AAL Project no: AAL-call-2018-152

frAAgiLe

Platform for detecting and preventing frailty and falls

DELIVERABLE D3.3b. Qualitative final evaluation and recommendations for further improvement

Additional Insights to D3.3. from second round of usability and field testing



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Abstract (for dissemination)	This deliverable's main objective is to analyse the feedback received from the testing and describe the implementation of changes in the technologies

¹ L Legal agreement, O = Other, P = Plan, PR = Prototype, R = Report, U = User scenario

² PU = Public, PP = Restricted to other programme participants (including the Commission Services), RE = Restricted to a group specified by the consortium (including the Commission Services), CO = Confidential, only for members of the consortium (including the Commission Services)



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0.2	TERZ	09.09.2022	Completion of inputs from TERZ, handover to BZN
0.3	MAT and ANA	12.10.2022	2nd iteration field trial results
0.4	BZN	14.12.2022	Completion of inputs from BZN
1.0	IDE	12/01/2023	Last revision from IDE



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1.About this document

1.1 Role of the deliverable

This document reports on the feedback received from the second cycle of usability testing. Deliverable 3.3a introduced the results from a first phase of the deployment of the fragile solutions in the field. Two distinct approaches were pursued for the field testing. A clinical focus was introduced in Cyprus (MAT) and Romania (ANA) to gain a deeper understanding of the impact the fragile solution can have. In Switzerland (TERZ) and Hungary (BZN), the focus was put on usability issues to allow a more agile approach and help improve and redesign the software concurrently through ongoing feedback and advice.

This deliverable (D3.3b) focuses on evaluating whether the changes made to the first prototype (based on the volunteers' feedback – described in D3.3a) has positively impacted user experience. To this end participants used the system, in their home, for another 6 months. 40% of the participants included in this 2nd round of testing were new volunteers, the remaining 60% were the same volunteers that tested the first prototype. A second objective was to assess through a second field trial whether the fragile solution can have a clinical impact on its users frailty and quality of life status.

1.2 Relationship to other frAAgiLe deliverables

The present deliverable reports on the deployment of the fraagile solutions in the field (Field test) following D3.1. The involvement of TERZ in the field trials was not foreseen in the DoW and the results from their activity, although treated in a piloting context, can be read as part of the ongoing co-creation of the frAAgile solution. Thus, whereas requirements from the validation process described in D3.1 were followed and results are reported in D3.3a and D3.3b, it should also be understood as a complement to the activities run in WP2. The consortium dealt with the present activities as "extended co-creation". There was no design freeze but ongoing feedback and improvement of the prototype.



The first part of the present document, accordingly, complements the results of the first iteration of extended co-creation as reported in D3.3a. The difference to D3.3a is that the second iteration as reported in this document was run with an improved prototype.

Deliverable D3.3b deals with the more clinically oriented field trials in Cyprus and Romania as intended under WP3, while deliverable D3.3a, respectively the first round of field trials, was intended to fix technological issues related to the platform, by implementing the primary users (older adults) feedback. The second field trial wished to focus more on the benefits that the users could have (e.g. in terms of quality of life, any possible health improvements) as a result of using the platform. To that extent the primary user group, which actively used the platform for 6 months, was compared to a control group of older adults that did not use the platform, rather the latter continued with their life and activities as usual.

Some of the conclusions also impact on the D4.3 Final Business plan and business model.



2. Introduction

The distinct activities of usability testing (section 3) and clinical testing (section 4) will be introduced separately in the respective sections.



3. The feedback received from extended co-creation

3.1 Introduction

This section complements usability related insights from the first round of field deployment (as reported in D3.3a) by insights from a second round of deployment in Switzerland (TERZ) and Hungary (BZN). An improved frAAgile prototype was used to observe usability, accessibility and appeal of the solution with end-users over several weeks of testing. The study design, notably the objective, instruments and inclusion criteria were similar to those of the first iteration of usability testing in the field. The results are meant to be used by the technical partners to optimize the system further and to validate the effect of adaptations that have been made in response to critique received throughout the first iteration.

The participants were invited to introductory workshops to be informed about the frAAgile project and the prototypes. Having signed informed consent forms, they were invited to take home the system as well as standardised diaries for system testing. These diaries contained precise instructions (exercises) to be carried out with open text fields for reporting their observations, problems and recommendations for improvement. The aim of the extended co-creation was to collect further feedback on the adapted designs and activities in the fragile app (e.g. games).

3.2 Demographics

In Switzerland, 7 participants were part of the introductory workshop and 6 of them took the system home for testing in the period February through May 2022. The sample structure looked as follows:

- Age range 69 to 82 years
- 4 female, 2 male
- All participants being retired
- 4 living with spouse, 2 living alone



- 3 living rural, 3 living in urban environments
- 3 times tertiary education, twice secondary education, 1 no answer

The overall ICT affinity and experience was collected asking for agreement with the following claims and can be rated as being overall high.

"I have" (...)



Figure 1 - Availability of reliable internet connection - Switzerland

Figure 2 - Availability of good technical competences - Switzerland





Figure 3 - Feeling that apps are useful in daily life - Switzerland



Figure 4 - Fun using new ICT - Switzerland





Tests in Hungary

There were in total five participants, three female and 2 male, all of them between 60 and 67 years old. Three of them were married and the rest of them lived on their own even if one of them had a partner. Other information about the participants:

- 2 retired, 3 still active
- all of them have at least good or very good ICT skills
- 4 had a colleague or university degree, one had finish high school
- all of them use their smartphone daily, two of them had a tablet and four of them use laptop regularly
- 3 of them live in bigger city, two live in the countryside

2nd Iteration in Hungary



In Hungary, 10 seniors took part in the second iteration focus group workshop where the frAAgiLe system improved and fine-tuned based on preliminary user feedback was presented to senior users, family members and professional caregivers.

Ten of the participants volunteered to test the system between September and November 2022. The sample structure looked as follows:

- age range 65 to 78 years
- 9 female, 1 male
- all participants are retired
- 4 living with spouse, 6 living alone
- 2 living rural, 8 living in urban environments
- 5 tertiary education, 4 secondary education, 1 primary education

The overall ICT affinity and experience of the Hungarian participants in the second iteration was collected asking for agreement with the following claims.

Figure 5 - Availability of reliable internet connection - Hungary



Figure 6 - Availability of good technical competences - Hungary frAAgiLe/ AAL-call-2018-152





Figure 7 - Familiarity with tablets - Hungary



Figure 8 - Feeling that apps are useful in daily life - Hungary





Figure 9 - Fun using new IT - Hungary





3.2.1. Usability

<u>Switzerland</u>

Only 4 participants completed the questionnaire on system usability. The remaining users did not feel able to apply an overall rating given the variances of the different apps.

Question	Average score (1= fully agree ; 7 = do not agree)
I think that I would like to use this system frequently.	5.75
I found the system unnecessarily complex.	3
I thought the system was easy to use.	4.75
I think that I would need the support of a technical person to be able to use this system.	4
I found the various functions in this system were well integrated.	4
I thought there was too much inconsistency in this system.	3
I would imagine that most people would learn to use this system very quickly.	5
I found the system very cumbersome to use.	3
I felt very confident using the system.	5.25
I needed to learn a lot of things before I could get going with this system	3.75

Table 1 - Usability - Switzerland

<u>Hungary</u>

Ten users filled-in the questionnaire, and rated system usability.



Table 2 - Usability - Hungary

Question	Average score
	(1= fully agree ; 7 = do not agree)
I think that I would like to use this system frequently.	5.3
I found the system unnecessarily complex.	3.5
I thought the system was easy to use.	4.5
I think that I would need the support of a technical person to be able to use this system.	4.4
I found the various functions in this system were well integrated.	3.9
I thought there was too much inconsistency in this system.	3.8
I would imagine that most people would learn to use this system very quickly.	4.5
I found the system very cumbersome to use.	3.9
I felt very confident using the system.	4.5
I needed to learn a lot of things before I could get going with this system	3.4

3.2.2. Grip me

Switzerland

The first iteration had shown that participants liked the activity but lacked clear instruction for the game. Problems were identified in terms of vocabulary and connection issues with the Squegg.



