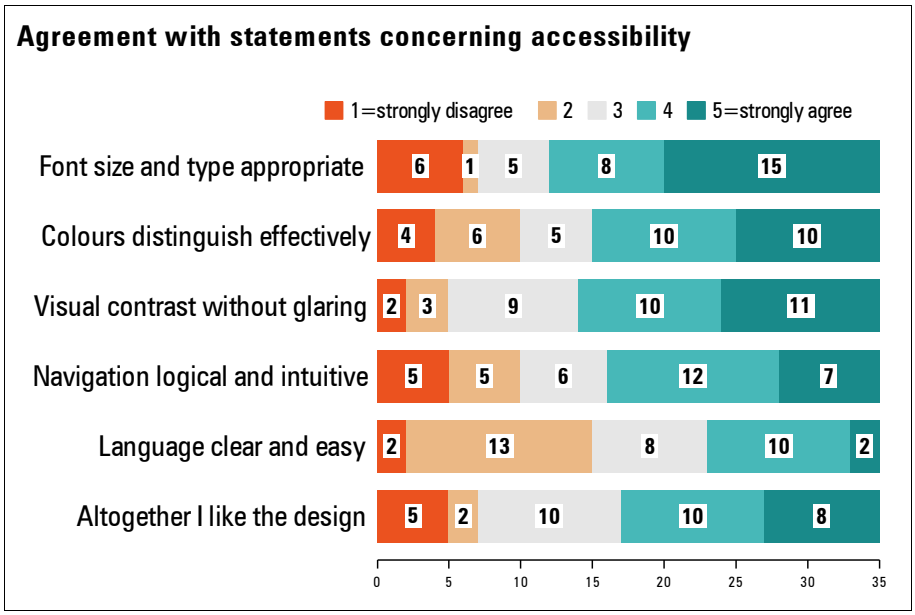
5.5 Accessibility

The average score of the responses to the individual items on the accessibility of the platform showed that the two aspects judged most positively are "Font size and font type of the Rule Editor are appropriate" and "The visual contrast of the Rule Editor is appropriate". The aspects with the lowest score are "The language and the terms used in the Rule Editor are clear and easy to understand" and "The navigation through the different pages of the software is logical and intuitive" (see table below).



To better analyse the results of the questionnaire on accessibility, a sum indicator of the individual items was constructed and cross-referenced with some socio-demographic variables.

Considering the limited number of cases that affect the significance of the rather small differences displayed in this table, it can be seen that the socio-demographic variables do not affect the assessment of accessibility: the only value that stands out is the much higher level of the accessibility index emerging of the tests carried out in Romania in comparison to the results in other countries.

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		Accessibility overall score	Basis
		mean	cases
TOTAL		20,5	35
Gender	**Female**	20,1	26
	Male	21,7	9
Test region	**Austria**	19,0	5
	Romania	27,0	5
	Italy/Bolzano	18,7	15
	Italy/Rome	20,7	10
Language	**German**	18,3	14
	Italian	20,4	16
	Romanian	27,0	5
Age group	**18-49 years**	20,2	21
	50 + years	21,0	14
Highest educational degree	**Technical school or lower**	18,8	6
	Senior high school	22,3	13
	College, university	19,7	16
Formal/informal caregiver	**formal**	22,3	12
	informal	18,6	16
	no experience	21,9	7

Table 7: Average accessibility values and socio-demographic variables

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The cross-referencing of this indicator with computer skills leads to a more positive assessment of the accessibility of the platform by those with good programming experience (see table 8).

		Accessibility overall score	Basis
		mean	cases
TOTAL		20,5	35
Familiarity with the web	**not at all/ slightly/ somewhat familiar**	22,6	10
	very familiar	17,8	11
	extremely familiar	21,1	14
Programming experience	**no programming experience**	18,4	16
	low programming experience	20,8	11
	medium/good/very good progr. experience	24,3	8

Table 8: Average accessibility values and computer skills

5.6 Specific problems in using the system

The last question of the questionnaire provided a space to refer to any problems that may have arisen during the test. Ten respondents made a concluding remark or simply repeated an aspect they had already mentioned in other parts of the questionnaire.

