Final report of end-users validation results

Deliverable D2.5

Work Package 2: End-User Input and Validation

DOCUMENT HISTORY

VERSION	CONTRIBUTOR	COMPANY	COMMENT	DATE
1.0	Ingema Team	INGEMA		14/12/2012
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8.0	INGEMA and CURE Teams	INGEMA & CURE		15/03/2013

EXECUTIVE SUMMARY

This document describes the process followed by INGEMA and CURE, as partners in charge of the users' requirements and validation.

The User Centered Design it is defined as a process in which users' wishes, preferences and needs are taken into account to develop the platform. The consortium has followed this idea in order to have a valid tool for end-users. In order to reach this knowledge final users have been involved from the first steps to the final validation of 3rD-LIFE platform. This means that end-users participated in the focus groups, first evaluation, multi-user trial, end-user device trial and final trial.

This has been a long way in a very short time. Because of that, the whole consortium has done a really huge effort: UL and I&IMS developing, among others, the code necessary for all the elements such as video streaming, photo gallery at the exhibition area, learning panels for the learning area, games for the gamming area, doors to identify the owners of the houses, specific 3rD-LIFE mail in our server, internet access from the island, the backend to organize the photo exhibitions, the news and the announcements; O2T has designed, among others, the concept of the Island, the houses, the learning area, the café, the exhibition area, the gaming area, the roads, the beaches… Last, but not least, CURE and INGEMA have done a fantastic work with the end-users. They have organised more trials than the ones that were planned because the whole consortium was determined to tackle this challenge and overcome it to do a good job to be proud of, analysed the data and guided the developers in order to have a platform adapted to end-users so we have changed the equation were end users used to be the ones who had to adapt themselves to technology.

Finally, as coordinator of the project, now that I'm ending the project I was remembering the day I started my work here. It was the 14th of February of 2012 and we had to send 14 deliverables for the next day. I thought "This is a good Valentine". But from the beginning I found much support in the consortium members that everything was easy to do. I can only thank the previous coordinator of the project, Cristina Buiza and all the other members of the consortium. Matevz, Masa, Domen and Damir from UL; Manu from I&IMS, Goska, Lukasz

and Borys from O2T, Ulcay, Markus, Linda and Bernhard from CURE and Blanca, Raúl, Linnea, Vanja, Aitziber, Gerardo and Xabi from INGEMA. It has been so easy to work with this consortium that my work has no merit.

Iker Laskibar

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1. INTRODUCTION

1.1. NOTES ON THE PROJECT

The aim of the 3rD-LIFE project is to create a 3D environment that allows older people interact with other people and perform a variety of leisure activities on a computer with Internet connection. One of the most important aspects that 3rD-LIFE focuses on is the anxiety and the difficulties that older people usually face by the usage of new technologies. 3rD-LIFE addresses such difficulties with a focus on usability and accessibility issues on a 3D environment, where the user interaction takes place in a more visual and intuitive way.

1.2. SCOPE OF THE DELIVERABLE

In order to gain insight about the acceptance, usability and user experience of a 3D environment for the older people, an extensive set of trials was carried out with 3rD-LIFE potential users in two countries: Spain and Austria.

3rD-LIFE project follows a User Centered Design (UCD) approach. This implies, in the first place, taking into account the users' needs and wishes or, in other words, taking into account the specifications that influence the usability of the system and the user experience factors, such as the perceived benefit for the target users. In addition, UCD implies the active participation of the end users in the design process and in the evaluation process. WP2 – End-User Input and Validation includes; therefore, not only the initial requirement analysis phase, where the target end user groups actively participated, but also user trials for assessing the development of the system based on the user requirements analysis results.

The aim of this document is to present the results of the four different trials carried out during this period:

- First trial in order to have a first feedback from the end users about the beta version of the Island.
- Multi-user trial in order to test how people interacted in the Island.
- End user device trial in order to test new ways to interact with the Island
- Final trial in order to have the final feedback.

2. EVALUATIONS DEVELOPED

2.1. FIRST EVALUATION

2.1.1. INTRODUCTION

For the trials 54 end users were involved (17 Primary users in Spain and 10 in Austria; 17 Secondary users in Spain and 10 in Austria). Users were recruited and tested in Spain and in Austria. The virtual island was prepared and equipped with various developed applications and functions. Users were instructed to walk their avatar around the virtual island by following a predestined route, as described under, "Evaluation with scenarios". During the walk, the user was guided by a researcher represented as an avatar on the virtual island. In addition an assisting person was physically present to make them feel more comfortable during the trial.