Reported issues in second cycle:

- Difficulties in loading and connecting Squegg reported by several participants; more advice appreciated about how to handle the Bluetooth and the hardware (cables etc.); some issues related to overall tablet handling and android settings
- Online training is not possible due to the pandemic.
- One complaint about continuously positive feedback: as kg can be set individually, the system will always give positive feedback and never complain.

<u>Hungary</u>

During the 1st iteration participants tried the Grip me with the Squegg device. Some reported that it was not so easy for them to connect to the Squegg and for some it was a bit challenging to squeeze the device. Also, some translations were still missing. However, especially male participants liked the game.

In the second iteration, similar opinions were obtained as in the first iteration. The Squegg tool was used to adjust the Grip me. The majority still found it not so easy for them to attach the Squegg and some of them found it a bit of a challenge to squeeze the device this time.

3.2.3. SPPB

Switzerland

In the first iteration, participants had difficulties connecting to the game and starting the game. They had to reconnect multiple times. Instructions were only available in English and therefore not understood.

Reported issues in second cycle:

- Recognition of hand required holding up for longer time was not intuitive enough



- Difficulties in placing the tablet in a way that camera can detect all movements was found difficult
- Balance exercise was not intuitive (instructions needed)
- Feedback still in English in some cases
- Disappointment about the relation between effort needed to get exercises running and the return through doing the exercises
- Space needed. Placement on a chair is not an ideal solution. Developers should improve camera recognition or find alternatives to placement on chairs.

<u>Hungary</u>

In the first iteration, participants could only join the game and play the game with help and additional detailed instructions. Users had to repeatedly reconnect to the system due to unexpected disconnections. Most of the instructions were only available in English, so seniors had little or no understanding of them, making them difficult to use and not a real positive experience.

By the second testing cycle, some of the issues had been solved, translations were helpful, and this was reported as a positive. In some cases, it was felt tedious to use, the ergonomics of the system were felt to be relatively poor. Similar to the experience in Switzerland, the main problem was the placement of the tablet, in many cases the camera did not detect movements adequately, which was an extra physical burden for the senior users.

3.2.4. Kwido

Switzerland

In the first iteration, most participants could not access the game and therefore did not play the game. The few that did access the game could not follow the instructions as it was only Spanish. This has not been removed until the second cycle. The app was generally appreciated as playful and diversified.

Reported issues in second cycle: frAAgiLe/ AAL-call-2018-152



- Still issues with translations: Spanish instructions/feedbacks finally solved
- Orange help button not accessible in the beginning
- Settings for sound should be more obvious, now a new control has been included

Hungary

In the first iteration, Hungarian participants were not able to play this game, mainly due to the lack of translations.

In the second iteration, e.g. also during the focus group meeting, they were able to start the application with help, the basic idea of the game elicited a positive response from the elderly users, who liked the versatility of the game.

However, in the second cycle there were still problems with the Hungarian translations, some instructions were not available in Hungarian, which caused difficulties for the users. Finally, all the games were in Hungarian.

3.2.5. Exercises

Switzerland

In the first iteration, participants like the physical activities section. Most found it not clear what the option to change categories does. It should be better explained. Participants found it easy to find and access videos. The overall perception was confirmed in the second iteration. The videos were found engaging.

Reported issues in second cycle:

- Good selection of videos and recommendations for senior users.
- Complaint about noisy background music
- Switching between videos sometimes very sluggish or not possible <u>Hungary</u>



Both in the first and the second round participants liked the fact that they can access video for doing physical activities. They liked the selection of them and said that the ones they tried were doable. Easy accessibility also received positive feedback from users, this feature proved to be one of the most popular among them. They also said that they feel it is important to exercise physically.

3.2.6. Sailgility

Switzerland

In the first cycle, some participants were not able to access the game. Those who did either liked the game due to the simple exercises and the videos showing the exercise, others found the game was not a challenge. Most participants found the instructions for this game insufficient and therefore the game was unclear to them. Participants also missed a clear icon to end the game. Such an icon should be easily viewable. Translations were incomplete. Some users criticised that the game was unsuitable for the tablet they used. The second cycle still suffered from some bugs, but generally the app was considered easy to follow and the exercises rated as useful.

Reported issues in second cycle:

- Screen freezes or app does not give response after clicking buttons
- No feedback after mirroring the seaman's exercises
- Reaction of ship in "sailing" too sluggish + error message after completion
- Difficulties to exit game
- Difficulties with screen (sometimes inverted and not moving back)
- Loading the game freezing at 13%
- Requires experience and many trials until app notices hand movements

<u>Hungary</u>

During the first iteration participants tried out the Sagility game by only using the tablet. Out of 5 participants 4 have managed to try it out, for 1 it did not load. frAAgiLe/AAL-call-2018-152 D3.3



The ones who tested found the game easy and in the long run a little bit repetitive.

In the second iteration, we tested Sailgility using both a tablet and Magic Carpet. The experience with the tablet was consistent with the results of the first iteration, feeling relatively easy and repetitive. Using the Magic Carpet makes it much more difficult to complete tasks, requiring much more concentration and well controlled balance. In some cases, this has led to users finding the game too difficult and stopping. However, there were some users who, with more practice and routine, were able to learn to control the game properly. This resulted in positive feedback.

3.2.7. Sapa

Switzerland

In the first cycle, the participants found Sapa to be an interesting game, well made and fun. Some participants found the game was a bit boring and no challenge as it was too slow and repetitive. The instructions should be shown at the beginning. The second iteration confirmed mixed feelings towards the game.

Reported issues in second cycle:

- Navigation of sun not intuitive enough
- Noisy music
- Very mixed feedback regarding ease of playing

<u>Hungary</u>

In the first iteration some people liked the SAPA and others didn't. There were some missing translations and overlapping user interface elements as well that did not make the game very enjoyable. However, participants stated that in general this can be an interesting game.



When the Sapa game was played during the second phase of the trials, senior users found the characters sympathetic, but even after longer practice they found the game too complicated and the rules difficult to understand. Essentially, they were only able to play with help, which quickly discouraged users.

3.2.8. Chop it

<u>Switzerland</u>

In the first cycle, feelings towards the fun factor and ease if used were mixed. More levels and various difficulty levels should be explored such that elements fall slower. Some participants did not find the game intuitive enough.

Reported issues in second cycle:

- Exiting the game found troublesome
- Some words still not translated e.g. "Platanos"

<u>Hungary</u>

During the first and second iteration mainly the female participants like the idea of this game as they are the ones who enjoy cooking more. They were curious about the recipes but when playing the game they said that it was a bit too quick, and it was challenging to tap on the ingredients on time.

3.2.9. Sapa Cars

Switzerland

The game was not tested in the first iteration and still under development at the time of the second iteration in CH. Carpas maze was considered easy but boring, Carpas, in contrast, too hectic. Improvements towards end of cycle (May 22) improved the feedback significantly.

- Navigation and goals not intuitive enough (where to navigate)

Hungary frAAgiLe/ AAL-call-2018-152



This game was not available during the first iteration so it was not tested.

During the second iteration Sapa Mase were pretty popular among male users, but finally found too simple when playing several times.

3.2.10. Rabbit finder

Switzerland

The game was not tested in the first iteration. Participants found the game to be challenging and engaging. The different levels and the ability to progress in the game was motivating and was marked as positive. However, one participant found the game to be rather childish.

Reported issues in second cycle:

- Music noisy
- First game: Trouble entering the numbers and no feedback about right/wrong

<u>Hungary</u>

This game was not available during the first iteration so it was not tested.

During the second phase of the trials this game was one of the most popular ones among the users in Hungary. In both versions, the scenery and graphics were sympathetic, and the difficulty of each level increased with the right degree of progression. However, navigation was a problem, but after repeated practice players were mostly comfortable navigating between levels. Typically, the feedback was very positive, users found the game interesting and were keen to return to play it again.

3.2.11. Trivial

Switzerland

All participants enjoyed this type of game, however they also agreed that it was a shame that the questions were very american-centric. This prevented them frAAgiLe/AAL-call-2018-152 D3.3



from staying motivated and was irritating. It would be great if trivial games are adjusted to a local context with questions more specific to the user's country.