A couple of test persons stressed once more a certain difficulty in defining and implementing the rules:

- *assignment to categories not unique (for beginners)*
- *did not find the items to create given rules*
- *logical operator: not clear*
- *more instruction is desired use larger fonts*
- *saving rule 3 and 4 did not work could not enter phone number (field blocked)*

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Other test persons had difficulties to understand the translation of some of the terms, which was considered not to be very clear and exhaustive, in this case people wrote:

- *the (Italian) translation is not complete yet*
- *translations task description did not match editor terms*
- *translations unclear. Terms is/becomes?*

And finally, the last two respondents made a general observation on the tests carried out, complaining about the fact that only a few actions and triggers were active ("*it's not good to test the editor when a lot of actions and triggers are not implemented/available*") and another person repeated that the graphic design of the platform should improve ("*colour: differentiate with colour and font size. Visual difference between trigger and action. Save and final commands more clearly*").

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6 CONCLUSIONS AND NEXT STEPS

The usability tests certainly have given helpful indications how and in which ways the Rule Editor platform should be further improved, i.e.:

- layout and visual design (such as font size, format for date/time, ...)
- better translation into the languages needed for the field trials
- more intuitiveness and simplification
- activation/expansion of the possibilities to define triggers and actions

Generally, the persons who took part in the tests were very interested in the Petal project and consider the objectives of the project very important and relevant for the near future.

Also for this reason they have been very actively engaged in carrying out the tests and in providing a critical evaluation of the system.

The project partners now have the task of considering the results of the tests in the next steps of the project and to realize the suggestions for improvement that emerged from the tests as far as it is possible.

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7 ANNEX

7.1 PETAL – Questionnaire In-lab Tests

This survey is completely anonymous and subject to the European and National privacy regulations. Your data will be used exclusively for statistical purposes.

Identification number of test person (account): _____

Test region:

☐ Austria

☐ Romania

☐ Italy/Bolzano

☐ Italy/Pisa

☐ Italy/Rome

Date: ___ / ___ / 2018

Socio-demographic questions:

First of all, could you please give us some information on yourself.

Year of birth _____

Gender

☐ Female

☐ Male

Which is your highest educational degree?

☐ Elementary school

☐ Junior high school (compulsory school)

☐ Professional training/apprenticeship

☐ Technical/vocational school

☐ Senior high school, general qualification for university entrance

☐ Academic title of college, university

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Do you have a professional qualification for the care of elderly people?

☐ Yes

☐ No

Does your current professional activity include the care of elderly people with mild cognitive impairment (MCI)?

☐ Yes

☐ No

☐ Currently I am not professionally active.

Have you been involved in the care of a family member or another elderly person with MCI on a private (informal) base?

☐ Yes

☐ No

How would you generally judge the level of your familiarity with the Web?

☐ 1 = not at all familiar

☐ 2 = slightly familiar

☐ 3 = somewhat [moderately] familiar

☐ 4 = moderately [very] familiar

☐ 5 = extremely familiar

Where:

1. *Not at all familiar means: I never use the web*
2. *Slightly familiar means: I occasionally use the web (few times a month), mainly to read news, etc.*
3. *Somewhat familiar means: I use the web a few times a week, mainly for visiting web pages, access social networks, read emails.*

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4. *Moderately familiar means: I frequently use the web (at least every day), I can send emails with attachments, I can fill in forms, I can do some search on the web.*
5. *Extremely familiar means: I use the web many times every day, I'm confident with practically all tasks (fill in forms, proficiently use email, purchase objects online, do advanced search on the web).*

How would you generally judge the level of your programming experience?

