AAL Project no: AAL-call-2018-152

frAAgiLe

Platform for detecting and preventing frailty and falls

DELIVERABLE D3.2

Dashboards and KPI Performances

Project ref no	AAL-call-2018-152
Project acronym	**frAAgiLe**
Project full title	frAAgiLe: Platform for detecting and preventing frailty and falls.
Nature[1]	Report
Dissemination level[2]	Public
Due date of deliverable	M14
Actual submission date	
Deliverable name	D3.2 Dashboards and KPI Performances
Status	Finished
WP contributing to the deliverable	WP3
Main contributors	IDE
Other contributors	TERZ, DEU, ANA, Materia
Author(s)	Iñaki Bartolomé (IDE), Begoña García-Zapirain (DEU), Patrizia Murko (TERZ), Sotiria Moza (MAT), Mircea Marzan (ANA)
Keywords	

Abstract (for dissemination)	This deliverable´s main objective is to define and check the KPIs of the project and check the quality of the expected outcomes.

Disclaimer

The information in this document is subject to change without notice. Company or product names mentioned in this document may be trademarks or registered trademarks of their respective companies.

Version History

Version	Edited by	Date	Description
0.1	IDE	01.07.2020	Generation of the document
0.2	IDE	31.07.2020	Full version
1.0	IDE	20.08.2020	Revision
1.1	DEU	18/01/2022	Generation of new content and revision
1.2	MAT	20/01/2022	Review and comments
1.3	ANA	15/12/2022	Review and comments
1.4	DEU	19/01/2023	Generation of new content and revision

Table of Content

1.About this document

1.1 Role of the deliverable

This deliverable´s main objective is to define and check the KPIs of the project and check the quality of the expected outcomes.

1.2 Relationship to other frAAgiLe deliverables

The main relationship for this deliverable is the D1.2. On Boarding Progress report for the moment as the KPIs are measured from the first questionnaires used before the lab testing.

2.Introduction

A set of indicators has been established as a way to measure the progress of the project in several aspects. KPIs will be published in the Decision Dashboards that frAAgiLe provides with the aim to foster transparency on the execution of the project. The table below shows an initial list of impacts and KPIs related to objectives to have a complete frAAgiLe footprint.

3. Initial KPIs

The table below shows an initial list of impacts and KPIs related to objectives to be completed during the fraagile project.

KPI	Year 1	Year 2	Year 3
Final users			
Nr. of users by year % of new users	>5 per organization > 10 % per org	>10 per organization > 30 % per org	>15 per organization > 40 % per org
User experience			
Positive opinion of users experience Positive opinion of exercises quality Positive opinion of data quality Average hours of elderly's activity	= 3 stars in avg. = 3 stars in avg. > 50 % in avg. 4 hours a week	> 4 stars in avg. > 4 stars in avg. > 60 % in avg. 8 hours a week	> 4 stars in avg. 4 star in avg > 70 % in avg. 16 hours a week
Engagement			
Nr. caregivers Positive opinion of business engaged	> 2 per organization = 3 stars in avg	> 2 per organization = 3 stars in avg	> 2 per organization = 3 stars in avg
Content			
Nr. of videos developed for the platform Nr. of serious games created for cognitive stimulation	> 5 per year > 10 per year	> 10 per year > 10 per year	> 20 per year > 10 per year

4. Data

4.1 First data during the first year

For the first year, we will bear in mind the people involved in the co-creation phase and first questionnaires for the first year.
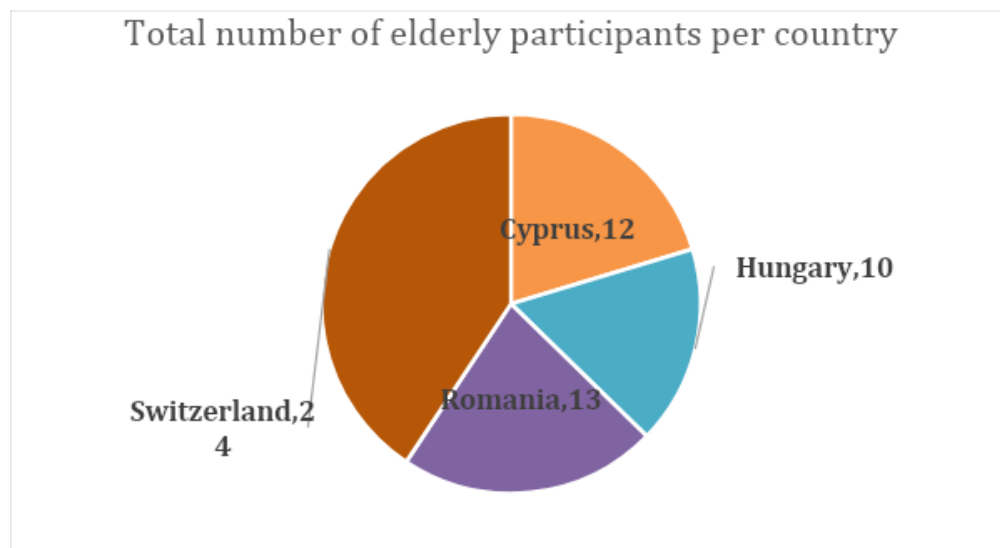

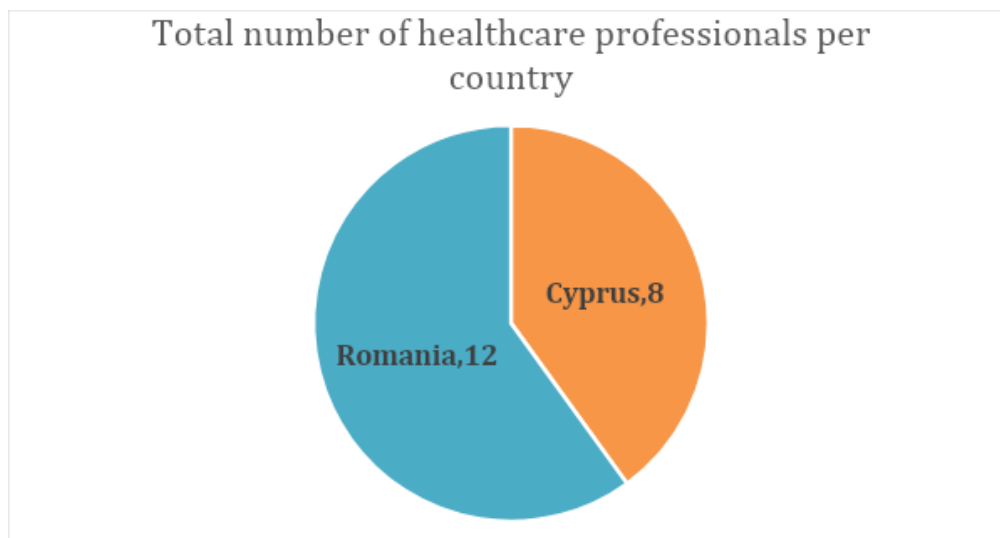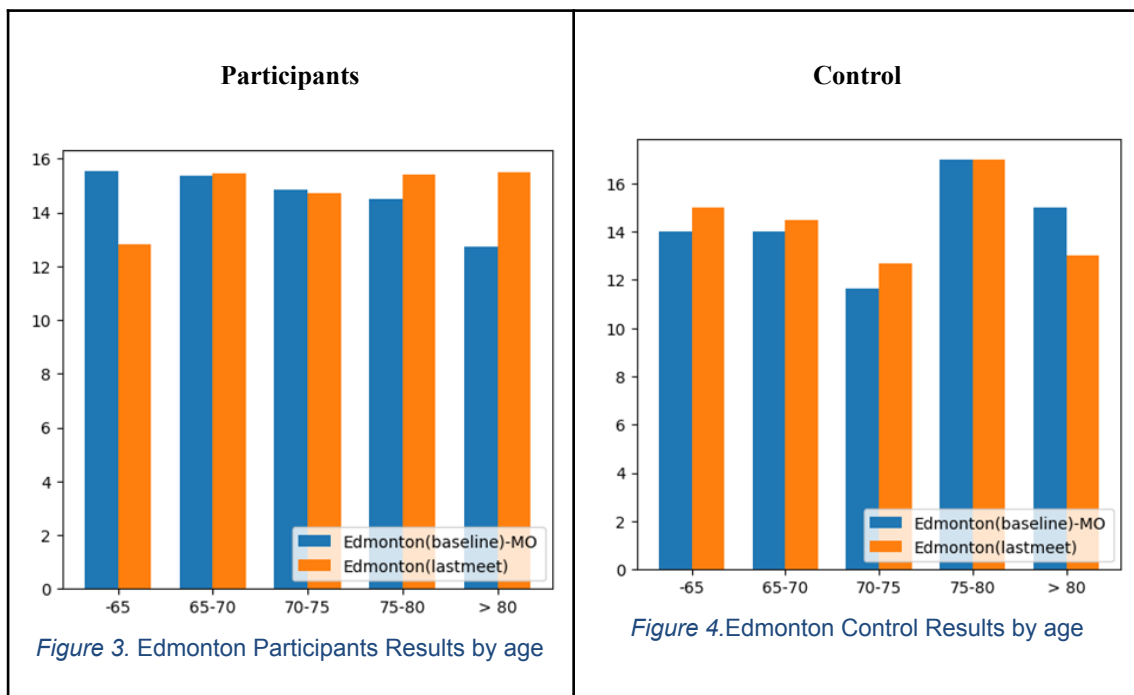*Figure 1.* Number of participants per country

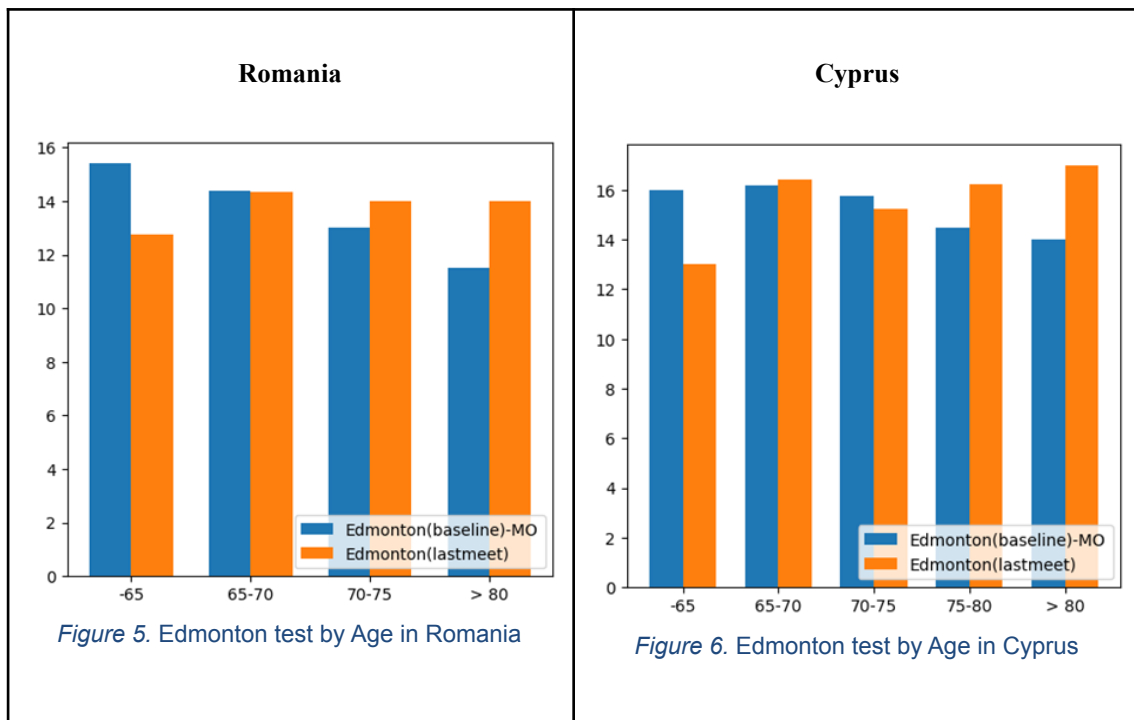*Figure 2.* Number of healthcare professionals per country

After describing the number of participants, both end-users and caregivers in each country, the results of the usability tests are described.