Reported issues in second cycle:

- Choice of music
- Choice of questions
- No incentive system in app
- Questions could be more challenging

Hungary

It was tested only in the second phase of the trials. This game was also very popular among users, and the memory game concept immediately appealed to the participants. Questions could be better adapted to the interests of this age group, as many of the questions are completely uninteresting for this age group.

Hungarian translations are typically available, but grammatical correctness needs to be improved. This has detracted from the enjoyment of the game.

Experience has shown that the most popular games are those that can be played in pairs or more, and the results can be compared with each other's scores.

3.2.12. Hole in One

Switzerland

All participants felt that clear instructions about how to play these games were missing. They would have liked to understand what the health benefits of the game are. Two participants also found it quite difficult to turn the tablet. The game was not finished by the start of the trials and early criticisms largely improved towards the end of the cycle (May22).

Reported issues in second cycle:



- Instructions about objectives missing in beginning; later implementation not finished
- Usability for seniors questioned (turning the tablet is difficult to handle physically and cognitively).

<u>Hungary</u>

Perspective and spatial orientation on 2D screens has been a major challenge for users. In addition, for certain physical limitations, tilting and rotating the tablet proved too difficult. Senior users found it difficult to understand the tasks and the rules that led to success. After a few attempts, they typically gave up and chose another game instead.

3.3 Summary of Comments from Hungary

In addition to those who volunteered to take part in the testing, we also asked those who took part in the focus group presentation but did not take part in the testing about the frAAgiLe system and the reasons for not doing so, which are summarised below:

- several senior club members said they could not use smartphones and tablets; they had no internet access at home
- seniors felt that the whole system structure was quite complicated
- as mentioned, many club members do not have an email address and therefore cannot or find it difficult to register in the frAAgiLe system. The existence of a possible caregiver helps here.
- the vast majority of older adult club members do not have a smartphone and cannot download and use these apps, a tablet is necessary to be used here.
- many of the interviewees do not understand the system, when to use it and, quoting club members "Why would it be beneficial for us?"
- some people complained that they were not sure how to switch to Hungarian within the games, as the default language is currently English; and registration is a bit complicated for them. For that, the frAAgiLe/AAL-call-2018-152



system now includes in the configuration the preferred language in the initial assessment.

- a few club members found the in-app and in-system games "childish"; with the exception of 2 games, the memory game and quiz questions, and the gymnastics exercises
- according to several club members, they would not use it at home because of the lack of IT and technical equipment
- when using it in the club, the app and one or two games were very slow to load, often the wifi connection was problematic, slow, dropped from the internet network
 - for 1 participant the dragging exercises in Kwido Mementia were very difficult
 - 3 participants struggled with SPPB Quote: "Its impossible to do on your own. Even if I were to put the tablet down somewhere, then I would not see from that distance what is going on".
 Observation - They had to give access to the camera from the settings, they did not know how to do that on their own.
 - 1 participant found the voice in SPPB annoying and horrible [the speech function does not work in Romanian] and they think it's impossible to complete without help.
 - 7 participants consider that more exercises should be added and all should advance to new levels.
 - 4 participants found physical exercises useful
 - 3 participants would not use the application
 - 2 participants had to be reminded where they would search for the exercises categories

4. Second Prototype Field Trials



4.1.Introduction

The purpose of the second prototype was to evaluate whether the changes made (based on the volunteers' feedback) to the first prototype has positively impacted user experience. To this end participants used the system, in their home, for another 6 months. 40% of the participants included in this round of testing were new volunteers, the remaining 60% were the same volunteers that tested the first prototype.

A second objective was to evaluate whether the use of the fraagile system would improve participants' frailty levels and generic quality of life. To this end participants baseline scores on measures of frailty (Edmonton scale) and self-reported quality of life (EQ-5D scale) were compared to their final scores (6th month assessment), as well as to that of the control groups. The control group included by ANA, in the first iteration, continued on for an extra 6 months (while the active group was testing the second prototype).

4.2. Method

4.2.1. Participants

Participants: 33 volunteers participated in the second round of trials (18 from Cyprus and 15 from Romania).

Age: Mean age of volunteers was 70.06 y.o.; with the youngest being 60 y.o and the oldest 82 y.o.

Gender: 18 volunteers were female and 15 were male

Education: 17 volunteers attended university (12 undergraduate level; 7 graduate level), 4 volunteers were high school graduates, 9 graduated professional schools.

BZN included 16 participants for the second round of trials too.

14 from urban spaces and 2 from rural areas.

Age: Mean age of seniors was 69,5 y.o.; with the youngest being 67 y.o and the oldest 78 y.o.

Gender: 14 volunteers were female and 2 were male

Education: 11 volunteers attended university, 4 volunteers were high school graduates, 1 graduated professional schools.



Living status: 7 volunteers live alone, 23 live with their spouse, 2 volunteers live with spouse and other family members; 1 respondent lives with other family members without a spouse

Participant ID	Age	Education	Edmonton (baseline)	EQ-5D (baseline)	Health scale	Edmonton (3rd month meeting)	EQ-5D (3rd month meeting)	Health scale	Edmonton (last meeting)	EQ-5D(last meeting)	Health scale
ANA4	70	University	3	11111	95	2	11121	90	2	11121	95
ANA5	70	University	4	11112	90	2	11111	90	1	11122	95
ANA6	66	Professional school	3	11111	80	1	11111	85	1	11121	70
ANA7	66	Highschool	3	11112	70	3	21142	100	4	11133	80
ANA8	71	Professional school	2	11111	85	0	21122	90	0	21122	90
ANA9	62	University	0	11112	80				dropped out		
ANA11	74	Professional school	0	11111	85	dropped out					
ANA13	61	University	1	11111	85				dropped out		



ANA14	61	University	3	11112	90	1	11112	75	2	11112	90
ANA15	63	Postgraduate	1	21131	85	7	31231	80	7	31231	80
ANA16	89	University	1	21111	95	3	42221	70	3	42221	70
ANA17	61	University	1	11121	75	3	31231	90	4	21131	80
ANA18	75	University	0	11111	98		,	<u> </u>	dropped out		
ANA19	73	University	7	22232	75	5	22333	50	5	11121	75
ANA20	66	Professional school	5	31233	80	4	11132	80	6	31133	50
ANA21	66	University	3	32232	80	3	21122	80	2	21121	95
ANA22	75	University	4	21111	90	4	21222	90	4	21211	
ANA23	62	University	2	21132	80	3	21221	100	4	21231	85
ANA24	76	Highschool	4	21121	70	4	11132	90	5	11122	90
ANAHC1	75	Undergraduate	3	21114	30				8	21223	50
ANAHC2	73	Postgraduate	5	21122	45				3	11111	70
		-				-	-				



ANAHC3	65	Undergraduate	4	21121	80	deceased					
ANAHC4	71	Undergraduate	5	21121	85				2	21122	75
ANAHC5	76	Undergraduate	1	11111	100				0	11111	90
ANAHC6	81	University	1	11121	80				3	11121	80
ANAHC7	93	University	4	21121	80				5	21221	90
ANAHC8	68	Highschool	3	11111	95				2	31123	50
ANAHC9	68	Highschool	1	11111	80				3	11121	75
ANAHC10	65	Postgraduate	1	11111	95				2	21122	80
MAT 1	66	University	3	31221	85	3	21111	85	2	11121	78
MAT 2	68	Professional school	0	11111	85	1	11111	90	0	11111	80
MAT 3	77	Post university studies	1	11112	80	0	11111	80	0	11112	85
MAT 4	75	High school	2	11111	80	4	11111	80	1	11111	80



MAT 7	68	Post University	0	11111	80	0	11111	80	0	11111	80
MAT 9	82	Post University	0	11111	80	1	11111	80	0	11111	90
MAT 11	70	Professional school							0	11111	95
MAT 13	84	Professional School	4	32221	60	4	32221	60	dropped out		
MAT 14	67	High School	1	11111	80	1	11111	80	1	11111	80
MAT 15	76	University	0	11111	60	0	11111	60	0	11111	80
MAT 17	73	University	-	-	-	2	11111	-	1	11111	90
MAT 18	73	Professional School	2	11111	70	2	11111	70	1	11111	75
MAT 19	61	University							4	21242	40
MAT 20	65	High School									
MAT 103	68	University	1	11111	85	1	11111	85	1	11111	90
MAT 105	77	High school	5	11111	75	5	11111	75	2	11111	75
MAT 106	74	High school	4	31322	68				4	31133	60



MAT 110	76	Professional School	2	11111	75	-	-	-	1	11111	80
MAT 112	70	University	0	11111	90	0	11111	90	0	11111	90

Note. ANA – code ID for participants recruited for the active group (those testing the platform at home) by Ana Aslan International Foundation; ANAHC - code ID for participants recruited for the control group by Ana Aslan International Foundation; MAT - code ID for participants recruited for the active group (those testing the platform at home) by Materia; Highschool + – This represents Highschool + 2 years of post-High School education; Participants written in bold represent the new volunteers, the remaining ones have also participated in the first prototype testing; Participants in the control group were only tested at baseline and final assessment (6th month).