3rD-LIFE island was subdivided into five areas (see figure 1 below). In area named "A" users have private houses which they could share access to with the people they know well. "B" is the Exhibition Area, the place where the users can view their photography collections previously uploaded to an internal server property of the 3rD-LIFE Consortium. The area labelled with a "C" is The Café, where the users are able to interact with each other playing some games (ludo and chess table). Furthermore, they can watch real events through the video streaming application. Finally, The Café is the place where the user can find out more about events and activities going on in 3rD-LIFE island. Additionally, there were several announcement boards providing information about on-going or coming-up events. "D" was the port and dock of the island, a place with no specific functionality besides the aesthetical one. This application was chosen to make the island more attractive for the end-users in the final trial. Finally, some roads can be found within the island. Their function is to connect the different areas in order to ensure some coherency within the island's areas and facilitate navigation. The rest of the island was a free space.

Figure 1: Map of 3rD-LIFE Island

Figure 1. 3rD-LIFE island bird's eye view.

In this first trials the following features of 3rD-LIFE were evaluated mainly regarding usability. Besides the usability evaluation of the developed tools and features for 3rD-LIFE the users evaluated the aesthetics of the environment and tools, and the technology acceptance was also addressed.

The study was carried out in 6 steps:

1. Introduction & Informed Consent

2. Pre-Interaction Interview

3. Evaluation based on the scenarios

a. Training Phase

b. Scenario 1

i. Questions

c. Scenario 2

i. Questions

d. Scenario 3

i. Questions

4. Post-Interaction Interview

5. Questionnaires

a. Questionnaire on System Usability

b. Questionnarie/s on Technology acceptance/ User Experience

6. Closing

2.1.2. GENERAL RESULTS

Sociodemographic data:

For these trials 54 end users were involved (17 Primary users in Spain and 10 in Austria; 17 Secondary users in Spain and 10 in Austria). Men and women were equally recruited. Regarding age, all Primary Users were above 65 and Secondary ones were around 30 as it is shown in the following illustrations.

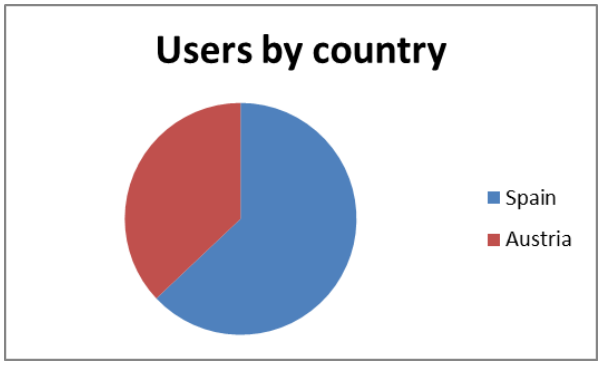

Figure 2: Users by country

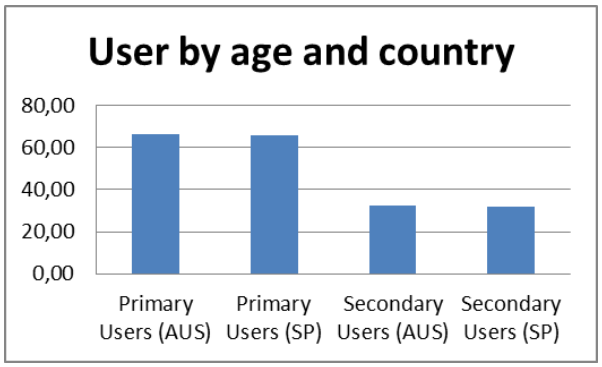

Figure 3: Users by age and country

Significant differences have been found between Spanish and Austrian Users regarding Perceived Usefulness ($p<0.05$) and Computer Anxiety ($p<0.05$).