4.2 Frailty Test Results

4.2.1 Edmonton test by age

The graphs show the comparison between the means by the age of the baseline data versus the final test data. In general, by visually inspecting the plot there seems to be a trend towards an improvement in scores for most of the participants most participants. While both active users of the platform and controls show an improvement, it seems that this trend is more noticeable for the older participants in the active user group. This could suggest that the activities carried out in the interventions showed greater effects on the older population. Still, this visual trend did not reach statistical significance. The results from a repeated-measures ANOVAs using the Edmonton scores as the dependent variable showed that mean scores did not differ significantly across the two-time points in either the participants' group (F(1, 28)=.271, p = .604) or the control group (F(1, 8) =.295, p = .602). Therefore, there were no statistically significant changes in participants' frailty scores between the baseline and 6-month assessments.

Figure 3. Edmonton Participants Results by age

*Figure 4.*Edmonton Control Results by age

Figure 5. Edmonton test by Age in Romania

Figure 6. Edmonton test by Age in Cyprus

Both participants from Romania and Cyprus showed similar results, which leads us to believe that cultural differences between the two countries would not influence results with this type of intervention.

4.2.2. Edmonton test by Education

According to the graph, the Edmonton test shows an improvement in the participants' frailty scores. This improvement is presented for all educational levels, except for the participants who have a "High-School" educational level, in which a slight decrease is presented. However, it is important to note that in comparison with the other educational levels, the increase presented in the latter is in a higher proportion in most cases.
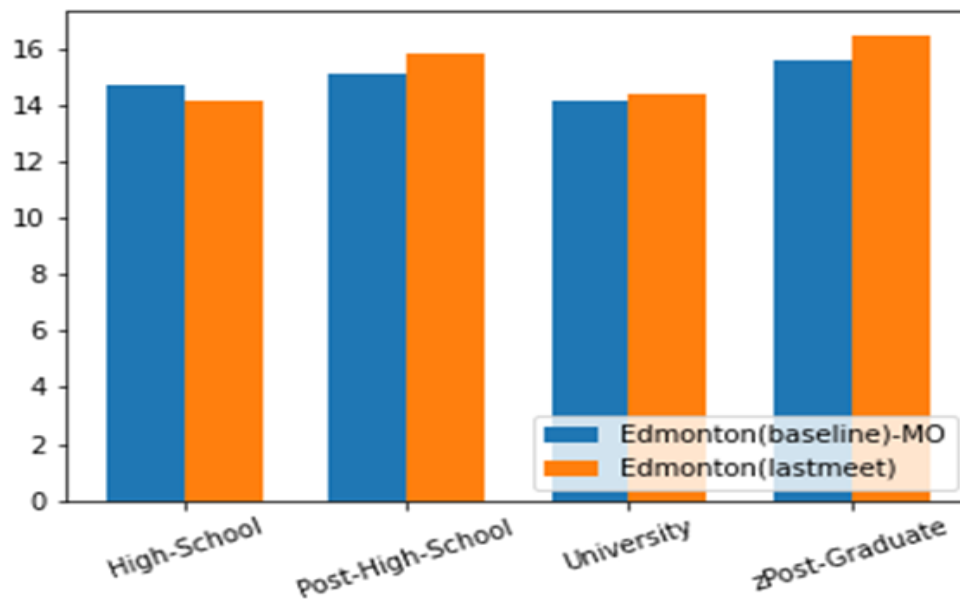
Figure 7. Edmonton test by Education

4.1.3. EQ-5D test by dimension

Based on the results of the EQ-5D test, there seems to be a migration from high levels of difficulty in each of the dimensions to low levels, showing a general improvement in self-reported quality of life (see tables below).

At baseline assessment the majority of participants were classified as *level 1* – having no problems on all 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.

Baseline percentages for each dimension of the EQ-5D test

	Mobility	Self-Care	Activity	Pain	Anxiety
1	61.1%	94.4%	88.9%	50.0%	63.9%
2	22.2%	5.6%	8.3%	27.8%	27.8%
3	13.9%	NaN	2.8%	19.4%	8.3%

4	2.8%	NaN	NaN	2.8%	NaN

Final percentages for each dimension of the EQ-5D test

	Mobility	Self-Care	Activity	Pain	Anxiety
1	68.8%	96.9%	84.4%	50.0%	71.9%
2	18.8%	3.1%	15.6%	28.1%	18.8%
3	9.4%	NaN	NaN	18.8%	9.4%
4	3.1%	NaN	NaN	3.1%	NaN

EQ-5D scale (health scale): the mean score 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 of over 80 points.

At 6 months assessment the majority of participants were classified as level 1 – showing 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.
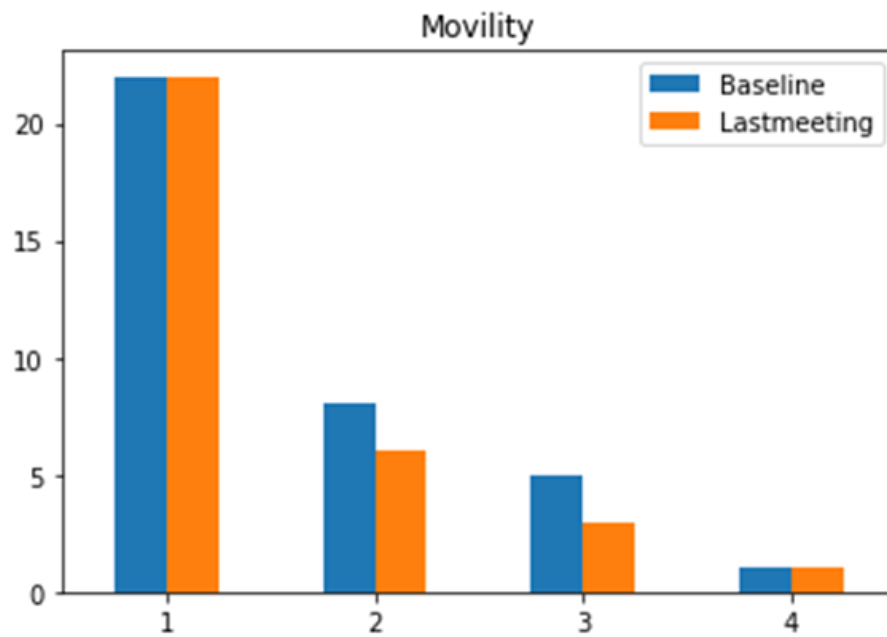
Figure 8. EQ-5D Mobility Results

Theparticipants show improvements in the mobility dimension, given that at the end of the study, the number of people who showed some level of frailty in this dimension decreased.
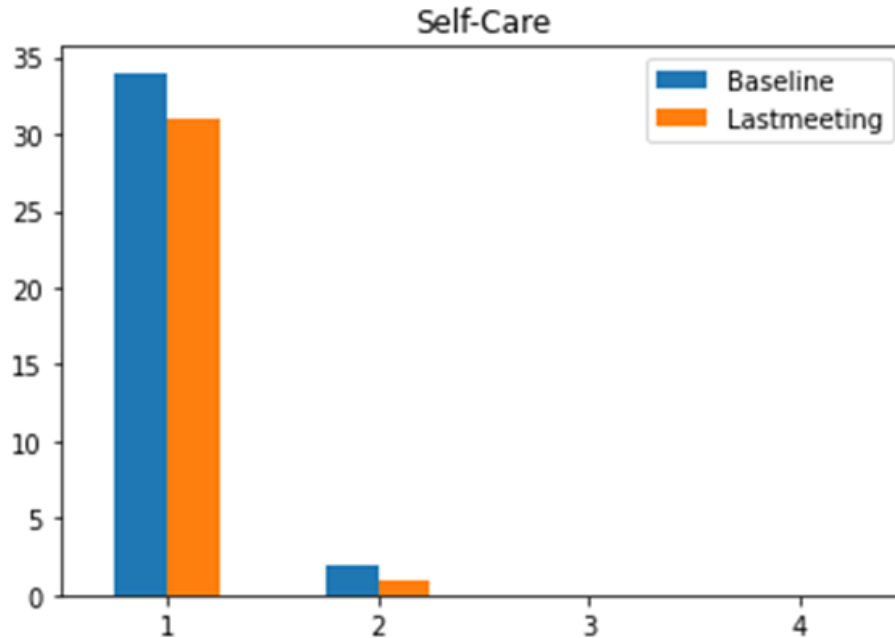

Figure .9 EQ-5D Self-Care Results

The self-care dimension did not obtain significant negative results in its baseline, despite this, there is evidence of a decrease in the number of people who at the end of the study showed some difficulty in this dimension.
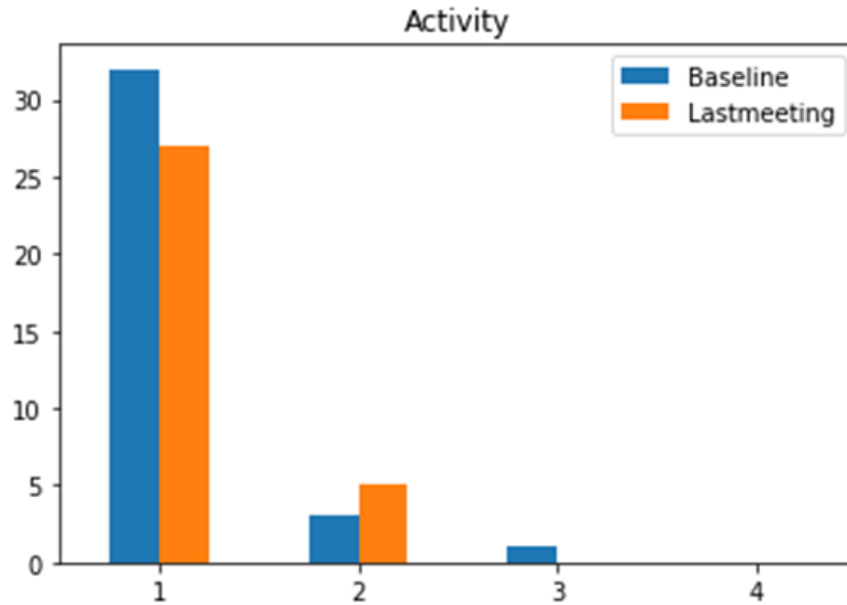