☐ 1 = no programming experience

☐ 2 = low programming experience

☐ 3 = medium programming experience

☐ 4 = good programming experience

☐ 5 = very good programming experience

Where:

1. *No programming experience means: I have no knowledge at all of any programming language.*
2. *Low programming experience means: knowledge of HTML and CSS; basic knowledge of JavaScript (or similar languages).*
3. *Medium programming experience means: Good knowledge of JavaScript, basic knowledge of PHP or Java or C++ (or similar languages).*
4. *Good programming experience means: Good knowledge of PHP or Java or C++ (or similar languages).*
5. *Very good programming experience means: Very good knowledge of development languages, at professional level.*

Before this test, have you ever used tools supporting personalisation based on dynamic events (like e.g. IFTTT)?

☐ Yes

☐ No

If yes, please specify which ones

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SUS questionnaire:

The following questions refer to the Rule Editor software (called the "system") that you have tested just before.

To what extent do you agree with the following statements?
Please answer using a scale from 1 "strongly disagree" to 5 "strongly agree"

		1 dis-agree	2	3	4	5 agree
1	I think that I would like to use this system frequently.	☐	☐	☐	☐	☐
2	I found the system unnecessarily complex.	☐	☐	☐	☐	☐
3	I thought the system was easy to use.	☐	☐	☐	☐	☐
4	I think that I would need the support of a technical person to be able to use this system.	☐	☐	☐	☐	☐
5	I found the various functions in this system were well integrated.	☐	☐	☐	☐	☐
6	I thought there was too much inconsistency in this system.	☐	☐	☐	☐	☐
7	I would imagine that most people would learn to use this system very quickly.	☐	☐	☐	☐	☐
8	I found the system very cumbersome to use.	☐	☐	☐	☐	☐
9	I felt very confident using the system.	☐	☐	☐	☐	☐
10	I needed to learn a lot of things before I could get going with this system.	☐	☐	☐	☐	☐

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Additional questions:

State three positive aspects of the Personalisation Rule Editor

1. _____

2. _____

3. _____

State three negative aspects of the Personalisation Rule Editor

1. _____

2. _____

3. _____

Do you have any general suggestions to improve the Personalisation Rule Editor?

_____

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Accessibility:

To what extent do you agree with the following statements?
Please answer using a scale from 1 "strongly disagree" to 5 "strongly agree"

		1 dis-agree	2	3	4	5 agree
1	Font size and font type of the Rule Editor are appropriate: I had no difficulty in reading.	☐	☐	☐	☐	☐
2	The colours used in the Rule Editor to distinguish different dimensions and sub-menus can be effectively perceived.	☐	☐	☐	☐	☐
3	The visual contrast of the Rule Editor appropriate (no glaring effects).	☐	☐	☐	☐	☐
4	The navigation through the different pages of the software is logical and intuitive.	☐	☐	☐	☐	☐
5	The language and the terms used in the Rule Editor are clear and easy to understand.	☐	☐	☐	☐	☐
6	Altogether I like the design of the Rule Editor.	☐	☐	☐	☐	☐

Did you have other specific problems in using the system? Which ones?

_____

Thank you for collaborating!

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7.2 Tables with answers to open-ended questions

7.2.1 The rules thought up by the test persons – task 1

nr	rule-text	codes
27	Danger of falling, fear not to be found - Alarm	falling
16	If person is fallen, send alarm to caregiver	falling
15	If the person is less than 30 cm from the ground (fallen?) for more than 5 minutes, sends an alarm to the caregiver	falling
13	When I fell, call my caregiver	falling
21	The person fell down, requesting help	falling
34	If he feels bad call me	falling
10	If a patient has fallen during the day and no movement is recorded in the home for more than xxx minutes, then notify caregiver / rescue by phone	falling
23	Falls on the ground / no movement, alarm	falling
24	Alarm when the person falls down	falling
32	If Mario has fallen, send me a message	falling
31	If user is inside bedroom DO Turn On Light and set colour to Splashed white	lighting
44	IF User is in front of entrance, DO Turn On All Light in the house	lighting
36	IF Time is 19:00, DO Turn On All Light in the house	lighting
38	IF User is in front of entrance, DO Turn On All Light in the house	lighting
23	When you go to bed turn off the lights	lighting
43	IF User is in front of bathroom, DO Turn On Light in the bathroom	lighting