BZN data from Hungary

User ID	Target Group	Informed consent read	Photos can be taken	Photos can be used	Age	Sex	Retired/Active	Living status	Living environment	Education level
BZN06	Senior	Y	Y	Y	72	Female	Retired	Alone	Urban	Tertiary education
BZN07	Senior	Y	Y	Y	68	Female	Retired	Alone	Urban	Tertiary education
BZN08	Senior	Y	Y	Y	66	Female	Retired	Spouse	Urban	Secondary education
BZN09	Senior	Y	Y	Y	74	Female	Retired	Alone	Urban	Tertiary education
BZN10	Senior	Y	Y	Ν	78	Female	Retired	Alone	Rural	Secondary education
BZN11	Senior	Y	Y	Ν	71	Female	Retired	Spouse	Urban	Secondary education
BZN12	Senior	Y	Y	Y	65	Female	Retired	Spouse	Urban	Primariy education
BZN13	Senior	Y	Y	Y	69	Female	Retired	Alone	Rural	Secondary education
BZN14	Senior	Y	Y	N	65	Male	Retired	Spouse	Urban	Tertiary education
BZN15	Senior	Y	Y	Y	67	Female	Retired	Alone	Urban	Tertiary education
BZN16	Family Member	Y	Y	Y	69,5	Female	Retired	Alone	Urban	Tertiary education
BZN17	Family Member	Y	Y	Y	83	Female	Retired	Alone	Urban	Tertiary education
BZN18	Organization	Y	Y	Y	46	Female	Active	Spouse	Urban	Tertiary education
BZN19	Healthcare Professional	Y	Y	Y	58	Female	Active	Spouse	Urban	Tertiary education
BZN20	Healthcare Professional	Y	Y	Y	44	Female	Active	Spouse	Urban	Tertiary education
BZN21	Healthcare Professional	Y	Y	Y	37	Male	Active	Alone	Urban	Tertiary education


4.2.2. Study Design

The same study design as for the first prototype testing was used for the second prototype trial. With the exception that for the last assessment (6th month) we used a different feedback form to be able to better quantify the participants' evaluation of the system.

For the first iteration and beginning of the second iteration of field trials we emphasise the functionality and design of the prototype in order to provide as much as possible information to the technical partners and optimise the prototype. In the final 6 months of the testing, we added assessments such as the Unified Theory of Acceptance and Use of Technology (UTAUT), SUS questionnaire and Exploitation and Impact questionnaire in order to assist in improving the experience of the user but also to gain information to our Business WP. Since the duration of the project was 39 months, it was important to find out from our users which games, devices and assessments are worth exploiting further, and which need improvement or even decide if it is worth spending more resources on them.

4.2.2.1 Final evaluation

Perceived ease of use [I found the system easy to use]

The mean score for the 4 aspects regarding the ease of use was 3.76 out of 5. indicating that the ease of use is above average.

23 out of 33 responders found the system easy to use, only 4 found it difficult (3) and very difficult (1).



Figure 30 - Perceived ease of use



The use of the system was clear and understandable.

25 out of 33 responders found the system clear and understandable, only 4 found it difficult to understand.





Figure 31 - Clarity and understability of system usage

Perceived ease of use [It would be easy for me to learn to operate]

23 out of 33 responders consider that they could easily learn the system, only 2 consider learning the system would be difficult for them.







Perceived ease of use [It would be easy for me, to continue training with the system independently]

25 out of 33 responders consider that they could easily use the system independently, only 2 consider using the system would be difficult for them.







Perceived usefulness [I imagine the use of the system beneficial for my physical and cognitive well-being]

The mean score for the 4 aspects regarding system perceive usefulness was 3.69 out of 5, indicating that perceives usefulness of the system is above average.

21 out of 33 responders consider that using the system could be beneficial for physical and cognitive well-being, 9 are neutral and only 2 consider using the system would bring them no benefits.

Figure 34 - System benefits for users' physical and cognitive well-being





Perceived usefulness [I find it advantageous to train independently at home]

23 out of 33 responders consider that using the system at home would be useful, 5 are neutral and 5 consider using the system would not be useful.

Figure 35 - System advantages in training independently at home





Perceived usefulness [The use of the system would enrich my everyday life]

22 out of 33 responders consider that using the system at home would enrich their daily life, 6 are neutral, 3 volunteers think it would not.



Figure 36 - System would enrich users' everyday life

Social influence [People who are important to me think I should use technology/such a system]

Most volunteers (23) consider that using the system would be encouraged by people who are important to them.

Figure 37 - System usage would be encouraged by people who are important to users







However, only 18 out of 33 volunteers consider that using the system would be encouraged by healthcare providers.



Figure 38 - System usage would be encouraged by healthcare providers

Perceived behavioural control [I have the necessary internal resources (e.g. positive attitudes, ideas, positive feelings) to use the system]

The mean score for the 4 aspects (internal resources, knowledge and skills, external resources, technical assistance) regarding perceived behavioural control was 4 indicating that volunteers consider they have the necessary behavioural control to use the system.

The majority of volunteers (31 out of 33) consider they do have the necessary internal resources (e.g. positive attitudes, ideas, positive feelings) to use the system; only 2 are neutral.







Perceived behavioural control [I have the necessary knowledge and skills to use the system]

The majority of volunteers (26 out of 33) consider they possess the necessary skills to use the system; 7 gave a neutral response.





Perceived behavioural control [I have the necessary external resources (e.g. financial situation, environment, health, free time)]: 27 volunteers consider they have the external resources necessary to use the system.





Perceived behavioural control [If necessary, I have technical assistance available]: the majority of volunteers – 27 out of 33 have technical assistance available.







Intention to use

While 79% of responders (24) like the idea of being trained using the system, have a positive attitude and would recommend the system and 63% would use the system in the future if available, less of them (42%) declare that they would use the system frequently.



Most participants found that the system was easy to use (53%) with well-integrated functions (42%), and felt confident using the system (49%). 30% consider that most people would be able to learn how to use the system.

15% of volunteers considered that they may need to learn a lot of skills and 20% considered that they would need technical support before being able to use the system;

15% considered that there were inconsistencies in various functions, 10% found the system unnecessary complex, and 17% found the system very cumbersome to use.





The majority of the participants said they used the system less than 5 hours a week.





Favourite frAAgile functions within the fraagile ap - the Cognitive Games, least favourite - the Calendar.





Favourites among the available games: Trivial (29 respondents) Rabbit finder (24 respondents) Sapa cars (18 respondents) Sapa (12 respondents).



The reasons for liking the up mentioned games provided by respondents:

- · motivating
- · challenging
- · challenging to the mind
- · made me think fast, motivation to do better
- · challenging and makes you become faster
- · interesting
- · original and interesting
- · made me exercise my memory
- · learn new things
- triggered my mind



- · made me exercise my mind
- pressure to remember and exercise my brain

Least liked games were Sagility (26 respondents), Chop IT (18 respondents) and SAPA CARS (15 respondents). Volunteers complained about these games for being boring, uninteresting and not appropriate for their age, but also about some dysfunctionalities within the games.