Figure 10. EQ-5D Activity Results

The Activity dimension also shows improvement in terms of the level of difficulty perceived by the participants. This is evidenced by the fact that at the beginning there were participants who reported a level 3 of difficulty in this dimension and at the end of the study, none of the participants reported having this level of difficulty, level 2 being the highest for this last follow-up.
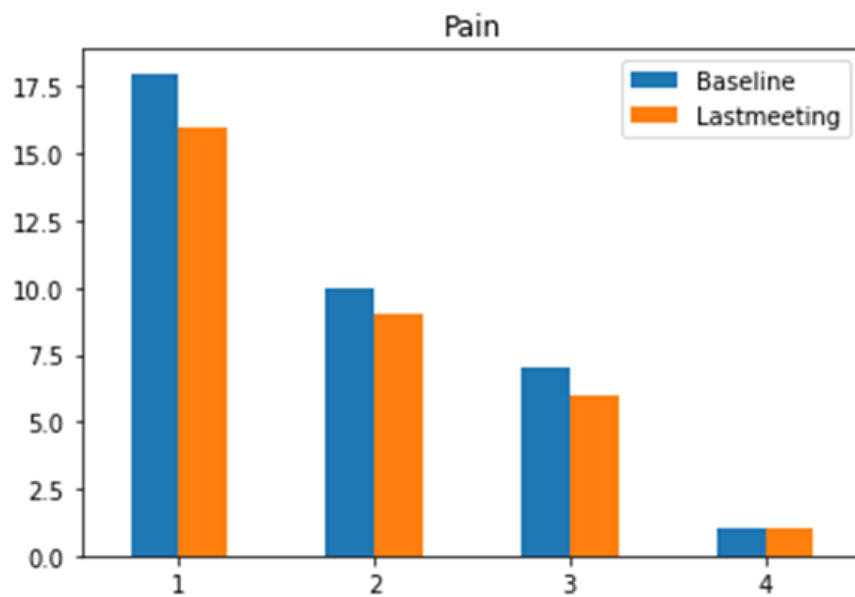
Figure 11. EQ-5D Pain Results

The pain dimension shows interesting improvements at all levels where participants perceived some difficulty. This is evidenced by the decrease in the number of responses in the different levels of this dimension, which represents an improvement in the participants.
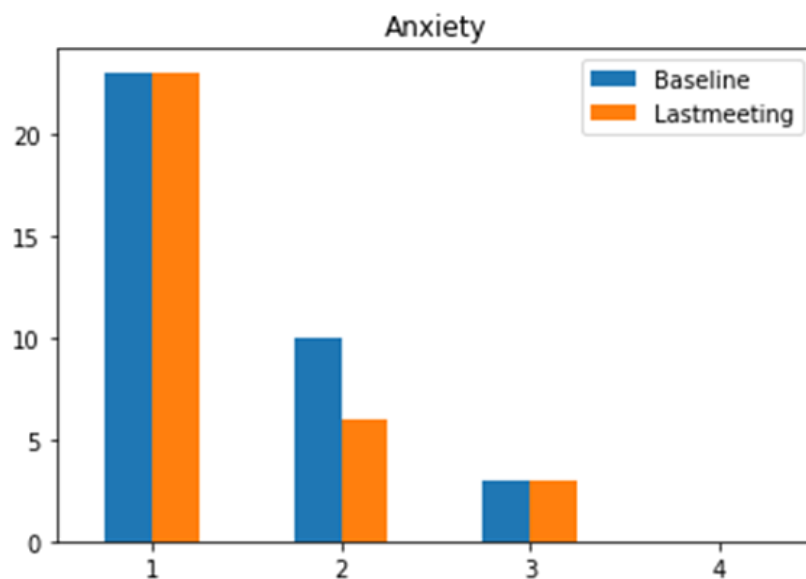

Figure 12. EQ-5D Anxiety Results

There was a slight improvement in participants' self-reported anxiety levels for the 2nd only.

While visual inspection of the bar charts show a trend towards improvement, repeated-measures ANOVAs on EQ-D5 scores determined that mean scores did not differ significantly across the two-time points in either the participants' group ($F_{(1, 28)}$ F=.189 , p=. 667) or the control group ($F_{(1, 8)}$ =,229, p = .645). Therefore, there were no statistically significant changes in participants' health status, as measured with EQ-D5 scale, between baseline and 6-month assessment.

4.3 Usability Results

Several tests have been carried out to evaluate the usability of the generated application, and the results are described below.

4.3.1 Usability Test General Analysis

First, the results are presented per item posed to the users:

A: Perceived ease of use

A1: I found the system easy to use

A2: The use of the system was clear and understandable

A3: It would be easy for me to learn to operate

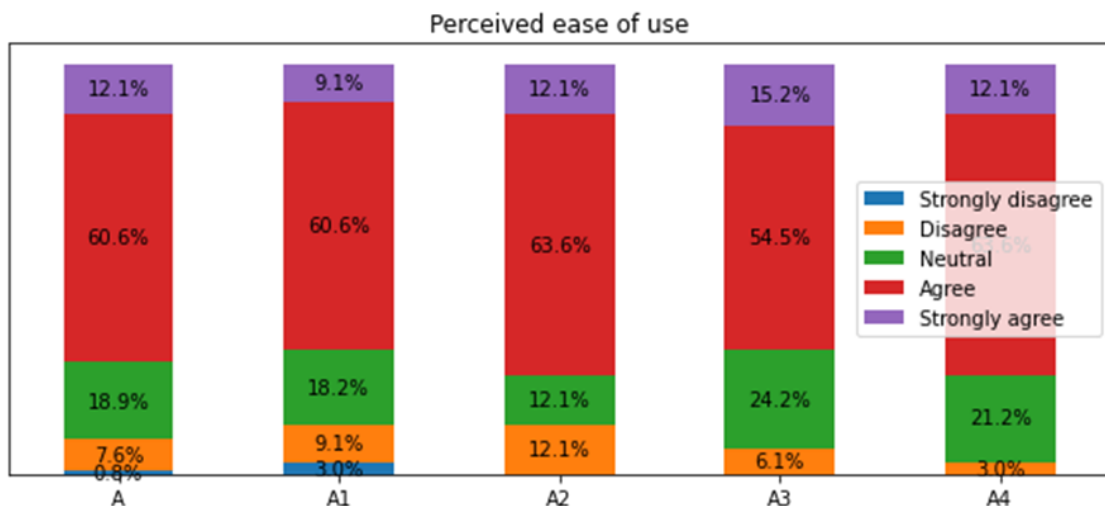A4: It would be easy for me, to continue training with the system independently

Figure 13. Perceived ease to use results

72% of the participants have a favourable perception of the use of the application, while 19% have a neutral opinion on the ease of use. 69% consider it to be easy to use (A1) mainly because they felt it was clear and understandable to use, according to 75% of respondents to question A2.

B: Perceived usefulness

B1: I imagine the use of the system beneficial for my physical and cognitive well-being

B2: I find it advantageous to train independently at home

B3: The use of the system would enrich my everyday life

B4: I find the system useful
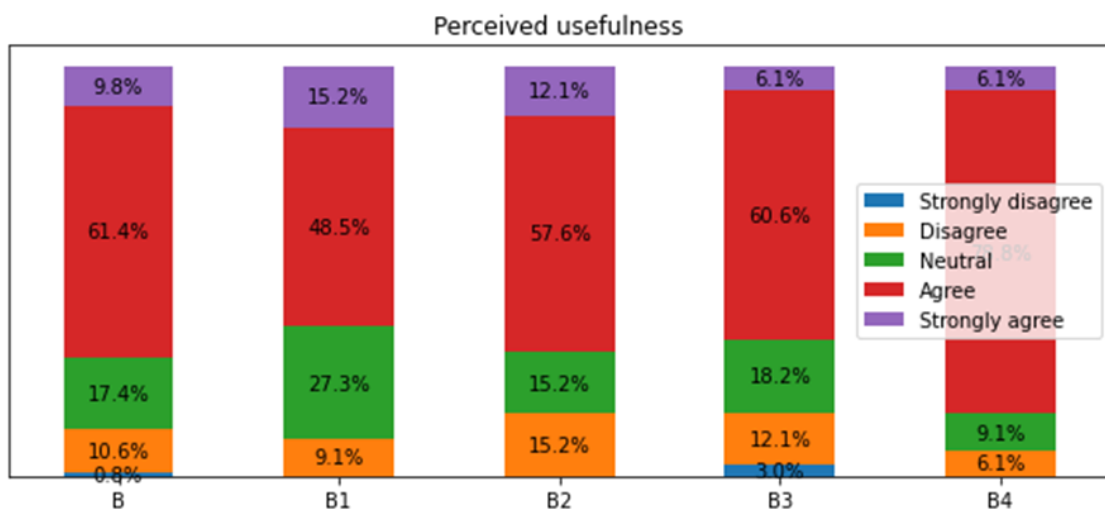
Figure 14. Perceived usefulness results

71% of the participants consider the application to be useful. However, 36.3% consider it of little benefit to physical and cognitive well-being (B1), but 67% believe that the application could enrich their daily lives (B3).