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nr	rule-text	codes
35	When the elderly exits home and if lights are on, turn off the lights	lighting
31	If user is inside bedroom DO Turn On Light and set colour to Splashed white for 10 minutes	lighting
44	IF User is outside entrance, DO Turn Off All Light in the house	lighting
28	if Patient should eat, turn on light	lighting
36	IF User is inside living room, DO Turn On Light in Living Room	lighting
38	IF User is in front of bedroom, DO Turn On Light in the bedroom	lighting
4	If the user gets out of bed between 10 pm and 7 am, turn on the lights	lighting
20	Turn on the light in the morning	lighting
44	IF User is outside bedroom, DO Turn Off Light in the bedroom	lighting
36	IF Time is 19:23, DO Turn On Light Living Room	lighting
38	IF User is in front of kitchen, DO Turn On Light in the kitchen	lighting
14	When I'm in the bathroom and it's dark, turn on the light in the bathroom	lighting
43	WHEN User leaves living room, DO Turn Off Light Living Room	lighting
29	If the elderly gets out of bed at night turn on the lights	lighting
30	At 8 pm turn on the light in the kitchen	lighting
6	If the bathroom was not visited within the scheduled time, increase the light in the bedroom	lighting
12	If person is in living room then turn light in kitchen off	lighting
28	If medication was forgotten, remember patient or relative	medication

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nr	rule-text	codes
14	If the blood pressure tablets were not taken in the morning, make red light in the bedroom and living room.	medication
4	If the user does not take the medicine at the appointed time, send him a message	medication
19	Taking medication at a certain time	medication
29	If the elderly has to to take Triatec at 2 pm please send a message	medication
24	Reminder with description of the punctual intake of the various medications	medication
6	If the medicines is not taken at the scheduled time, send a signal to the caregiver	medication
20	Reminder medication	medication
37	He woke up, remind him to take medicine and send me a message	medication
18	Reminder regarding required medication, even several times a day	medication
17	In the evening take the prescribed medicines	medication
26	take medications	medication
34	If he did not take the medicine, remind him and send me a message	medication
33	If you have not taken the medicine, remember that	medication
41	Remind him to take the medicine	medication
42	If the gas is on call him and send me a message	gas/smoke sensor (or stove)
17	Turn off the gas after cooking	gas/smoke sensor (or stove)
21	If the stove is on for 20 minutes, switch it off	gas/smoke sensor (or stove)
33	If the gas is on, send me a message	gas/smoke sensor

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nr	rule-text	codes
		(or stove)
26	Do not forget to switch off the stove	gas/smoke sensor (or stove)
27	Forget about switching off the stove - smoke sensor - alarm	gas/smoke sensor (or stove)
19	Switch off the gas stove	gas/smoke sensor (or stove)
23	smell gas for a long time, send alarm	gas/smoke sensor (or stove)
22	while cooking, pay attention to the gas on	gas/smoke sensor (or stove)
24	Alarm if a stove or gas should still be on without cooking	gas/smoke sensor (or stove)
35	When the oven is on since more than 70 minutes, turn off the oven	gas/smoke sensor (or stove)
25	If the person have breakfast and turn off the gas	gas/smoke sensor (or stove)
15	If the System detects smoke then sends alarm to 112 and to the caregiver	gas/smoke sensor (or stove)
4	If the user forgets to turn off the stove gas, make a beep or intermittent lights	gas/smoke sensor (or stove)
10	If the patient is not in the kitchen and the stove is on, let the lights flash throughout the apartment (possibly until the oven is switched off).	gas/smoke sensor (or stove)
34	When he's sad send me a message	emotional status
40	If he feels sad, call me	emotional status
22	Remember to take home keys before leaving	reminding some appointment
18	Lunch within 13 o'clock	reminding some appointment