The reasons for not liking the mentioned games, as provided by respondents:

- · did not find them interesting
- · trivial is not complex enough
- · they are not representative for our age group
- · monotonous and boring
- nothing exciting about them
- · not interested in cooking
- · I was not a good player with Sailgility
- · I did not find it easy to use



- they were confusing
- · did not like the topic
- $\cdot\,$ some were not functional and made be frustrated
- · they do not have a proper instructions manual
- · it doesn't work
- there is nothing attractive about these games plus Sailgility does not work properly
- · the boat was very difficult to handle

Less than half of volunteers (15) find it useful to be cognitively evaluated by the system.



With regards to their preference to keep using the associated devices, 16 volunteers would like to keep the Squegg device and 15 the Smart band.

Regarding the perceived usefulness of the recommendation pop-up messages and calendar features out of the total 33 respondents, 19 found the pop-up messages useful but only 10 found the calendar useful.



Overall frAAgile system evaluation

The mean score provided by the volunteers for the overall frAAgile system was 3.27 stars indicating that the opinion about the system is slightly above average, with 1 respondent evaluating the system as excellent, 11 as good, 19 as medium and 2 as very poor.



When asked whether they believed the frAAgiLe application helps them in their daily life one respondent said not at all, 2 said they had no time to use it and 7 said it did not help much. The remaining 23 volunteers, which found the frAAgiLe application useful in their daily life, provided various ways in each the system helped improve their daily lives:

- · Makes my mind think quicker, motivational, challenging to use it
- · It was fun during my first time
- · Routine in exercising my mind
- Kept me busy, the competition element which made you compete with yourself and become better
- · If I did not have anything else to do, it enrich my day
- · Kept me busy some days
- I had the opportunity to learn new things, and practise my technology skills by using the tablet. I have tested myself by using the system



- · Kept me busy in times I was alone. Fun
- · It enriched my life I had something extra to do
- If you have time, you can exercise your brain, you get the chance to improve digital skills
- · It kept me busy
- · I was enjoying my time
- $\cdot\,$ In some degree it was good cognitive exercise for me
- · It piqued my curiosity
- · It gave me diverse activities
- · Yes, it gave me something else to do, it motivated me to train my memory
- Yes, for my memory. But it should be more complex, and have more pleasant games
- It helped me keep track of my physical activity and maintain a good level
- · It kept me more active
- · It motivated me to keep active
- Yes, to stay informed with what is available, but I have other passions, I didn't spend much time using the tablet
- · I was exposed to new information

The majority of volunteers (27) would recommend the system to others, 4 would not and 2 volunteers did not answer the question.



4.3 Conclusions from the second prototypes' trial

Ease of use: The mean score for the 4 aspects regarding the ease of use was 3.76 out of 5, indicating that the ease of use is above average.

Perceived usefulness: The mean score for the 4 aspects regarding system perceived usefulness was 3.69 out of 5, indicating that perceived usefulness of the system is above average.

Social influence: the majority of volunteers consider that people important to them would influence them to use the system but the health professionals might not.

Resources to use the system: The mean score for the 4 aspects (internal resources, knowledge and skills, external resources, technical assistance) regarding perceived behavioural control was 4 indicating that volunteers consider they have a good behavioural control necessary to use the system.

Use: most participants used the system less than 5 hours a week

Favourite frAAgile app features - Cognitive games, least favourite - Calendar.

Favourite games: Trivial, Rabbit finder and Kwido Mementia, which were the new games added to the second prototype after the first 6-month trial, based on our volunteers feedback. Even in the second trial, the least favourite games were Sagility, Chop it. Participants believed that these games still need improvement to make them even more appealing.

Our volunteers favourite devices were the Squegg and the smart band, several participants even mentioned they purchased smart bands after the end of the projects. The majority of volunteers considered that the system helped them in their daily lives, and would continue using it. More so, the majority of volunteers (27) would recommend the system to their peers.

4.4 Assessing the effect of the frAAgile system on users' frailty score and overall quality of life

4.4.1. Participant demographics

A sample of 48 older adults were recruited from a convenience sample of volunteers in Romania and Cyprus 10 of which dropped out at a given point during the project. A final sample of 38 volunteers from Cyprus and Romania were included in the analysis. Participants that had dropped out at an intermediate time point (e.g. after the 3rd month assessment) have not been frAAgiLe/AAL-call-2018-152



included in this "clinical" analysis because we wanted to see the effect that the system may have after prolonged use. This analysis included active users of the system (n=29) that tested the second prototype from MAT and ANA, plus the 9 participants from the control group (recruited by ANA – one user passed away by the final assessment).

Participants were aged between 61 - 93, mean age of participants was 71,63. The majority of participants who had high levels of education (n=24) attended University, of which 18 were educated at undergraduate level and 6 at postgraduate level; 2 participants have post-high school studies, 8 participants graduated high school and 4 professional schools.

4.4.2. Methodology

Participants were tested on three occasions, baseline assessment, 3 months and 6 months with the Edmonton Frail scale and EQ-5D scale. Controls were tested at baseline and 6 months only.

4.4.3. Results

4.4.3.1. Results at baseline assessment

Frailty level

Edmonton (scores between 0-17, where 0 means not frail): mean score was 2.3 (SD.=1.77) in the participants group, with 28 out of the 38 participants being classified as not frail (score between 0-5) and 1 as vulnerable (score 7); and the mean score in the control group was 2.67(SD=1.73) all 9 controls being classified as not frail (score between 0-5) (see table 4a and b).

Self-reported health profiles

EQ-5D scale (health scale: 0-100, where 100 means perfect self-reported health) - mean score was 80.45 (SD 8.26) in participants group and 76.67 (SD 23.72) in the control group (see table 4a and b).

At baseline the majority of participants were classified as level 1, with no problems on any of the five dimensions of the scale: mobility (24 participants), self-care (26 participants), usual activities (33 participants), pain/discomfort (25 participants) and anxiety/depression (26 participants). No participant was classified as level 5- extreme problems/inability on any of the 5 dimensions (see Table 1 below).



Table 1

EQ-5D proportions reported by dimension and level- in the participants group at baseline

DIMENSION	MOBILITY	SELF-CARE	USUAL	PAIN	ANXIETY
LEVEL			ACTIVITIES		
Level 1- NO PROBLEMS	65.5	93.1	82.8	69	69
Level 2 - SLIGHT PROBLEMS	20.7	6.9	13.8	13.8	27.6
Level 3- MODERATE PROBLEMS	13.8	0	3.4	17.2	3.4
Level 4 - SEVERE PROBLEMS	0	0	0	0	0
Level 5 - EXTREME PROBLEMS	0	0	0	0	0

4.4.3.2. Results at the 6-month assessment

Frailty level

The mean score on the Edmonton scale was 2.17 (SD=2.02) in the participants group, with 28 out of the 38 participants being classified as not frail (score between 0-5) and 1 as vulnerable (score 7);

The mean score in the control group was 3.11(SD=2.26) 8 controls being classified as not frail (score between 0-5) and 1 as mildly frail (score 8) (see Table 2a & b).

Self-reported health profiles

The mean score on the EQ-5D scale was 81.48 (SD= 10.46) in the participants group and 73.33 (SD= 14.8) in the control group. The majority of older adults 27 out of 38 had a baseline health score over 80 points (see Table 2a & b).

The majority of participants were classified as level 1, indicating no problems on all five dimensions of the scale: mobility (24 participants), self-care (37 participants), usual activities (32 participants), pain/discomfort (16 participants) and anxiety/depression (26 participants). No participant was classified as level 5- extreme problems/inability on any of the 5 dimensions (see Table 3).