C: Social influence

C1: People who are important to me think I should use technology/such a system

C2: People who are important to my health care services think I should use technology/such a system
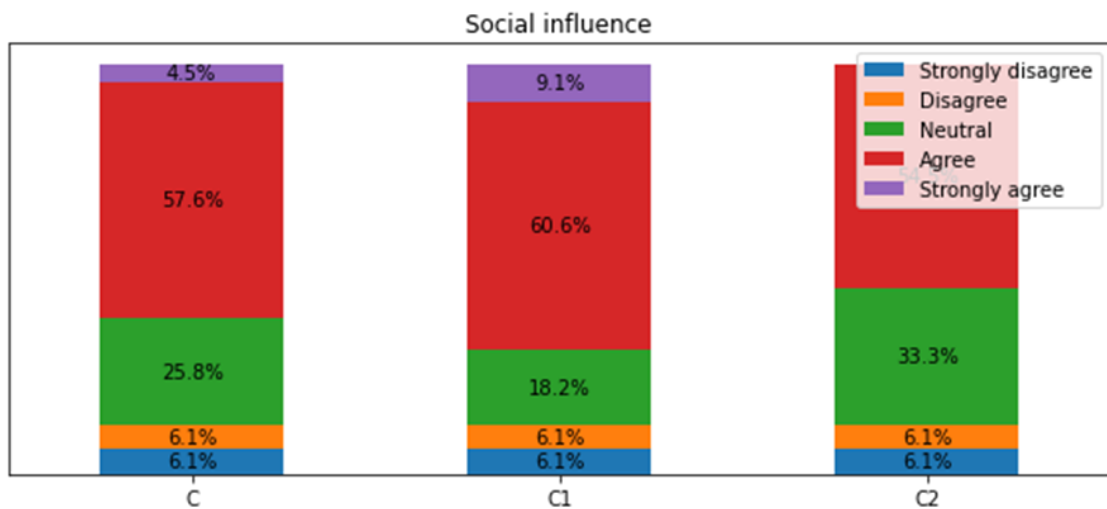
Figure 15. Social Influence Results

The social influence of 62% of the participants agree that the participant should use this system compared to 12% who disagree and 25.8% who have a neutral position. The close social environment is more favourable toward the use of technology than the environment shaped by health care services, with 70% for the first ones versus 54% for the second ones.

D: Perceived behavioural control

D1: I have the necessary internal resources (e.g. positive attitudes, ideas, positive feelings) to use the system

D2: I have the necessary external resources (e.g. financial situation, environment, health, free time)

D3: I have the necessary knowledge and skills to use the system
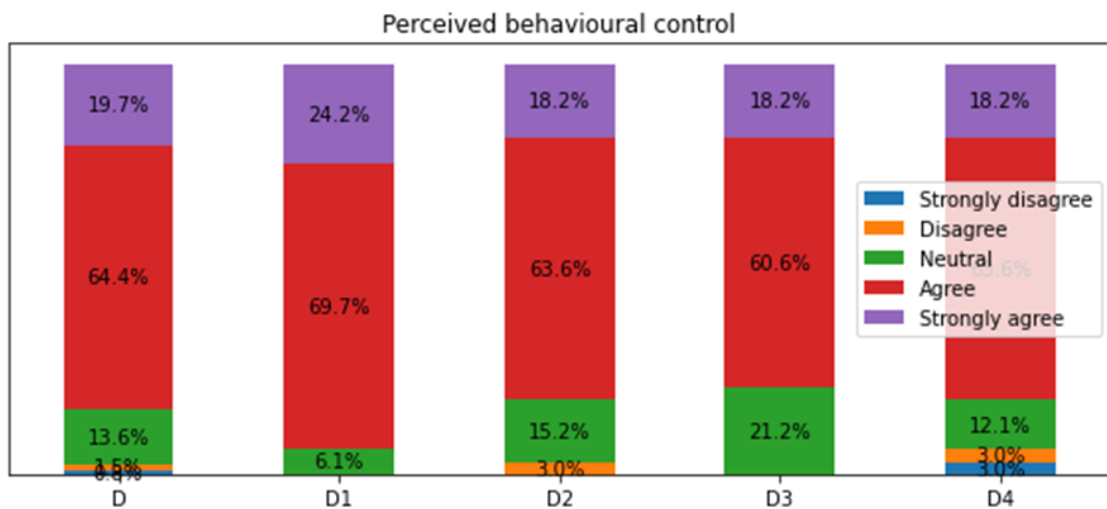
D4: If necessary, I have technical assistance available

Figure 16. Perceived behavioural control results

Most of the participants consider that they have the necessary resources and skills to use the system; only 6% consider that they lacked technical assistance when using the system (D4). 94% consider that they have a good disposition to use the system (D1), which implies a good attitude and good emotions regarding the use of the system, while 3% report that they lacked some external resource for the use of the system (D2).

E: Attitude towards use

E1: I like the idea to conduct a training with the system

E2: I have a positive attitude towards the system

E3: I think, it is a bad idea, to use this system as a training possibility
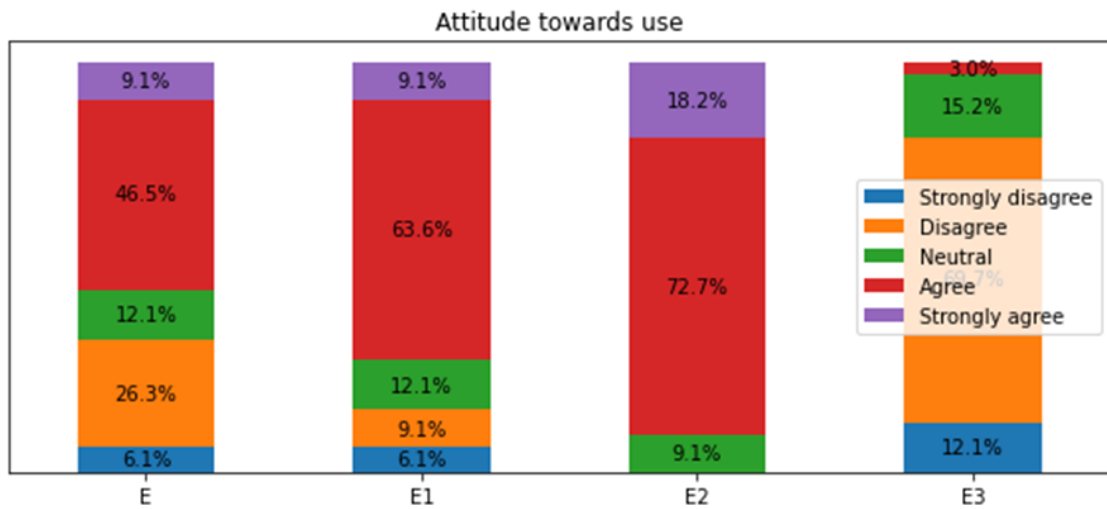
Figure 17. Attitude towards use results

91% of the participants have a positive attitude towards the use of the system (E2) and 72% think it is a good idea to train with the system (E1).

F: Intention-to-use

F1: If I had access to the system, I would use it in the future

F2: If possible, I would use the system often
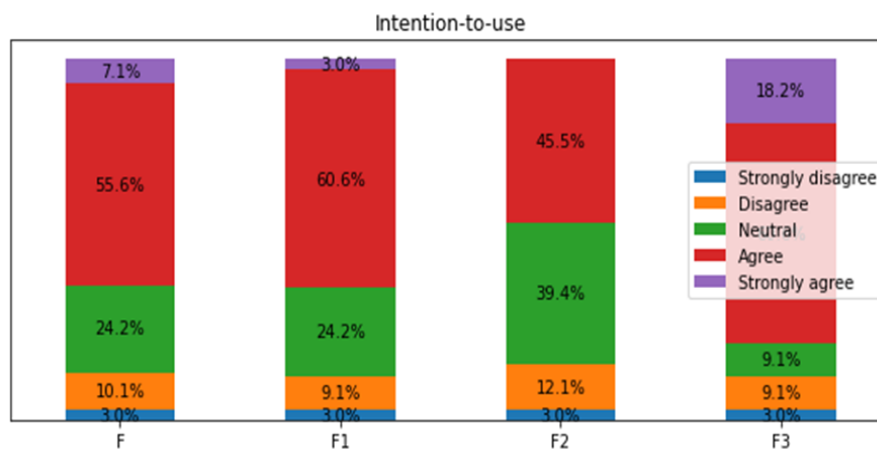
F3: I would recommend the system

Figure 18. Intention-to-use results

Most of the participants (62.7%) said they would use the system again, 24.2% were indifferent while 13.1% would not use it again. Despite this, only 45% of the participants would use it often (F2) while 78.8% would recommend its use to others (F3).

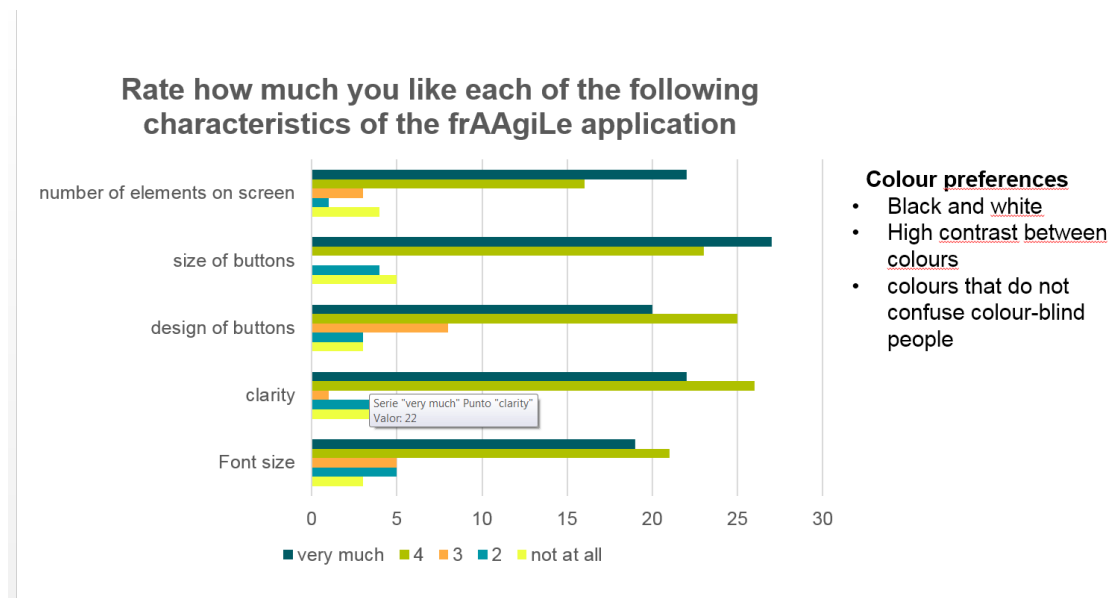The following shows how the users have evaluated each of the interface features:

Figure 19. Interface features rating.
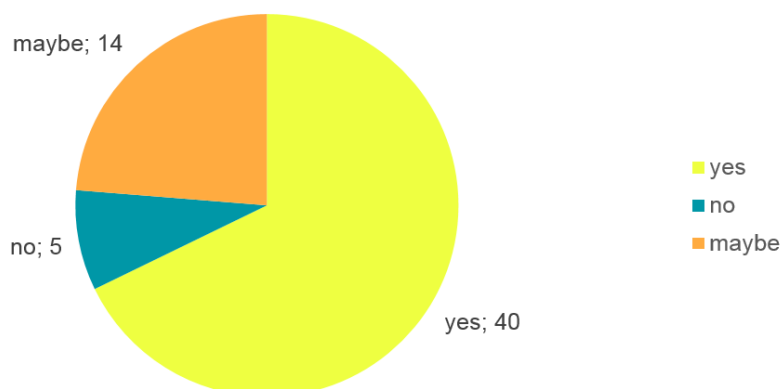
Figure 20. Feasibility of connecting games and devices

How would you prefer your results to be conveyed to you?