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nr	rule-text	codes
41	If he has a medical examination, remind him to go to the doctor	reminding some appointment
14	Remind me every Monday at 9:00 am that I go to the doctor to measure my blood pressure (also therapy)	reminding some appointment
30	At 1 pm remember to have lunch	reminding some appointment
41	If he has little food in the pantry, remember him to do the shopping	reminding some appointment
28	if there are appointments e.g. with doctor, send reminder	reminding some appointment
42	Remind him to take a walk	reminding some appointment
18	Reminder of daily walk	reminding some appointment
20	Remembering to move	reminding some appointment
15	If there is no movement at home between 20 and 23 send text message to the caregiver	no movement
32	When Mario is in bed for a long time send me a message	no movement
21	If the person does not move until 8 o'clock in the morning, requesting help	no movement
16	If the kitchen is not entered from 11 am to 1 pm, then send a message to ...	no movement
32	When Mario opens the door send me a message	entry door monitoring
12	When time > 12 pm and front door is not locked than lock the front door	entry door monitoring
43	IF User leaves entrance, DO Turn Off All Light in the house	entry door monitoring
42	If uncle leaves entrance, send an alarm by SMS to Daniela	entry door

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nr	rule-text	codes
		monitoring
29	If the person leaves the house at unsuitable times in the evening or at night send me a text message	entry door monitoring
40	If he leaves the house late in the evening, send me a message	entry door monitoring
16	When the door is open at night, send a message to caregiver	entry door monitoring
12	If nobody is at home lock the front door	entry door monitoring
35	When the door was not opened for more than 1 day, do send message to all care-givers	entry door monitoring
13	When I am out of the living room turn off TV and Radio in the kitchen	other issues
30	If the door is open call me	other issues
10	If the person is not in the bedroom for more than 30 minutes after 9:00 pm, then inform a caregiver by SMS	other issues
25	See if the person has got up in the morning	other issues
33	If you have not eaten yet, let me know	other issues
6	If the cognitive task was not performed, SMS to the daughter	other issues
37	Let me know if he has eaten	other issues
27	Forgotten in general: appointments, washing out of the machine, etc. - notification	other issues
31	IF Temperature becomes 24°C DO Turn on the air conditioning system.	other issues
13	If I did not get up at 8:15 and it's not a sunday, then turn on radio with maximum volume	other issues
19	Close the water tap after use	other issues
22	leave the spaces free to walk	other issues

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nr	rule-text	codes
17	Do not watch too much television	other issues
40	If he has done a few exercises, let me know	other issues
26	drinking water	other issues
37	Let me know if he went to sleep	other issues
25	check whether the taps are closed after daily personal hygiene	other issues

7.2.2 Positive aspects of the Rule Editor

NR	D_14: Positive aspects	codes
20	easy handling	platform easy to use and/or fast in use
21	Easy to use	platform easy to use and/or fast in use
17	Easy to use	platform easy to use and/or fast in use
41	Easy triggers and actions	platform easy to use and/or fast in use
15	fast in use	platform easy to use and/or fast in use
35	natural language makes it easy to understand the meaning of the rules	platform easy to use and/or fast in use
36	The platform is easy to use.	platform easy to use and/or fast in use
4	The system is easy to use, intuitive programming	platform easy to use and/or fast in use
18	the system will surely become easier after multiple use	platform easy to use and/or fast in use
35	easy editing	platform easy to use and/or fast in use