Ranks

	Country	N	Mean Rank	Sum of Ranks
pu	Spain	34	31,71	1078,00
	Austria	20	20,35	407,00
	Total	54		
peou	Spain	34	24,66	838,50
	Austria	20	32,33	646,50
	Total	54		
cse	Spain	32	27,03	865,00
	Austria	18	22,78	410,00
	Total	50		
pec	Spain	34	25,79	877,00
	Austria	20	30,40	608,00
	Total	54		
cplay	Spain	32	26,30	841,50
	Austria	19	25,50	484,50
	Total	51		
canx	Spain	34	32,38	1101,00
	Austria	20	19,20	384,00
	Total	54		
enj	Spain	34	30,22	1027,50
	Austria	20	22,88	457,50
	Total	54		
bi	Spain	34	29,47	1002,00
	Austria	19	22,58	429,00
	Total	53		

Test Statistics[a]

	pu	peou	cse	pec	cplay	canx	enj	bi
Mann-Whitney U	197,000	243,500	239,000	282,000	294,500	174,000	247,500	239,000
Wilcoxon W	407,000	838,500	410,000	877,000	484,500	384,000	457,500	429,000
Z	-2,577	-1,749	-1,001	-1,052	-,189	-3,050	-1,693	-1,578
Asymp. Sig. (2-tailed)	,010	,080	,317	,293	,850	,002	,091	,115

a. Grouping Variable: Country

Figure 4: U-Man whitney between Spanish and Austrian End-users for TAM3

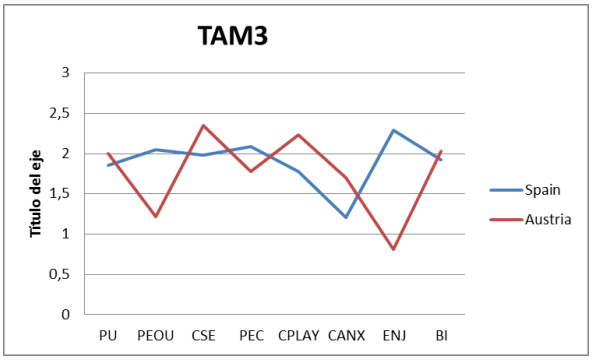

Figure 5: TAM 3 Scores for Spanish and Austrian End-users

No differences have been found between Primary and Secondary users in the TAM3 factors (p> 0.05). Results of both groups are almost overlapping.

Ranks

	Primary or Secondary User	N	Mean Rank	Sum of Ranks
pu	Primay	27	28,87	779,50
	Secondary	27	26,13	705,50
	Total	54		
peou	Primay	27	27,80	750,50
	Secondary	27	27,20	734,50
	Total	54		
cse	Primay	24	24,69	592,50
	Secondary	26	26,25	682,50
	Total	50		
pec	Primay	27	24,85	671,00
	Secondary	27	30,15	814,00
	Total	54		
cplay	Primay	26	24,02	624,50
	Secondary	25	28,06	701,50
	Total	51		
canx	Primay	27	30,59	826,00
	Secondary	27	24,41	659,00
	Total	54		
enj	Primay	27	26,63	719,00
	Secondary	27	28,37	766,00
	Total	54		
bi	Primay	27	27,19	734,00
	Secondary	26	26,81	697,00
	Total	53		

Test Statistics[a]

	pu	peou	cse	pec	cplay	canx	enj	bi
Mann-Whitney U	327,500	356,500	292,500	293,000	273,500	281,000	341,000	346,000
Wilcoxon W	705,500	734,500	592,500	671,000	624,500	659,000	719,000	697,000
Z	-,644	-,140	-,383	-1,253	-,993	-1,482	-,415	-,090
Asymp. Sig. (2-tailed)	,520	,889	,702	,210	,321	,138	,678	,928

a. Grouping Variable: Primary or Secondary User

Figure 6: U Man whitney for TAM3 between Primary and Secondary End-users

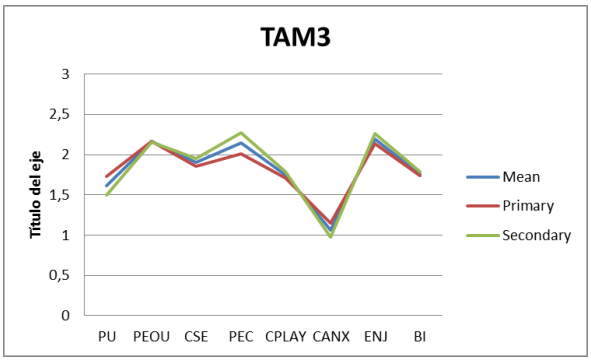

Figure 7: TAM 3 Scores for Primary and Secondary End-users

When comparing Spanish and Austrian Primary Users, no significant differences have been found but for anxiety being the Spanish ones who have a higher score.