Scores/numbers — ~39
Trend chart — ~35
different colours — ~32
symbols — ~11

(Scale: 0, 5, 10, 15, 20, 25, 30, 35, 40, 45)

Others
- Number of points achieved compared to the maximum score ?; this could also be defined in relation to the patient: Example: a weak body reaches a maximum of 80 points, but for him this means a very good result, because he will never reach 100 points...
- Text messages or notifications
- With words. Someone to tell me or to read about it

Figure 21. User Statistical preferences

Professionals' opinion:

Would you recommend this application to your patients to prevent and monitor clinical frailty?

maybe; 1
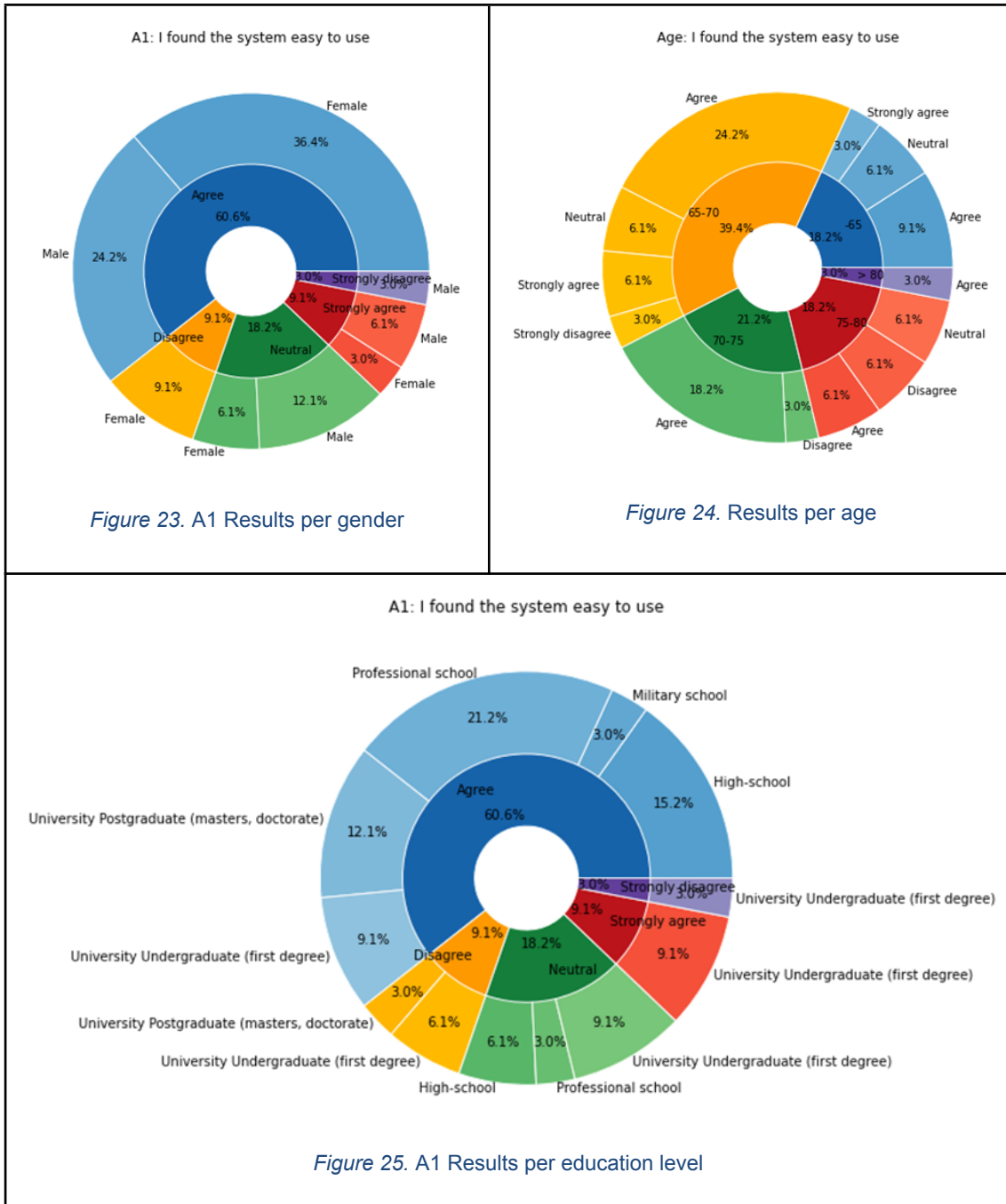yes; 19

yes ▪ no ▪ maybe ▪
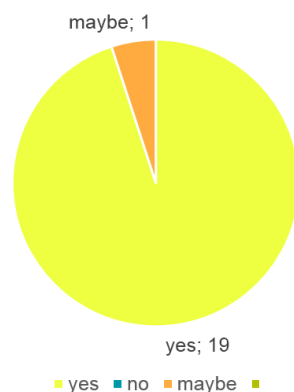
- It is an innovative and holistic tool
- Because it seems that it will be of great benefit to them but also for me.
- It is a very good idea and I think it will be a powerful tool in the hands of the therapist.
- It allows close monitoring of the clinical picture and offers stability in evaluation. It offers the person many activities and facilitates and enriches the quality of the treatment.
- It strengthens doctor-patient relationship
- It is cost effective – expenses resulting from frailty are quite high
- It has a holistic approach
- Personalized approach

Figure 22. Application recommendation results

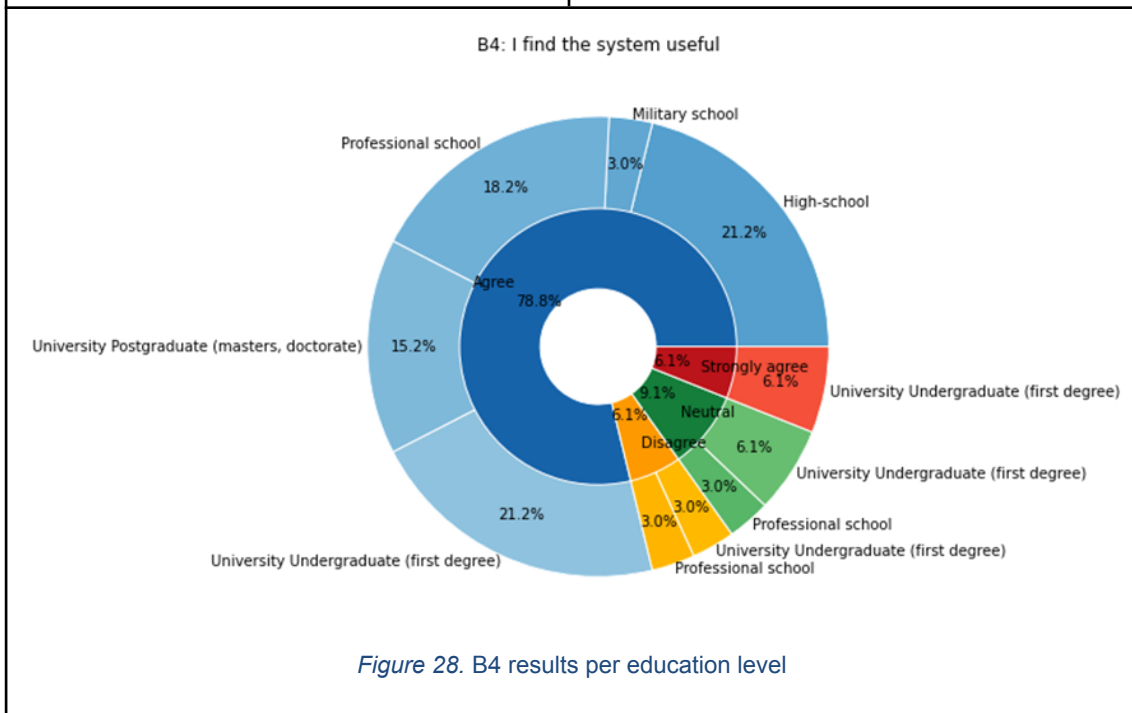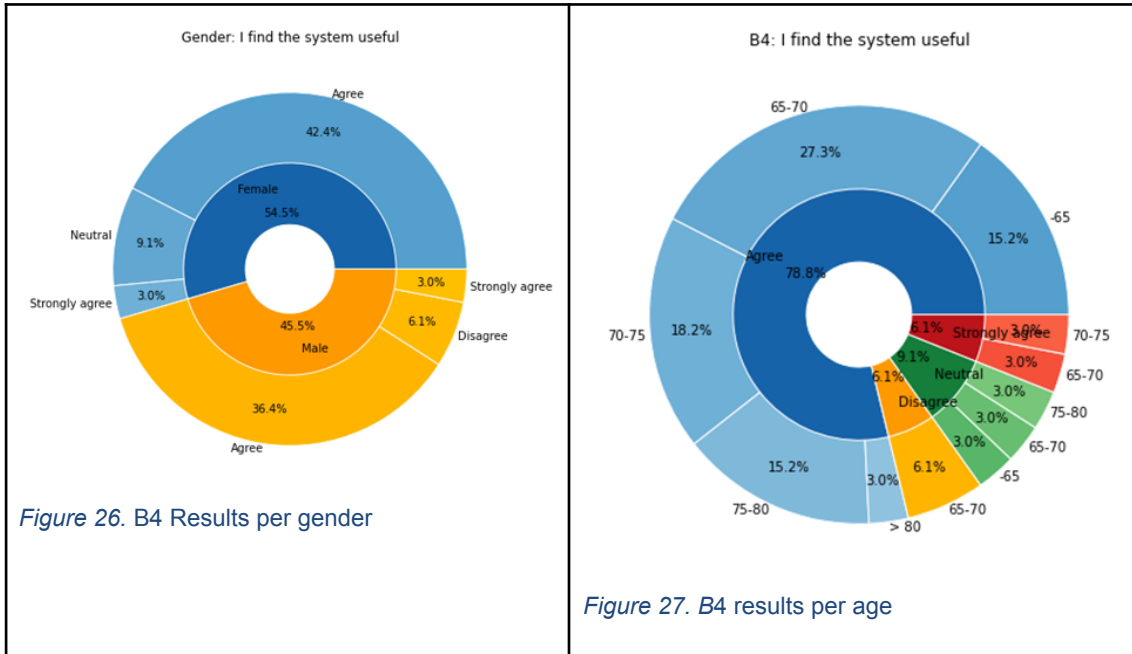## 4.3.2 Usability test Detailed Analysis

It is important to note that the most favourable responses about the use of the application are from women (39,4%), but also the majority of the negative responses are from women (9,1%).