Table 2a

Means and Standard deviations of Edmonton, EQ-D5 in participants group

Descriptive Statistics					
	BASE	LINE	6 MONTHS		
TEST	Mean	Std. Deviation	Mean	Std. Deviation	
	N=29		N=29		
EDMONTON	2.31	1.77	2.17	2.02	
MOBILITY	1.48	0.74	1.48	0.83	
SELFCARE	1.07	0.26	1.03	0.19	
ACTIVITY	1.21	0.49	1.14	0.35	
PAIN	1.48	0.78	1.72	0.80	
ANXIETY	1.34	0.55	1.38	0.68	
HEALTH SCORE	80.45	8.27	81.48	10.46	
a GROUP = PARTICIPANT					



Table 2b

Means and Standard deviations of Edmonton, EQ-D5 in control group

Descriptive Statistics	BASELINE		6 MONTHS	
TEST	Mean	Std. Deviation	Mean	Std. Deviation
	N=9		N=9	
EDMONTON	2.67	1.73	3.11	2.26
MOBILITY	1.44	0.53	1.67	0.71
SELFCARE	1.00	0.00	1.00	0.00
ACTIVITY	1.00	0.00	1.22	0.44
PAIN	1.44	0.53	1.78	0.44
ANXIETY	1.44	1.01	1.67	0.87
HEALTH SCORE	76.67	23.72	73.33	14.79
a GROUP = CONTROL				



Table 3

	MOBILITY	SELF-CARE	USUAL ACTIVITIES	PAIN	ANXIETY /
Level 1- NO PROBLEMS	69	96.6	86.2	48.3	72.4
Level 2 - SLIGHT PROBLEMS	17.2	3.4	13.8	31	17.2
Level 3- MODERATE PROBLEMS	10.3	0	0	20.7	10.3
Level 4 - SEVERE PROBLEMS	3.4	0	0	0	0
Level 5 - EXTREME PROBLEMS	0	0	0	0	0

EQ-5D proportions reported by dimension and level- in the participants group at 6 months

4.4.4. Change from baseline to 6 months

Pearson correlation showed statistically significant correlations between baseline assessment and 6-month assessment on Edmonton as well as EQ-5D scales and statistically significant correlations between Edmonton and EQ-5D scores at 6-month assessment (see Table 4 below).



Table 4

Bivariate Pearson correlations; variables; age, education level, Edmonton scores at baseline, Edmonton scores at 6 months; EQ-D5 scores at baseline, EQ-D5 scores at 6 months

Correlations								
				EDMONTON	HEALTSCORE	EDMONTON	HEALTHSCORE	
		AGE	EDULEVEL	BL	EQ-5D BL	M6	EQ-5D M6	
AGE	Pearson Correlation	1	.057	.050	112	006	.024	
	Sig. (2-tailed)		.732	.767	.504	.970	.888	
	Ν	38	38	38	38	38	37	
EDULEVEL	Pearson Correlation	.057	1	151	.069	.005	.343*	
	Sig. (2-tailed)	.732		.365	.682	.977	.037	
	Ν	38	38	38	38	38	37	
EDMONTONBL	Pearson Correlation	.050	151	1	218	.482**	290	
	Sig. (2-tailed)	.767	.365		.188	.002	.082	
	Ν	38	38	38	38	38	37	
HEALTSCOREBL	Pearson Correlation	112	.069	218	1	398*	.407*	
	Sig. (2-tailed)	.504	.682	.188		.013	.012	
	Ν	38	38	38	38	38	37	
EDMONTONM6	Pearson Correlation	006	.005	.482**	398*	1	447**	
	Sig. (2-tailed)	.970	.977	.002	.013		.006	
	N	38	38	38	38	38	37	
HEALTHSCOREM6	Pearson Correlation	.024	.343*	290	.407*	447**	1	
	Sig. (2-tailed)	.888	.037	.082	.012	.006		
	N	37	37	37	37	37	37	

*. Correlation is significant at the 0.05 level (2-tailed).

**. Correlation is significant at the 0.01 level (2-tailed).

Means and standard deviations for each of the 7 variables at baseline assessment and at 6 months are presented in Table 2a and 2b and in Figures 1,2,3 below.



Figure 1

Mean Edmonton frailty scores at baseline and 6 months for the participant and control groups



Figure 2

Means EQ D5 scores on the 5 dimensions at baseline and 6 months for the participant and control groups





Figure 3

Mean EQ-D5 scores – Self reported health score at baseline and 6 months for the participant and control groups



To evaluate whether there were significant changes between baseline and 6-month assessments we conducted a Linear Mixed Models analysis with time frAAgiLe/AAL-call-2018-152 D3.3



as the independent variable for each of the 7 variables (Edmonton scores, Health score and for each of the 5 dimensions of the EQ-D5 scale), separately in the participants group and control group. We set up linear mixed effects models with random intercept and random slopes for each participant.

The results of the analysis show that there were no statistically significant differences across the two time points on any of the 7 dependent variables in either the participants group or control group.

Edmonton - no statistically significant change from baseline to 6 months in either group: Participants: F(1,55)=.153, p=.697; Control group: F(1,8)=.295, p=.602.

Self-reported health score - no statistically significant change from baseline to 6 months in either group: Participants: F(1,27.5)=.105, p=.749; Control group: F(1,8)=.229, p=.645.

EQ-D5 mobility measure - no statistically significant change from baseline to 6 months in either group: Participants: F(1,7.5)=.000 p=1;Control group: F(1,8)=.640 p=.447.

EQ-D5 selfcare measure: no statistically significant change from baseline to 6 months in either group: Participants: F(1,56)=.341 p=.561; Control group: F(1,8)=.000 p=1.

EQ-D5 pain measure: no statistically significant change from baseline to 6 months in either group: Participants: F(1,55)=.2.676 p=.108; Control group: F(1,16)=2.118 p=.165.

EQ-D5 anxiety measure: no statistically significant change from baseline to 6 months in either group: Participants: F(1,55)=.101 p=.752; Control group: F(1,8)=.471 p=.512.

To conclude, there were no statistically significant changes between baseline and 6-month assessment in participants frailty level, as measured with Edmonton scale, or quality of life, as measured by the self-reported health status with EQ-D5 scale, in either the participants or the control group.

Change in frailty scores from baseline to 6 months assessment (as measured with the Edmonton scale) for each participant can be seen in Fig. 4 and 5.



Figure 4

Frailty scores at baseline and 6 months for each participant in the participant group



Figure 5

Frailty scores at baseline and 6 months for each participant in the control group





Change in self-reported health scores from baseline to 6 months (as measured with EQ-D5 scale) for each participant can be seen in Fig. 6 and 7.

Figure 6

Health scores at baseline and 6 months for each participant in the participants group





Figure 7

Self-reported health scores at baseline and 6 months for each participant in the control group





4.5 Feedback from the early adopters

The system was tested in Portugal in the Viseu Hospital. The contact here was the Doctor Luís Nogueira (Médico - Medicina Geral Familiar / Geriatria).

The system was also tested in Spain by the IMQ Igurco team in the etxeTIC centre in Bilbao. The contact here was Eneritz Elgezua, Manager Director of the IMQ Igurco day centres in the Basque Country (Spain).

They also participated in the business questionnaires offered to professionals. The main feedback was:

- The system is interesting for monitoring frailty
- With the new assessment tool that adapts the use of the platform to the requirements of the users, it's easier to be used at home. Anyway, in their opinion, it's a much more interesting tool for being used at the centre for some of the evaluations, and at home for some of the interventions. The division would be:
 - Evaluations and assessments should be done and performed with the caregivers and professionals in the centre.
 - Interventions with physical videos, cognitive games and tracking of the activity (smartbands) and weight could be done at home to analyse the engagement and the evolution between the evaluations done in the centre.
- IMQ Igurco found it interesting for improving frailty, but their approach is more holistic, they need a complete analysis of the physical, clinical, psychological and social situation of the person, and frailty is just a part of it. So, IMQ Igurco has designed, along with Ideable Solutions, a new geriatric assessment tool that incorporates some of the evaluations (MNA, Fried) and interventions (Squegg, smart bands, cognitive stimulation games, videos) to work at home.
- In Portugal, no other tools are available, so fraagile is interesting again to work with patients in nursing homes and day centres, specially for cognitive stimulation, hand training and some physical activity.
- In both cases, the tool for home should be more focused on specific interventions, not on the complicated evaluations that could be done in the centres.



5. Assessment and validation by stakeholders

This section aims to summarise the results of T3.4 Assessment and validation by stakeholders that was carried out in all participating countries and in one additional country, Portugal.