Ranks

	Type of user	N	Mean Rank	Sum of Ranks
pu	Primary Users (Spain)	17	14,91	253,50
	Primary Users (Austria)	10	12,45	124,50
	Total	27		
peou	Primary Users (Spain)	17	12,29	209,00
	Primary Users (Austria)	10	16,90	169,00
	Total	27		
cse	Primary Users (Spain)	15	14,47	217,00
	Primary Users (Austria)	9	9,22	83,00
	Total	24		
pec	Primary Users (Spain)	17	14,03	238,50
	Primary Users (Austria)	10	13,95	139,50
	Total	27		
cplay	Primary Users (Spain)	16	14,56	233,00
	Primary Users (Austria)	10	11,80	118,00
	Total	26		
canx	Primary Users (Spain)	17	17,00	289,00
	Primary Users (Austria)	10	8,90	89,00
	Total	27		
enj	Primary Users (Spain)	17	14,24	242,00
	Primary Users (Austria)	10	13,60	136,00
	Total	27		
bi	Primary Users (Spain)	17	14,47	246,00
	Primary Users (Austria)	10	13,20	132,00
	Total	27		

Test Statistics[b]

	pu	peou	cse	pec	cplay	canx	enj	bi
Mann-Whitney U	69,500	56,000	38,000	84,500	63,000	34,000	81,000	77,000
Wilcoxon W	124,500	209,000	83,000	139,500	118,000	89,000	136,000	132,000
Z	-,786	-1,477	-1,780	-,025	-,919	-2,605	-,206	-,407
Asymp. Sig. (2-tailed)	,432	,140	,075	,980	,358	,009	,837	,684
Exact Sig. [2*(1-tailed Sig.)]	,443[a]	,155[a]	,084[a]	,980[a]	,391[a]	,009[a]	,863[a]	,711[a]

a. Not corrected for ties.

b. Grouping Variable: Type of user

Figure 8: U Man whitney between Spanish and Austrian Primary Users for TAM 3

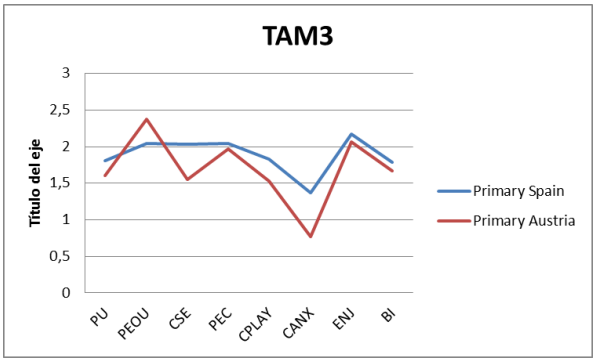

Figure 9: TAM 3 Scores for Spanish and Austrian Primary Users

Regarding Secondary Users, Spanish ones enjoy it significantly more than Austrian ones and find it more useful ($p<0.05$). Even if Spanish Secondary users are more likely to use or buy it than Austrian ones, this differences in not statistically significant ($p=0.066$).

Ranks

	Type of user	N	Mean Rank	Sum of Ranks
pu	Secondary Users (Spain)	17	16,94	288,00
	Secondary Users (Austria)	10	9,00	90,00
	Total	27		
peou	Secondary Users (Spain)	17	12,82	218,00
	Secondary Users (Austria)	10	16,00	160,00
	Total	27		
cse	Secondary Users (Spain)	17	13,06	222,00
	Secondary Users (Austria)	9	14,33	129,00
	Total	26		
pec	Secondary Users (Spain)	17	12,26	208,50
	Secondary Users (Austria)	10	16,95	169,50
	Total	27		
cplay	Secondary Users (Spain)	16	11,81	189,00
	Secondary Users (Austria)	9	15,11	136,00
	Total	25		
canx	Secondary Users (Spain)	17	15,94	271,00
	Secondary Users (Austria)	10	10,70	107,00
	Total	27		
enj	Secondary Users (Spain)	17	16,41	279,00
	Secondary Users (Austria)	10	9,90	99,00
	Total	27		
bi	Secondary Users (Spain)	17	15,50	263,50
	Secondary Users (Austria)	9	9,72	87,50
	Total	26		