Figure 23. A1 Results per gender

Figure 24. Results per age

Figure 25. A1 Results per education level

Regarding age, the negative perceptions are mostly given by people between 75 and 80 years old, while the positive ones are by people between 65 and 70 years old, which allows concluding that age is a factor that influences the perception of the use of the application.

According to the results, education also has some effect on the perceived use of the application, given that all the negative evaluations regarding the use of the application

are by people with university and higher education, perhaps because they have a more demanding criterion at the time of evaluation.

Figure 26. B4 Results per gender

*Figure 27. B*4 results per age

Figure 28. B4 results per education level

The majority of those who consider the application useful are women (45,4%), while all the negative evaluations are given by men (6.1%). In the case of the perception of usefulness, it is the youngest age group (between 65 and 70 years old) who provide

the negative evaluations, in contrast to the oldest age group (over 80 years old) whose evaluations are all positive.

Regarding educational level, people with a high level of education (postgraduates) have a favourable opinion of the usefulness of the application, while people with a medium level of education give neutral and negative evaluations. In conclusion, the expectations of usefulness are higher for younger and less educated people.
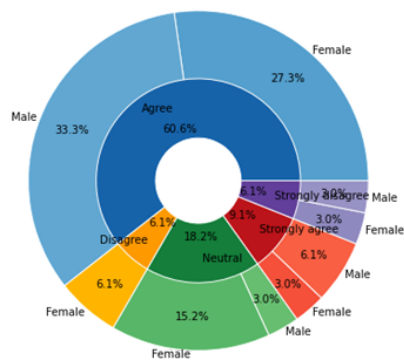
Figure 29. C1 results per gender
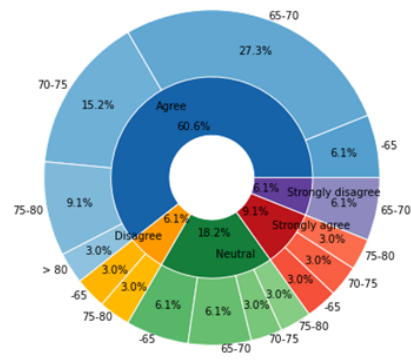
Figure 30. C1 results per age

Women are the least recommended to use this system by their social environment, while men are recommended more. Those over 80 years of age are always recommended to use the system by their social environment, in contrast to those between 65 and 70 years of age, 6% of whom are not recommended to use the system.
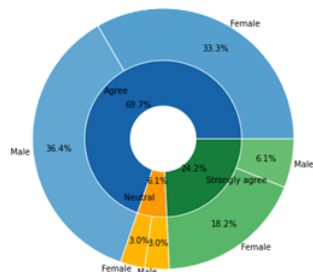
Figure 31. D1 results per gender

Figure 32. D1 results per age

Figure 33. D3 results per education level

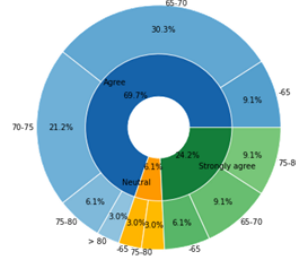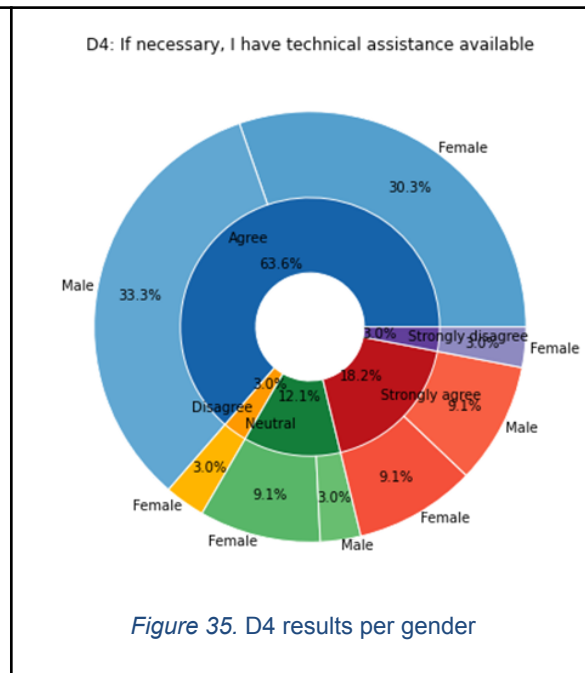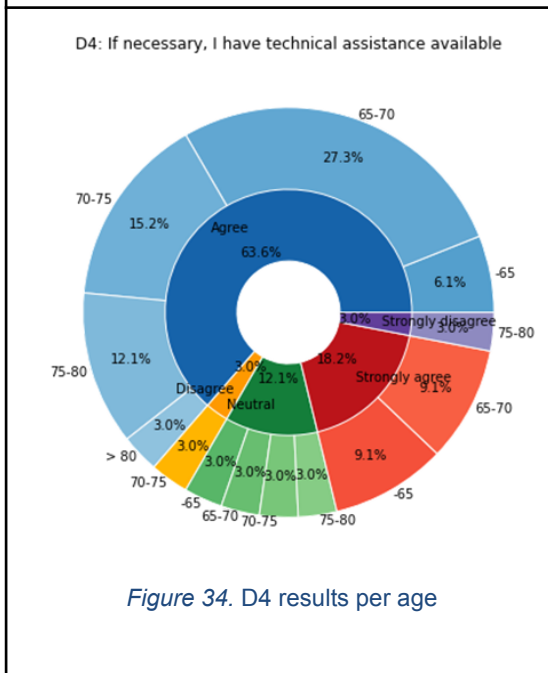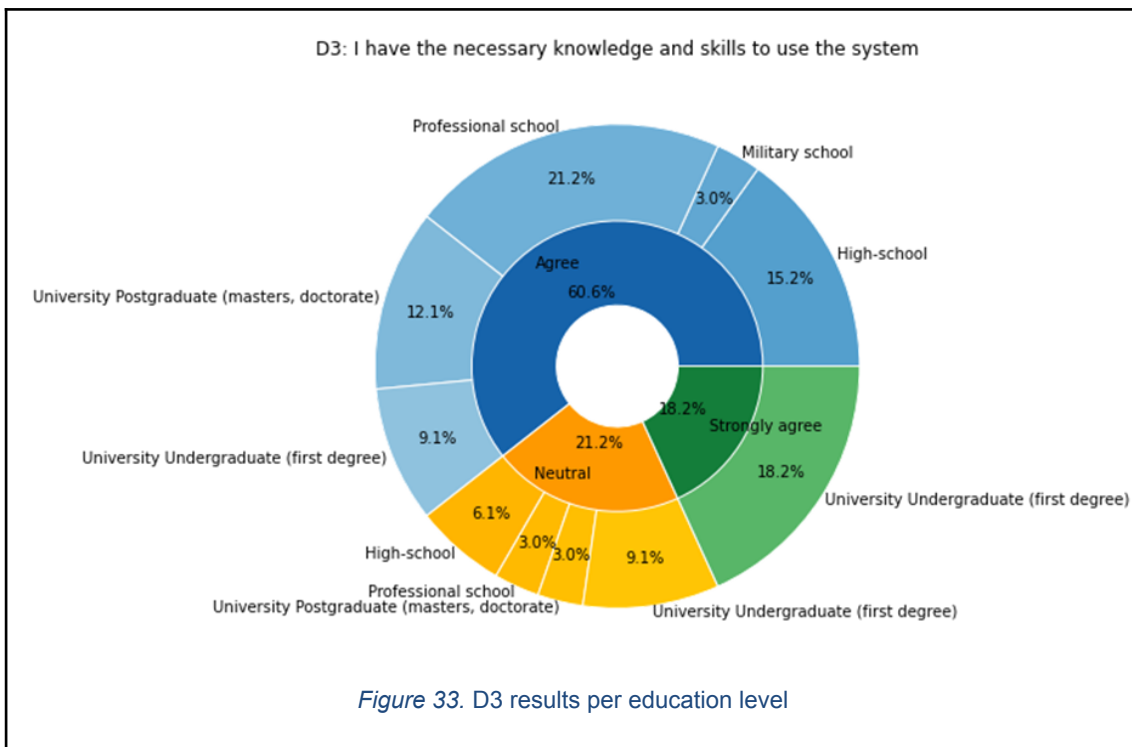*Figure 34.* D4 results per age

Figure 35. D4 results per gender

The strongest willingness to use the system was shown by women and participants between 65 and 70 years of age. Those who considered most likely to have the necessary knowledge to use the system were the "University Undergraduates", followed by the "Professional School", while those who considered that the availability of technical assistance was lacking were women and those over 70 years of age.
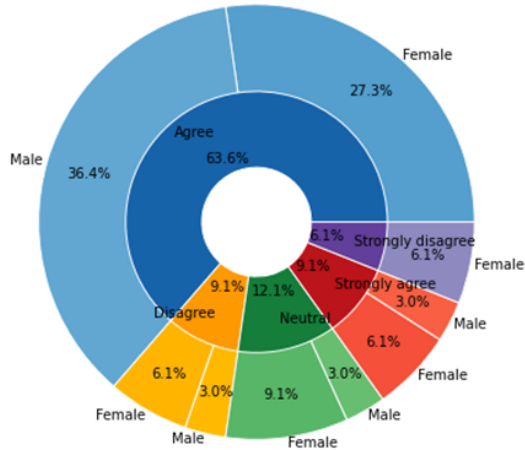
Figure 36. E1. Results by gender
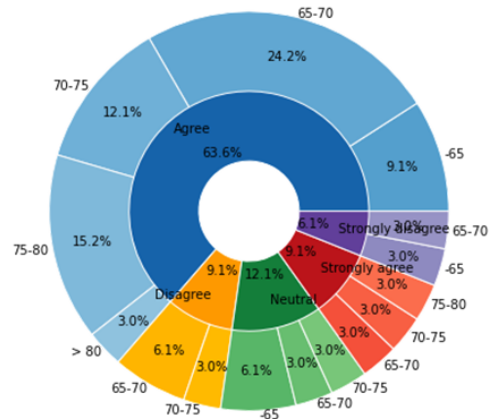
Figure 37. E1 results by age
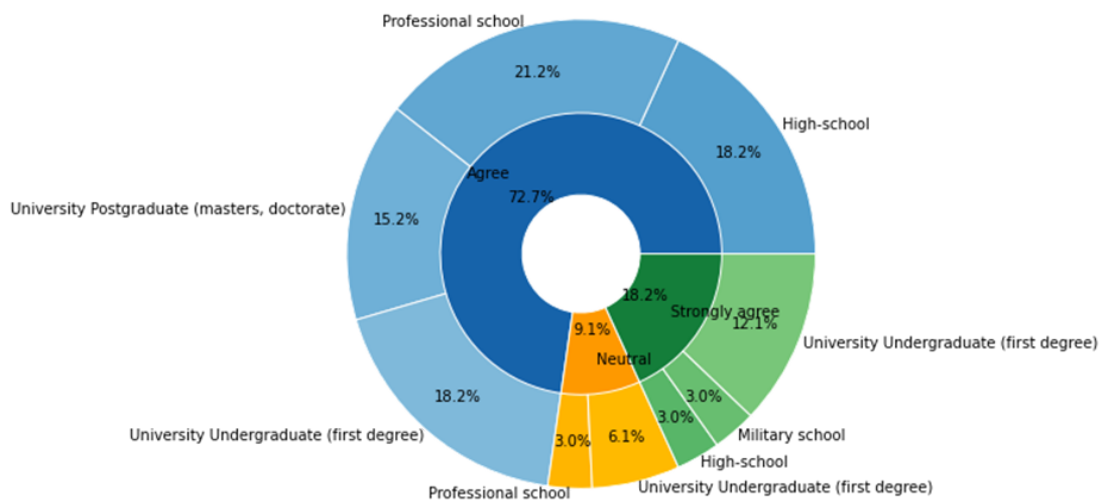
Figure 38. E2 results by education level