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NR	D_14: Positive aspects	codes
34	easy insertion of instructions	platform easy to use and/or fast in use
12	easy to understand and easy to use	platform easy to use and/or fast in use
15	immediate	platform easy to use and/or fast in use
26	Logically structured	logical structure
20	clear to use	logical structure
17	Rational to use	logical structure
26	repetitive structure	logical structure
21	clear	logical structure
15	clear and readable graphics	logical structure
35	intuitive	logical structure
42	control the physical well-being of the person	remote control, helpful, safety
23	Convenience in quickly receiving notifications	remote control, helpful, safety
19	Get people longer independently	remote control, helpful, safety
22	Greater security and peace of mind for the caregiver	remote control, helpful, safety
16	If system works, big help	remote control, helpful, safety
32	it is useful to monitor the elderly at home	remote control, helpful, safety
33	Remote control	remote control, helpful, safety
34	Remote control	remote control, helpful, safety
40	Remote control	remote control, helpful, safety
37	remote information	remote control, helpful, safety
33	Control a family member and know when to intervene	remote control, helpful, safety

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NR	D_14: Positive aspects	codes
30	Feeling independent	remote control, helpful, safety
22	greater autonomy for the patient	remote control, helpful, safety
21	helpful	remote control, helpful, safety
40	helps to take care of the elderly leaving him to live alone	remote control, helpful, safety
42	intervention in case of emergency	remote control, helpful, safety
37	possibility to intervene in case of need	remote control, helpful, safety
16	Safety for caregivers and carers	remote control, helpful, safety
22	immediate confirmation of what happens to the elderly	remote control, helpful, safety
42	interact remotely in a positive way	remote control, helpful, safety
6	possible combinations	individual setting, personalisation
27	safety	individual setting, personalisation
30	Security if I'm not at home	individual setting, personalisation
10	a lot of sensors can be implemented	individual setting, personalisation
6	Inclusion of the personal network	individual setting, personalisation
27	individual setting	individual setting, personalisation
23	personalized settings based on the elderly's habits	individual setting, personalisation
37	help the patient in carrying out daily activities	individual setting, personalisation
6	Numerous applications	individual setting, personalisation

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NR	D_14: Positive aspects	codes
27	selection of solution-oriented offers	individual setting, personalisation
24	Formulate rules that are understandable.	other issues
25	important to do research in this area	other issues
13	makes fun at the end	other issues
10	principle of if this than that is interesting	other issues
12	when all triggers and action are implemented this editor makes sense	other issues
25	it will be the future for the next seniors	other issues
13	make bigger text-fields for editing	other issues
19	may slow down cognitive impairment	other issues
36	The buttons are easily visible.	other issues
17	Suitable for many people	other issues

7.2.3 Negative aspects of the Rule Editor

NR	D_15	Codes
32	few trigger	too few options activated, important triggers were missing
35	Lack of certain trigger	too few options activated, important triggers were missing
21	some options are missing	too few options activated, important triggers were missing
42	you cannot enter all types of triggers	too few options activated, important triggers were missing

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NR	D_15	Codes
41	all triggers cannot be realized	too few options activated, important triggers were missing
10	can not combine actions	too few options activated, important triggers were missing
15	Longitude, latitude and Altitude: who knows the values? Some triggers are missing (e.g. smoke)	too few options activated, important triggers were missing
35	I have not found any conditions to enter the duration, for example he stays in bed for a long time	too few options activated, important triggers were missing
34	It can do a few actions, such as opening windows	too few options activated, important triggers were missing
27	The possibility to address a smoke sensor is missing	too few options activated, important triggers were missing
40	limited types of warning	too few options activated, important triggers were missing
28	not much choices possible	too few options activated, important triggers were missing
15	Some triggers are missing (e.g. smoke)	too few options activated, important triggers were missing
12	a lot of instructions is necessary	system difficult to use
6	Capturing conditions is difficult (sometimes)	system difficult to use
27	complex construction	system difficult to use
33	Difficult for an elderly without any knowledge of computer	system difficult to use