Test Statistics[b]

	pu	peou	cse	pec	cplay	canx	enj	bi
Mann-Whitney U	35,000	65,000	69,000	55,500	53,000	52,000	44,000	42,500
Wilcoxon W	90,000	218,000	222,000	208,500	189,000	107,000	99,000	87,500
Z	-2,535	-1,015	-,408	-1,505	-1,105	-1,749	-2,097	-1,866
Asymp. Sig. (2-tailed)	,011	,310	,683	,132	,269	,080	,036	,062
Exact Sig. [2*(1-tailed Sig.)]	,011[a]	,334[a]	,711[a]	,141[a]	,301[a]	,103[a]	,040[a]	,066[a]

a. Not corrected for ties.

b. Grouping Variable: Type of user

Figure 10: U Man whitney between Spanish and Austrian Secondary End-users for TAM 3

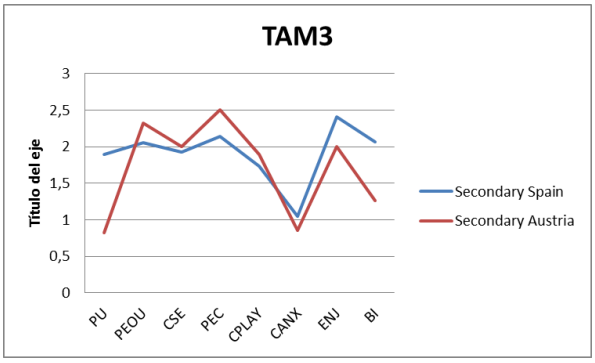

Figure 11: TAM 3 Scores for Spanish and Austrian Secondary users

No differences have been found between Spanish Primary and Secondary Users in any of the factors (p>0.05).

Ranks

	Type of user	N	Mean Rank	Sum of Ranks
pu	Primary Users (Spain)	17	17,12	291,00
	Secondary Users (Spain)	17	17,88	304,00
	Total	34		
peou	Primary Users (Spain)	17	17,47	297,00
	Secondary Users (Spain)	17	17,53	298,00
	Total	34		
cse	Primary Users (Spain)	15	17,57	263,50
	Secondary Users (Spain)	17	15,56	264,50
	Total	32		
pec	Primary Users (Spain)	17	16,76	285,00
	Secondary Users (Spain)	17	18,24	310,00
	Total	34		
cplay	Primary Users (Spain)	16	16,63	266,00
	Secondary Users (Spain)	16	16,38	262,00
	Total	32		
canx	Primary Users (Spain)	17	20,50	348,50
	Secondary Users (Spain)	17	14,50	246,50
	Total	34		
enj	Primary Users (Spain)	17	15,56	264,50
	Secondary Users (Spain)	17	19,44	330,50
	Total	34		
bi	Primary Users (Spain)	17	17,00	289,00
	Secondary Users (Spain)	17	18,00	306,00
	Total	34		

Test Statistics[b]

	pu	peou	cse	pec	cplay	canx	enj	bi
Mann-Whitney U	138,000	144,000	111,500	132,000	126,000	93,500	111,500	136,000
Wilcoxon W	291,000	297,000	264,500	285,000	262,000	246,500	264,500	289,000
Z	-,226	-,017	-,611	-,437	-,077	-1,785	-1,171	-,298
Asymp. Sig. (2-tailed)	,821	,986	,541	,662	,939	,074	,242	,766
Exact Sig. [2*(1-tailed Sig.)]	,838[a]	1,000[a]	,551[a]	,683[a]	,956[a]	,079[a]	,259[a]	,786[a]

a. Not corrected for ties.

b. Grouping Variable: Type of user

Figure 12: U Man whitney between Spanish Primary and Secondary End-users for TAM 3