Women were the least likely to agree with the idea of starting training with the system at 12.2%, compared to men who disliked the idea at 3%. In contrast, 39% are men who agree with the idea and 33% are women. 12.1% of the participants are under 70 years

old and do not agree with the idea of starting a training with the system, while the most agree with the idea are people over 70 years old with 36.3% of the participants.

Participants with "University Undergraduate" level of education have the highest positive attitude towards the system with 30.3%, followed by "Pro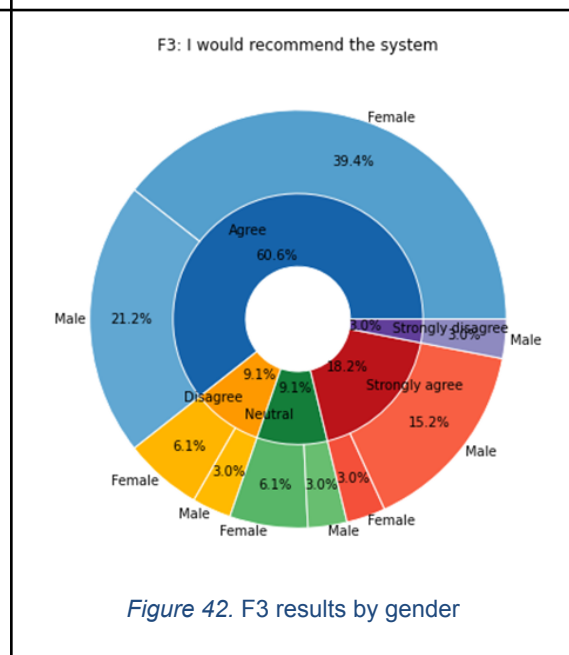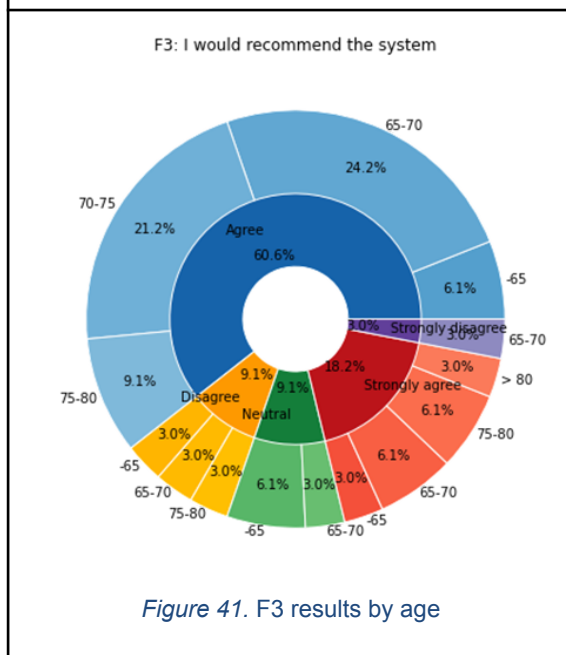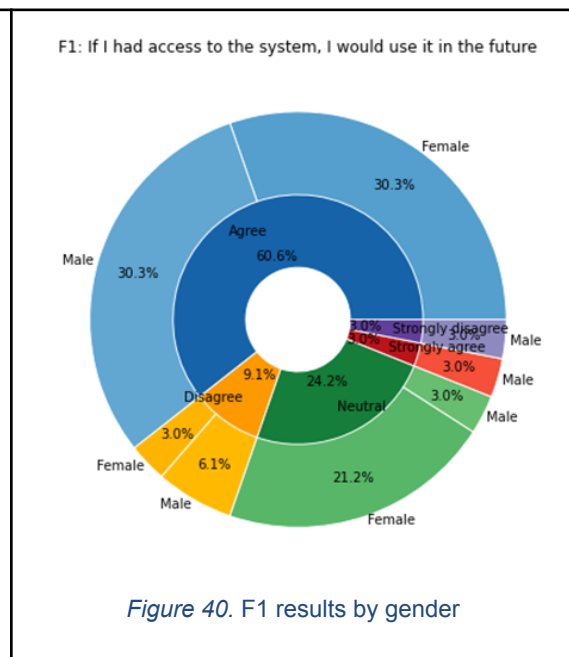fessional School" and "High-School" with 21.2% each. While those under 75 years of age have the highest positive attitude towards the system with 70%, which indicates that the positive attitude towards the system is more influenced by age than by educational level.

Figure 39. F1 results by age

Figure 40. F1 results by gender

Figure 41. F3 results by age

Figure 42. F3 results by gender
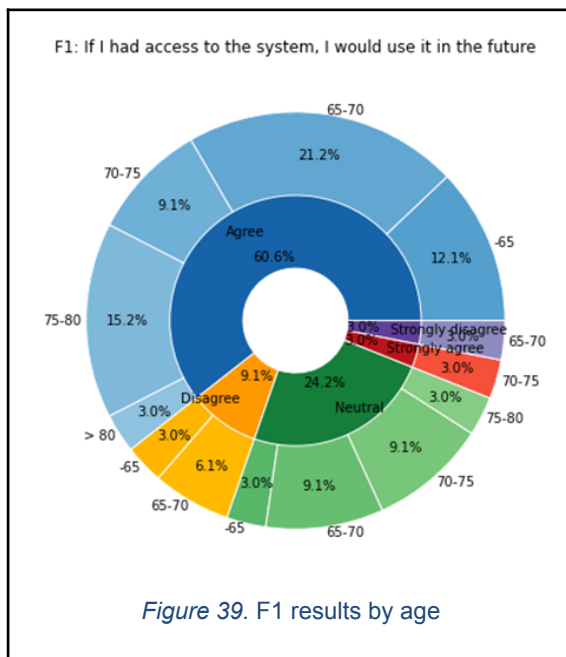
There is a greater inclination among younger people (under 70 years of age) not to use the system in the future (9.1%) than among older people (3%), while, categorised by gender, men are less willing to continue using the system (9.1%) than women (3%).

However, 39.4% of people under 70 years of age agree with recommending the system, a percentage identical to that of people over 70 years of age. Therefore, the decision to recommend or not use the system is more influenced by gender, with women being more likely to recommend it (42.4%) than men (36.4%).

Figure 43. G1 results by age

Figure 44. G1 results by education level
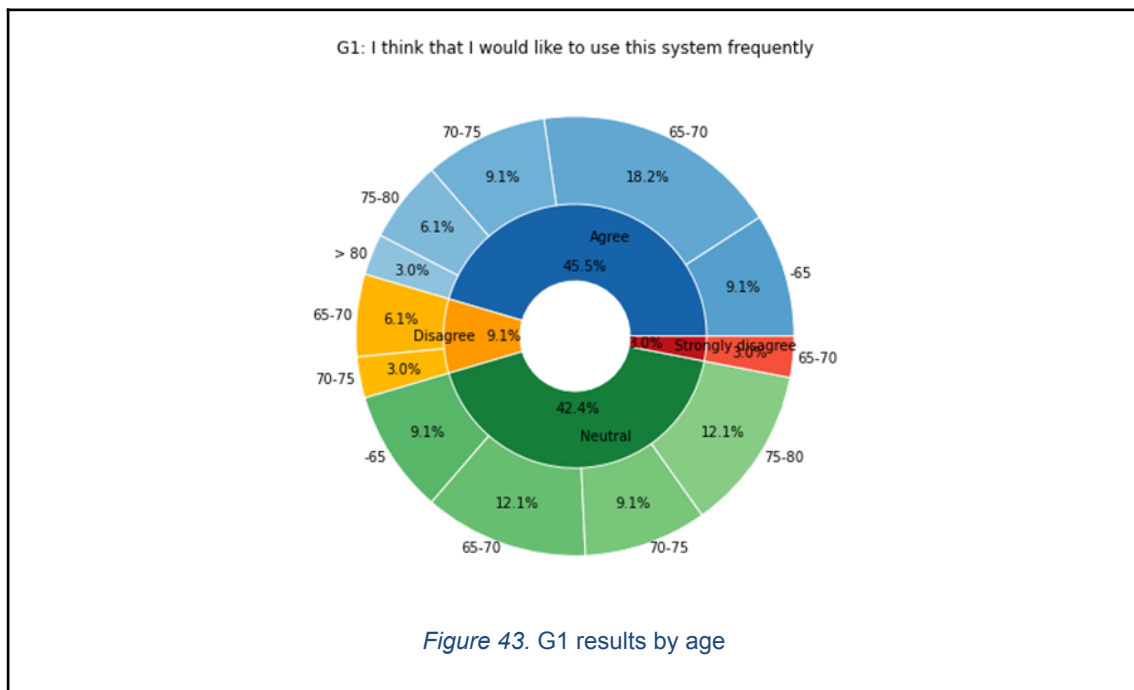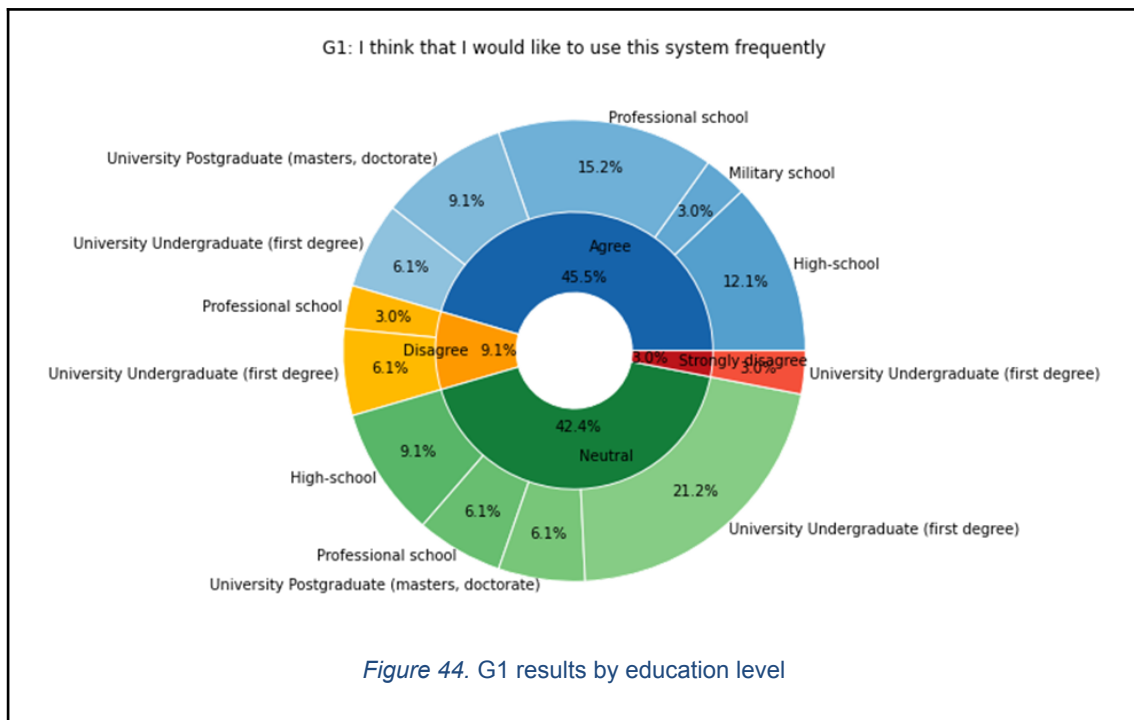
Less than half the participants (45.5%) agree with frequent use of the system, with 42.4% for whom their decision is neutral; however, those under 70 years of age are the least likely to agree with frequent use with 9.1%. Participants with professional and university studies are the most in agreement with frequent use of the system with 30.4%.