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NR	D_15	Codes
34	It seems that do not save the commands	system difficult to use
13	lot of clicks necessary to get an option	system difficult to use
19	maybe not always optimal	system difficult to use
29	not intuitive	system difficult to use
41	not intuitive	system difficult to use
30	unintuitive platform	system difficult to use
29	Difficult to program	system difficult to use
18	logical operator: not easy to understand	system difficult to use
30	not flexible	system difficult to use
28	not easy to overview	system difficult to use
10	not good for elderly with no computer experience	system difficult to use
18	not very intuitive	system difficult to use
37	rather complicated for the average person	system difficult to use
13	to many information on one site	system difficult to use
28	bad German	translation problems
15	not comprehensible translations (is, becomes)	translation problems
10	translation must be improved	translation problems
27	translation not good	translation problems
16	At the moment the program is not mature (half German, English, spelling mistakes, fields not pre-formatted)	translation problems
23	clearer graphics, diversifying colours and sections	improve layout, graphics, fonts, clock display
18	Clock display complicated	improve layout, graphics, fonts, clock display
17	Entering time awkward	improve layout, graphics,

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NR	D_15	Codes
		fonts, clock display
26	Larger font	improve layout, graphics, fonts, clock display
4	The possibility of inserting a "from … to" time slot in the hours window is missing	improve layout, graphics, fonts, clock display
17	Entering the colour does not have to be that fine	improve layout, graphics, fonts, clock display
23	Put the and / save commands more visible	improve layout, graphics, fonts, clock display
13	save/close/save-as - small fonts	improve layout, graphics, fonts, clock display
26	Set time too slow	improve layout, graphics, fonts, clock display
24	The different steps, such as AND and SAVE, should be made clearer	improve layout, graphics, fonts, clock display
17	Entering time intervals does not work	improve layout, graphics, fonts, clock display
20	Colour selection could be better resolved, for example with fixed colours	improve layout, graphics, fonts, clock display
37	almost total control of the person	other issues
20	Double entry of titles for the rule	other issues
25	If the mental decay is fast, unfortunately this system does not work	other issues
40	it is not clear how the sensors perceive the conditions of the elderly	other issues
24	the order of rule formulation is visually not chronological.	other issues
37	exclusivity of a single caregiver, is not shareable	other issues
12	for caregivers only	other issues

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NR	D_15	Codes
6	requires specific knowledge of day-to-day care	other issues
19	Stage of cognitive impairment	other issues
29	It implies familiarity with language and setting rules	other issues
16	Certain functions (rules) should already be pre-installed and changeable. It is easier for the users, otherwise they would have to come up with everything themselves. At the moment it's more of a programming than a personalizer	other issues

7.2.4 General suggestions to improve the Rule Editor

Nr	D_16: Any general suggestion to improve the Personalisation Rule Editor
42	add the phone call for more urgent communications and add reminders for appointments
21	Because not all areas were activated, it is difficult to assess the overall program
28	half of it was German - half of it English --> must be better
18	I found the usage in the first application not really user-friendly. Will certainly be better if you understand the logic
13	it was tiring
24	It would be important for the user to know where to go with the rule setting, or where are my limits when using the program
4	Italian translation is not always correct
27	Layout have to be clearer time-saving options for progression several realistic actions (by old people), e.g. Fall-slip, smoke (milk goes over, iron not, etc.), person does not return home from the walk
6	Make a test for the adaptation of the texts to the conditions (real value in use)
29	Improve graphic design and language in menus
19	More testing of the system, possible personalization
15	Possibility to send reminders for example daily (even without trigger) If a reference person is not reachable / occupied, then who receives the alarm?

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Nr	D_16: Any general suggestion to improve the Personalisation Rule Editor
	Health and social care worker must support user and reference person in the selection and evaluation of
10	save button is out of screen - must scroll down parts of editor not yet implemented would like search function for actions
14	see lot of notes in the transcript
37	simplify it and give technical support to users
25	Simplify it as much as possible
16	Telephone number cannot be entered Classifications / headings not very logical Font and font sizes different
12	translations must be improved but this will be better in future also more triggers and actions will be available
20	Use a uniform font. There should be presets for light, for example to cheer up or calm down

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