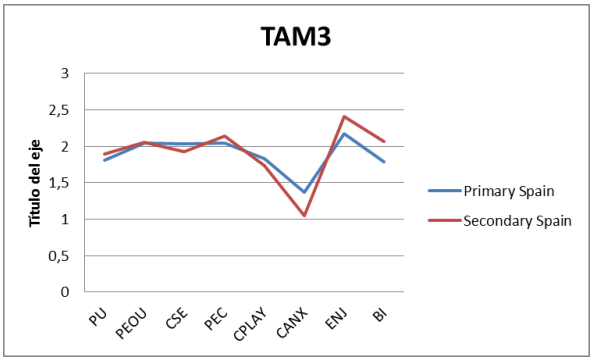

Figure 13: TAM 3 Scores for Spanish Primary and Secondary End-users

Same result is found when comparing Austrian Primary and Secondary users ($p>0.05$).

Ranks

	Type of user	N	Mean Rank	Sum of Ranks
pu	Primary Users (Austria)	10	12,90	129,00
	Secondary Users (Austria)	10	8,10	81,00
	Total	20		
peou	Primary Users (Austria)	10	10,80	108,00
	Secondary Users (Austria)	10	10,20	102,00
	Total	20		
cse	Primary Users (Austria)	9	7,89	71,00
	Secondary Users (Austria)	9	11,11	100,00
	Total	18		
pec	Primary Users (Austria)	10	8,70	87,00
	Secondary Users (Austria)	10	12,30	123,00
	Total	20		
cplay	Primary Users (Austria)	10	8,00	80,00
	Secondary Users (Austria)	9	12,22	110,00
	Total	19		
canx	Primary Users (Austria)	10	10,85	108,50
	Secondary Users (Austria)	10	10,15	101,50
	Total	20		
enj	Primary Users (Austria)	10	11,50	115,00
	Secondary Users (Austria)	10	9,50	95,00
	Total	20		
bi	Primary Users (Austria)	10	11,05	110,50
	Secondary Users (Austria)	9	8,83	79,50
	Total	19		

Test Statistics[b]

	pu	peou	cse	pec	cplay	canx	enj	bi
Mann-Whitney U	26,000	47,000	26,000	32,000	25,000	46,500	40,000	34,500
Wilcoxon W	81,000	102,000	71,000	87,000	80,000	101,500	95,000	79,500
Z	-1,836	-,231	-1,294	-1,389	-1,678	-,286	-,767	-,868
Asymp. Sig. (2-tailed)	,066	,818	,196	,165	,093	,775	,443	,385
Exact Sig. [2*(1-tailed Sig.)]	,075[a]	,853[a]	,222[a]	,190[a]	,113[a]	,796[a]	,481[a]	,400[a]

a. Not corrected for ties.

b. Grouping Variable: Type of user

Figure 14: U Man whitney between Austrian Primary and Secondary End-users for TAM 3

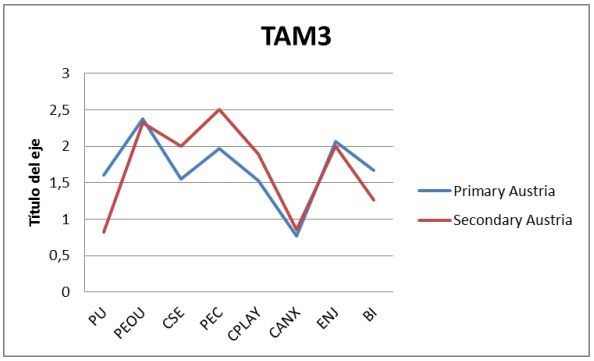

Figure 15: TAM 3 Scores for Austrian Primary and Secondary End-users

As this platform has to be attractive for older people, there was a strong agreement among the members of the consortium about the easiness to use it. Because of that, the use of the virtual Island as well as the navigation of the avatar has to be easy. Therefore, the learning process for the use of that technology should not require too much mental effort. . As a consequence, the ability to learn how to perform different tasks was measured. Participants were instructed to perform similar tasks at different moments during the trial. On each attempt their task performance was measured by the assisting person from 0=no difficulties to perform the task; 1=some difficulties, but does not need help to perform the task; 2=needs help to perform this task, but is able to do it and 3=the user is not able to perform the task. Once the trial was finished, learning ability was calculated in two different

ways in order to corroborate the results. For the first one, the scores of each variable were placed in temporal order. After that, the equation of the trend lines of the four groups were calculated in order to know if they showed an increasing or decreasing difficulty trend. Finally the slopes of these lines were calculated and compared