5.1 Web testing

According to the original description of 3.4.1 Web-testing, around 10 skilled caregivers and doctors all over Europe will be involved to give their feedback on the conceptual design of the fragile portal by all partners, as well as the different components. Finally, frAAgiLe, business model will be exposed to determine viability and sustainability after project ends.

Partners have contacted caregivers and doctors and during an agreed time they followed the procedure below:

- 1. Register volunteers-healthcare professionals in the frAAgiLe platform and demonstrate it by adding one new fake patient
- 2. Demonstrate existing data from our participants/fake patient
- 3. Demonstrate the application on the tablet.
- 4. Proceed with the Google form business questionnaire

To have a better picture of the solution and provide a more precise input for the business model we have also asked tertiary end-users, meaning organisations besides healthcare professionals.

Two questionnaires were used within the web testing phase:

- 1. Business Questionnaire for Healthcare professionals
- 2. Business Questionnaire for Organisations

5.1.1. Business Questionnaire for Healthcare professionals

Altogether 11 participants have answered the Business questionnaire for healthcare professionals.

Distribution of respondents by country




There were more female healthcare professionals participating in the testing which is aligned with the fact that in general there are more female workers in this sector.

Distribution of respondents by age



From the six countries participants' ages were between 28 and 52 years with more, 7 out of 11 who were below 40. Having more younger participants is not a surprise as usually younger people are more open to participate in surveys.

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D3.3



Distribution of respondents by profession



There were more doctors than other healthcare professionals who participated in the testing. In total 5 doctors, 4 psychologists and 1 sociologist took part in the business-related web testing.

Distribution of respondents by workplace and position



Active in healthcare since...





We have had participants working in the health sector since 1995 but the majority, 7 out of 11, have been working at least since 2010. The youngest participant has been in the field for 4 years now.



Working with older adults since...

All 11 participants work with older adults and most for the whole duration of the time they spent in the healthcare sector so far. The one with the most years has spent 24 years working with older adults and on average it is 8 years.

How many stars would you award the overall frAAgile system? (where 1 star indicates very poor; 2 stars indicates poor; 3 stars indicates neutral; 4 stars indicates good; 5 stars indicates excellent)



More than 2/3 of the participants were happy with the frAAgiLe system and considered the solution a good one. 2 out of 11 said that it is an excellent one and only 1 had a neutral opinion on it.

How would you rate the quality of the data provided by the frAAgile system e.g., results from the games, physical activity given by the smart band, results from the tests; would you trust this data when assessing the



status of your patient? Please indicate a number in percentages below: (in percentages: 1 to 100, 100 being excellent).



The quality of the data provided is valuable and good/easy to read for the involved healthcare professionals. 7 of them rated the data being shown in the solution with at least 75%, 100% being excellent.

Which of the frAAgile app features do you find most interesting for your patient?



Almost all participants, 9 out of 11, said that the feature that can be the most interesting for their patient is the cognitive games. After this they liked the Squegg games and the Evaluation Questionnaires the most appealing.

Which evaluation do you find more interesting?





In terms of evaluation of patients, the participants value there the most: the FRIED's criteria, the initial assessment and the MNA. This is also because these assessments are not part of other systems necessarily even if they are very useful to measure the level of fragility.

What hardware would you like to include when using the frAAgile platform?



Out of the three additional devices that can be part of the frAAgiLe system, healthcare professionals found the Squegg device the one that they would definitely use with the system as all of them said yes to it. This is mainly because it is easy to use and because the games are very well developed.

The frAAgile solution is really useful for monitoring frailty in older adults



Without a question, healthcare professionals find frAAgiLe a very useful system: 2 have strongly agreed, 8 agreed and 1 stayed neutral.



The frAAgile solution is really accessible for older adults

After looking at the system participants were mainly neutral about how accessible the system is for older people. Some said yes but the majority shall wait and see.

The frAAgile solution enables me to better monitor my patient





Almost all participants feel that the solution would definitely help them better monitor their patients and that it would help them see a long-term trend of their patients' health status. 54.5% agreed and 27.3% strongly agreed about how good the system is to monitor patients.



The frAAgile solution is easy to install and use

Usually, people find installing a system not very easy, however participants were very positive about installing frAAgiLe. Only 18.2% said that they disagree with frAAgiLe being easy to install and 36.4% felt neutral that it would be easy.



I would prefer the frAAgile solution to be used

Healthcare professionals would mainly see the system being used in centres (90.9%) or in home and centres (63.6%). They said it would be a great help for monitoring people in centres where institutes struggle with having enough time for all participants.

How much would you pay per patient for it as a caregiver (excluding the hardware)?



Participants were from six countries with Switzerland being in a better position in terms of financial conditions. Therefore, it is not a surprise that 63.6% of healthcare professionals feel that patients for the system only would pay less than 10 \notin /month. The highest they would pay was rated between 10-15 \notin /months.

I would prefer a renting model instead of buying devices



Interestingly renting the devices came in favour when asking about it. In total, 81.9% of the people would prefer to rent the devices and only one person said that buying would be better. Renting also gives the insurance that if something happens to the device there is a service provider that users can rely on.

I think that organisations for elderly users should pay for it



72,8% of participants said that it should not be the older adult who pays for the solution but centres. This goes in line with the result of the previous question when healthcare professionals stated that the system should mainly be used in centres.

6. Business questionnaire for organisations

Altogether 6 participants have answered the Business questionnaire for organisations.



Distribution of respondents by country

Distribution of respondents by gender





Gender distribution of representatives in the organisations is equal, despite the fact that there are far more females than men working in the sector, which still means that males are over-represented at management level.

Distribution of respondents by age

The age of respondents in the six countries participating in the pilot and the survey ranged from 33 to 69 years. Two respondents are under 40, two of them are between 40 and 60 and two representatives of organizations are over 60 but not yet 70. (33, 35, 45, 54, 60, 69)

Distribution of respondents by profession

Two of the respondents are physiotherapists by profession; moreover a medical doctor, a sociologist, psycho-educator, social worker, an economics, and a general director are among the stakeholders.

Distribution of respondents by job title

Among the respondents, job titles are distributed as follows: Head of Physio Kinisis Physiotherapy Center, Physiotherapist, Medical Coordinator (private clinic - seniors home), Head of institution (district social service - several institutions), Manager (seniors home), General Director.



Working in healthcare since...

There is considerable variation in the number of years worked in the care sector, with 40, 22, 17, 12, 11 and 8 years respectively.

Working with older adults since...

The number of working years in the elderly care sector is equal to the number of working years in the care sector, so there is also a wide variation in the number



of years in the sector: 40 (not exclusively older adults but an important segment), 22, 17, 12, 11 and 8 years.

How many stars would you award the overall frAAgile system?(where 1 star indicates very poor; 2 stars indicates poor; 3 stars indicates neutral; 4 stars indicates good; 5 stars indicates excellent)



Of the respondents, 2 are very satisfied and 2 are satisfied with the overall frAAgiLe system, while one is neutral and one considers its performance to be poor.

How would you rate the quality of the data provided by the frAAgile system e.g., results from the games, physical activity given by the smart band, results from the tests; would you trust this data when assessing the status of your patient? Please indicate a number in percentages below: (in percentages: 1 to 100, 100 being excellent).

Quality of data provided by the frAAgile solution was typically rated as good by respondents. Four respondents gave a score of 80% or above, while two respondents were quite critical with only 30% rating this feature of the system. (95%, 90%, 80%, 80%, 30%, 30%)

Which of the frAAgile app features do you find most interesting for your patient?





The pattern of responses is very similar to that reported by healthcare professionals in 9.1.1. Namely almost all participants, 5 out of 6, said that the feature that can be the most interesting for their patient is the cognitive games. After this they liked the Evaluation Questionnaires the most appealing. Squegg was a little less popular, but still as well received as physical games and videos.

Which evaluations do you find more interesting?



Similar to the assessment received from healthcare professionals, FRIED's CRITERIA proved to be the most popular assessment, with the Initial Assessment being the second most popular and the SPPB test also receiving positive ratings among institutional respondents.