Figure 45. G2 results by age

Figure 46. G2 results by gender
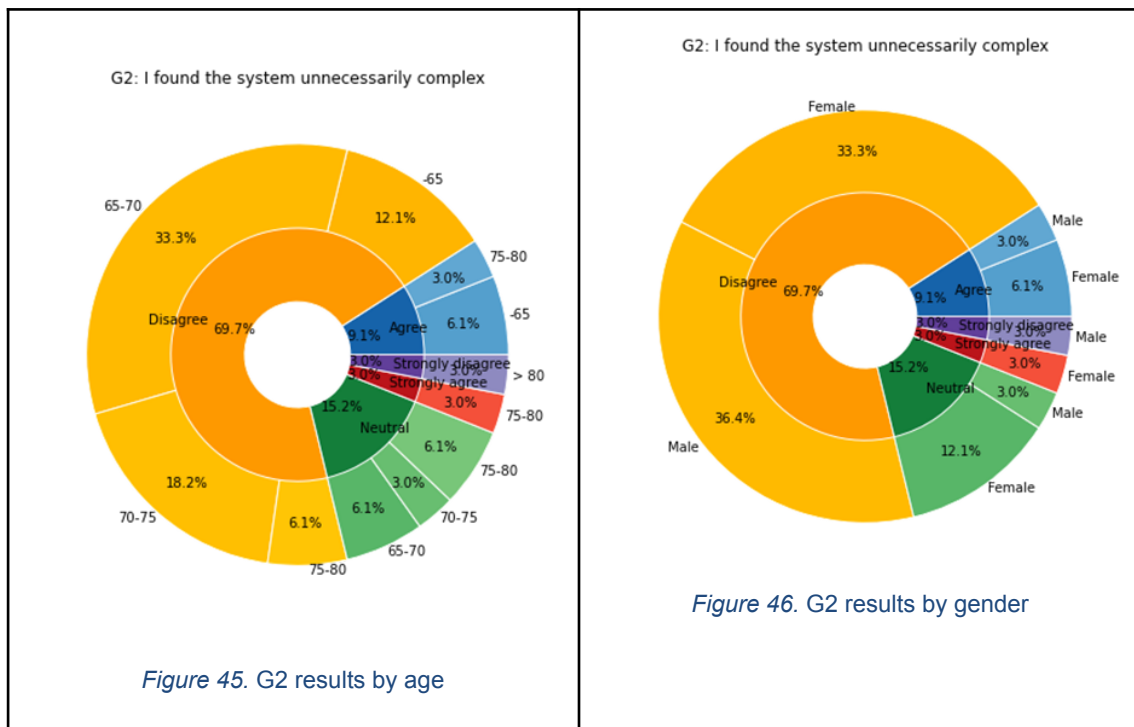
72.7% of the participants consider that the system is not complex, with participants between 65 and 70 years of age sharing this opinion the most (33.3%). For 9.1%, the system was unnecessarily complex. Women were the most likely to find the system complex, with 6.1% of the participants, while men were the most likely to find it complex (3%).

Figure 47. G3 results by gender

Figure 48. G3 results by education level
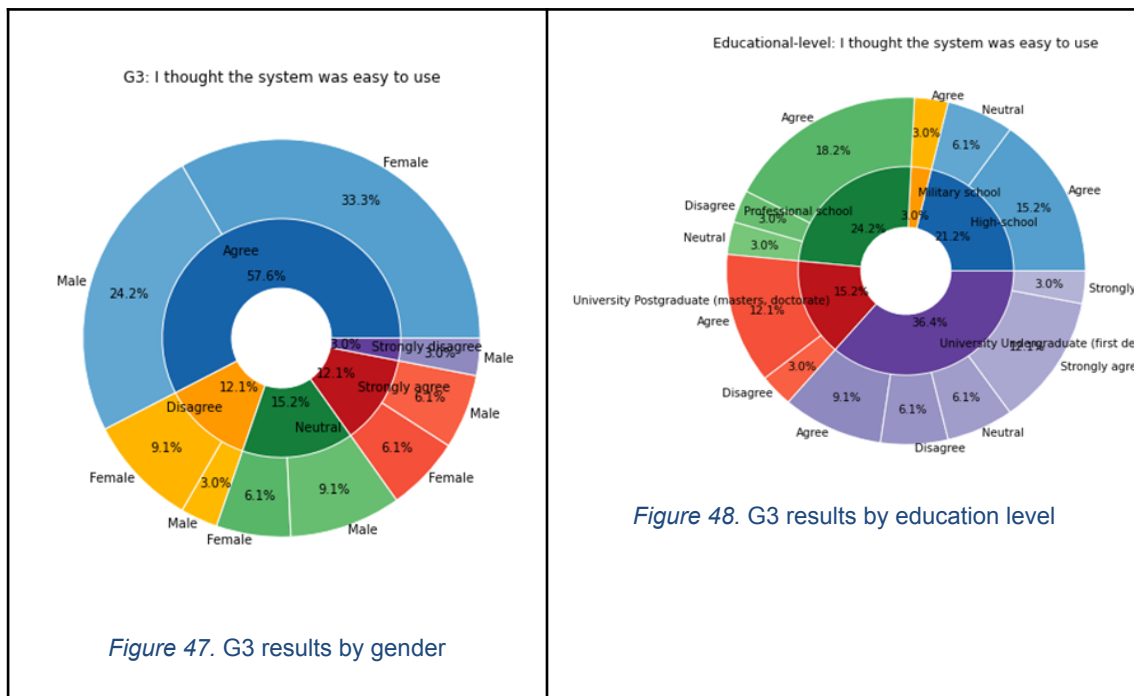
69.7% of the participants agreed that the system was easy to use, more so for women (39.4%) than for men (30.3%).

4.3 KPIs

KPI	Year 1	Results
Nr. of users involved in co-creation tasks % of new users	>5 per organization N/A	Achieved N/A
Positive opinion of users experience based on mockups and questionnaires Positive opinion of exercises quality based on mockups and questionnaires Positive opinion of data quality based on mockups and questionnaires Average hours of elderly's activity	= 3 stars in avg. = 3 stars in avg. > 50 % in avg. N/A	Achieved Achieved Achieved N/A
Nr. caregivers Positive opinion of business engaged	> 2 per organization = 3 stars in avg	Achieved Achieved
Nr. of videos developed for the platform Nr. of serious games created for cognitive stimulation	> 5 per year > 10 per year	9 > 5 per year 3 by DEU and 7 by IDE

KPI	Year 2	Results
Nr. of users involved in co-creation tasks % of new users	>10 per organization > 30 % per org	Achieved Achieved
Positive opinion of users experience based on mockups and questionnaires Positive opinion of exercises quality based on mockups and questionnaires Positive opinion of data quality based on mockups and questionnaires Average hours of elderly's activity	> 4 stars in avg. > 4 stars in avg. > 60 % in avg.	>3 stars in avg 3 star in avg Achieved

		Not Achieved
	5 hours a week	
Nr. caregivers	> 2 per organization	Achieved
Positive opinion of business engaged	= 3 stars in avg	Achieved
Nr. of videos developed for the platform Nr. of serious games created for cognitive stimulation	> 10 per year > 10 per yea	Achieved 6 by DEU and 7 by IDE

KPI	Year 2	Results
Nr. of users involved in co-creation tasks	>15 per organization	Achieved
% of new users	> 40 % per org	Achieved
Positive opinion of users experience based on mockups and questionnaires	> 4 stars in avg.	>3 stars in avg
Positive opinion of exercises quality based on mockups and questionnaires	4 star in avg	3 star in avg
Positive opinion of data quality based on mockups and questionnaires	> 70 % in avg.	Achieved
Average hours of elderly's activity	16 hours a week	Around 5-6h a week
Nr. caregivers	> 2 per organization	Achieved
Positive opinion of business engaged	= 3 stars in avg	Achieved
Nr. of videos developed for the platform Nr. of serious games created for cognitive stimulation	> 10 per year > 10 per year	21 videos created 8 by DEU and 8 by IDE and 2 by UNIGE

5. Conclusions

First tests seem to be promising and are aligned with the expected outcomes.

5.1 Frailty Test Conclusions

While the visual inspection of participants' scores on the Edmonton test, which evaluates frailty levels, showed a trend towards improvement for the older active users, compared to the older controls, this trend did not reach statistical significance. It may be that a larger sample size is needed to be able to show an improvement between groups.

5.2 Usability Test Conclusions

The results of the usability tests are generally very positive. frAAgiLe needs to be accessible to all kinds of users when it comes to education, and for this reason, the conclusions drawn from usability testing are key to designing future developments. When it comes to other variables such as gender and age, the results are closer to what is desirable and expected in a system such as frAAgiLe.