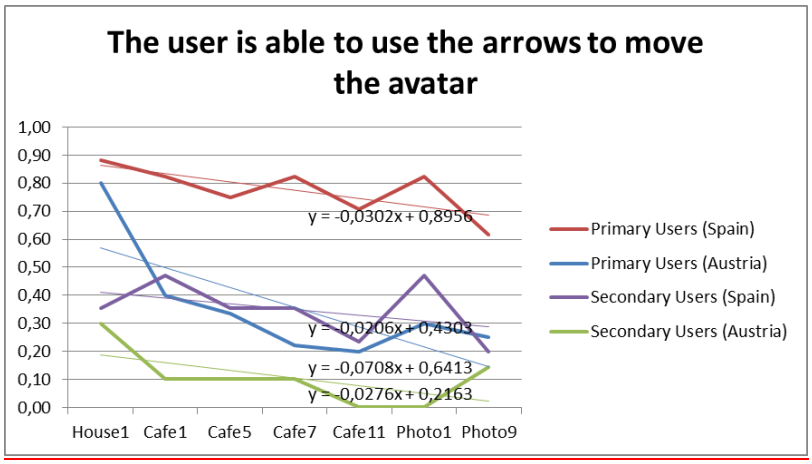

Figure 16: Example of the trend lines and equations calculated for learning ability

The second method started, as in the previous case, placing the scores of each variable in temporal order. After that, (first score + second score) – (third score + 4th score) was calculated. If the result was positive, it meant that they had learned to perform the task. If the result is negative or zero, they had not been able to learn how to perform the task.

In both cases the results were the same. As a consequence, Mobility Learning, General Orientation Learning, Zooming Learning, Orientation to the Teleports Learning, Teleporting Learning and Minimizing Screen Learning variables were created. These variables ranged from -3 to 3. A positive score means that they have learned along the test; on the contrary, a negative score means that have not been able to learn a specific issue. The purpose of these variables were to know whether the usage of the platform required a long learning process, and therefore the end user would desist from using it, or if, on the contrary, it requires little training to use.

After 50 minutes of usage their learning ability was measured. They obtained positive scores in Mobility Learning (▪=0,30, sd=1,15), General Orientation Learning (▪=0,23, sd=0,88); Zooming Learning (▪=0,32, sd=1,06), Teleport Learning (▪=0,19, sd=0,70) and Minimize Learning (▪=0,61, sd=1,20). The only negative score was found on Orientation to the Teleports Learning (▪=-0,12, sd= 0,97). Significant differences have been found between the four groups on Zooming Learning (p≤ ,05) and Minimizing Learning (p≤ ,01). Interestingly, same results were found when comparing Spanish and Austrian end users. Significant differences were found between on Zooming learning (p≤ ,01) and Minimizing Learning (p≤ ,01). Not significant differences were found between Primary and Secondary users in any of the learning ability variables. All the illustrations are shown below.

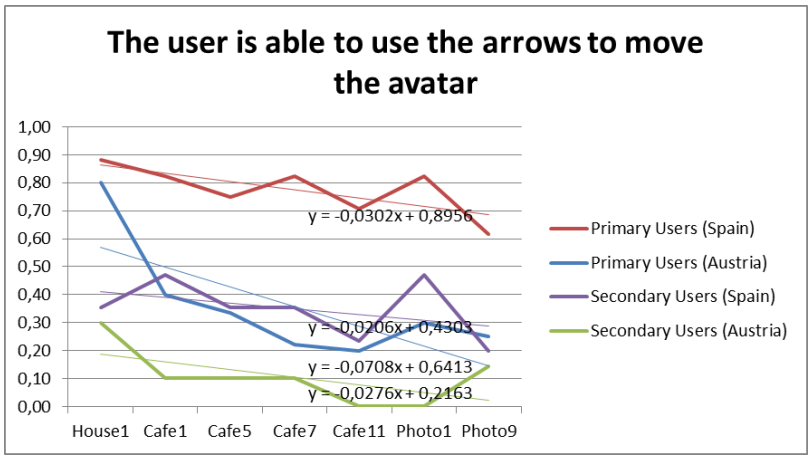

Figure 17: Learning ability trend lines and equations to move the avatar with the arrows