What hardware would you like to include when using the frAAgile platform?



The pattern of preference matches that indicated by the healthcare professional respondents. Out of the three additional devices that can be part of the frAAgiLe system, organizations found the Squegg device the one that they would definitely use with the system as almost all of them said yes to it. This is mainly because it is easy to use and because the games are very well developed. In addition, half of the users had a positive opinion of the smart band and one of them likes to use the Magic Carpet.

The frAAgile solution is really useful for monitoring frailty in older adults



Organisational respondents were even more positive than healthcare professionals about the usefulness of monitoring the frailty of older adults, with two respondents strongly agreeing and two agreeing that the frAAgiLe system is useful in this respect. One respondent was neutral, while one did not feel it was really useful.

The frAAgile solution is really accessible for older adults



Two thirds of respondents think that the system is indeed accessible for older people (two strongly agree, two agree), while two of them - like in the case of healthcare professionals - will wait and see.





The vast majority of participants consider that the solution would definitely help them better monitor their patients and that it would help them see a long term trend of their patients' health status. 33.3% said they agree and 33.3% strongly agreed that the system enables them to better monitor patients. One was neutral, while another said it did not allow better monitoring of the patient.

The frAAgile solution is easy to install and use



Out of the six respondents, only one felt that it was not easy to install the system, two were neutral, while one agreed that it was easy to install and two strongly agreed.

66,7% 66,7% 66,7% 66,7% 6 Between 10 and 50 6 Between 50 and 100 6 Over 100 6 Over 100

How many medical staff are there in your organisation?

Responses show that the institutions surveyed are small to medium sized, with two having less than ten health professionals and four having between 10 and 50.

How many users do you think would use it in your organization?





Half of respondents said fewer than ten users, a third said between 10 and 50, while one respondent said more than 100 users would use the frAAgiLe system in their organization.



I would prefer the frAAgile solution to be used

According to one-third of the respondents, the fraAAgiLe system can be used in centres, one-third in homes for the elderly, while one-third say it can be used in both cases. None of the respondents considered that the system is only suitable for autonomous patients at their homes.

How much would you pay, per patient, for the frAAgile system as an organization (excluding the hardware)?



In the case of one of the six countries, the respondent showed no interest in the paid service. One third of the respondents would be willing to pay not more than \in 10, one third \in 10-15 for the service (hardware not included), and 16.7% a maximum of \in 30. This latter monthly fee is the upper limit, and none of the respondents is willing to accept a higher cost.



How much would your organisation pay, per patient, for the frAAgile system software in a one-time payment structure?

80% of the respondents are willing to pay an annual subscription fee of between €80 and €100, while the remaining respondents would be willing to accept an annual cost of only €5 (!) per user. This difference in order of magnitude clearly indicates the significant difference in solvency potential resulting from the economic situation of the various member states.

100€/year, 100 €/year, 90€/year, 80€/year, 5€/year (30Lei)

How much would your organization pay, per patient, for the frAAgile system software in a quarterly payment structure?



Quarterly subscription fees roughly correspond to a proportional part of the annual fees. The significant difference in subscription potential can be seen here as well.

I would prefer a renting model instead of buying devices



While interestingly renting the devices came in favour in the case of healthcare professionals when asking them about it, in contrast, in the case of organizations, support and opposition are essentially equally distributed



(although 'strongly disagree' opinions are slightly more significant than 'strongly agree' considerations).



I think that families or elderly users should pay for it

Altogether 66.6% of respondents considered that it should not be the older adult who pays for the solution but centres, 16.7% is neutral, while 16.7% of respondents agree that seniors should pay for the service.

6.1. Hands-on final evaluation

Caregivers were also asked to evaluate some basic functionalities from frAAgiLe apps

Procedure used in this evaluation was the similar as during web testing, meaning that partners have:

- 1. Demonstrate frAAgiLe platform (from registration, to adding patients and showing existing data)
- 2. Demonstrate existing data from our participants
- 3. Demonstrate the application on the tablet.
- 4. use the questionnaire to gather feedback

6.1.1. Business questionnaire for Caregivers

Altogether 11 participants have answered the Business questionnaire for Caregivers.

Distribution of respondents by country



Distribution of respondents by gender



Distribution of respondents by age

There were more than two and a half times more female caregivers participating in the testing which is aligned with the fact that in general there are more female workers in this sector.



How many stars would you award the overall frAAgiLe system? (where 1 star indicates very poor; 2 stars indicates poor; 3 stars indicates neutral; 4 stars indicates good; 5 stars indicates excellent)



Overall, more than 60% were satisfied (or completely satisfied) with the quality of service provided by the frAAgile system. Whilst 9.1% of respondents have neutral opinion, and in the case of 9.1% of users the system failed to meet user expectations.

How would you rate the quality of the data provided by the frAAgiLe system e.g., results from the games, physical activity given by the smart band, results from the tests; would you trust this data when assessing the status of your family member (e.g., is it easy for you to understand the results)? Please indicate a number in percentages below. (in percentages: 1 to 100, 100 being excellent).



The quality of the data provided is valuable and good/easy to read for the involved caregivers. 4 of them rated the data being shown in the solution with at least 75%, 100% being excellent. It should also be mentioned that four respondents gave a value of 50% or less.

Please rate on a scale from 1 to 5, how much you like each of the following frAAgiLe app features for your family member? (where 1 indicates very poor; 2 indicates poor; 3 indicates neutral; 4 indicates good; 5 indicates excellent)



Please rate on a scale from 1 to 5, how much you like each of the following frAAgiLe app features for your family member? (where 1 indicates very poor; 2 in good; 5 indicates excellent)



Among caregivers, physical games and the Squegg device proved to be the most popular. In addition, Cognitive Games can also be mentioned as favorable, however, the SPPB test was typically neutral, while videos, calendar, messages and Magic Carpet are slightly well received.

What hardware would you like to include/purchase when using the frAAgiLe platform?



The pattern of preference matches that indicated by the healthcare professional and organization respondents. Out of the three additional devices that can be part of the frAAgiLe system, caregivers also found the Squegg device the one that they would definitely use with the system as almost all of them said yes to it. This is mainly because it is easy to use and because the games are very well developed. In addition, more than half of the users had a positive opinion of the smart band and two users were happy about the use of the Magic Carpet.

The frAAgile solution is really accessible for older adults.



Typically, similar to Healthcare Professionals, caregivers are neutral about the accessibility of the frAAgILe system. More than 20% of respondents consider fairly or fully accessible whilst almost 30% found it hardly accessible or inaccessible.



The frAAgiLe solution enables me to better monitor my family member.

More than half of the caregivers participating in the testing consider that the frAAgiLe solution enables them to better monitor their family members. However, more than 30% in this group will also wait and see and a minority dismisses this option.

The frAAgiLe solution is easy to install and use.





Usually, caregivers also find installing IT systems complicated, however more than 63% of respondents were positive or fully happy about installing the frAAgiLe system. Only 9.1% said that they disagree with frAAgiLe being easy to install and 27.3% felt neutral.



I would prefer the frAAgiLe solution to be used.

Caregivers would equally see the system being used in centres (45.5%) and at home and centres (45.5%). However, there was also the opinion (9.1%) that the system can only be used effectively in the case of autonomous patients at home.

How much would you pay per family member for it as a caregiver (excluding the hardware)?



In contrast to Healthcare Professionals and representatives of organizations, a rather large proportion (36.4%) of caregivers believed that they were not open to pay for frAAgiLe services. However, more than fifty percent would be willing to pay a maximum of \in 10 per month per caretaker, and in the case of 9.1% this could reach \in 15 per month.

I would prefer a renting model instead of buying devices.



Rental model is also a very popular solution for caregivers, namely 45.5% of the respondents obviously prefer this option. Another 18.2% consider renting to be a more favorable solution; whilst the same are neutral about this and finally 9.1% does not be happy with the rental option.



I think that organizations for elderly users should pay for it.

72.7% of participants said that it should not be the older adult who pays for the solution but centres. This goes in line with the considerations of healthcare professionals stated that the system should mainly be used in centres; the majority of caregivers definitely think so.