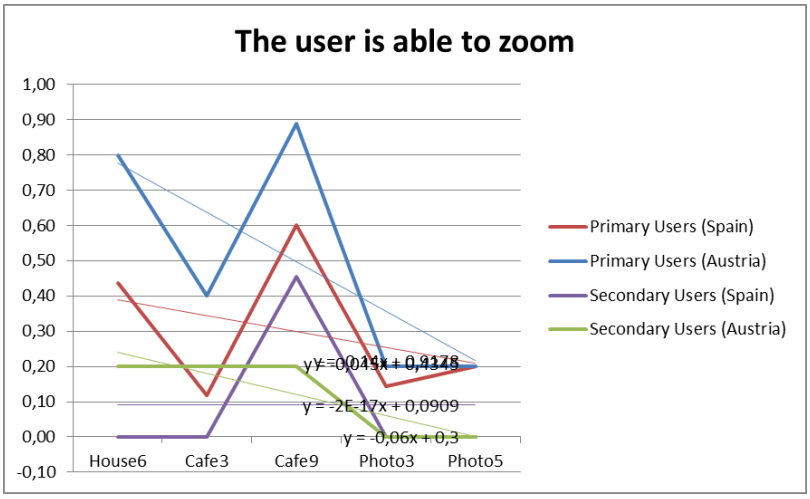

Figure 18: Trend lines and equations for zooming

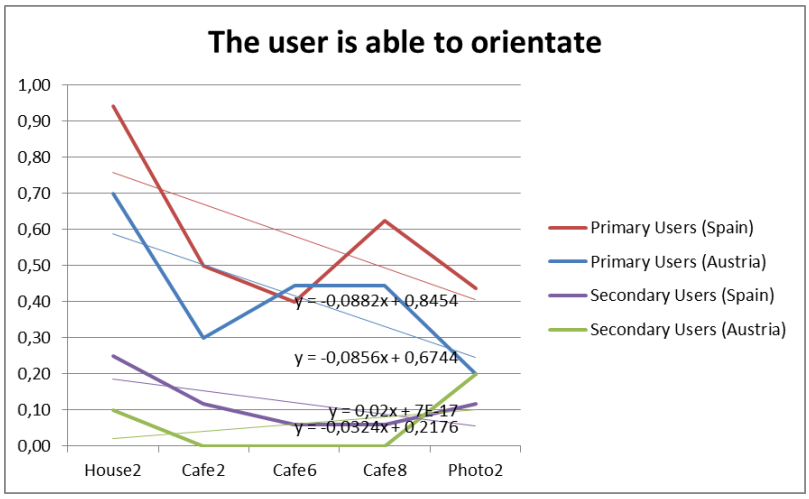

Figure 19: Trend lines and equations about orientation

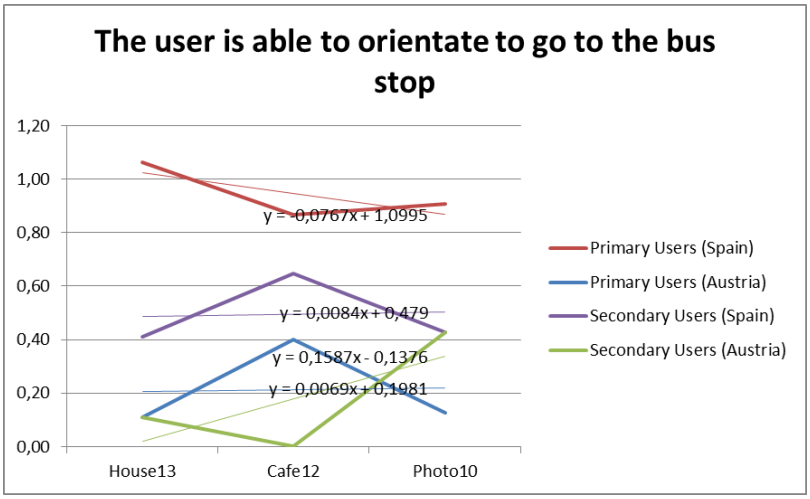

Figure 20: Trend lines and equations for orientation to the bus stops

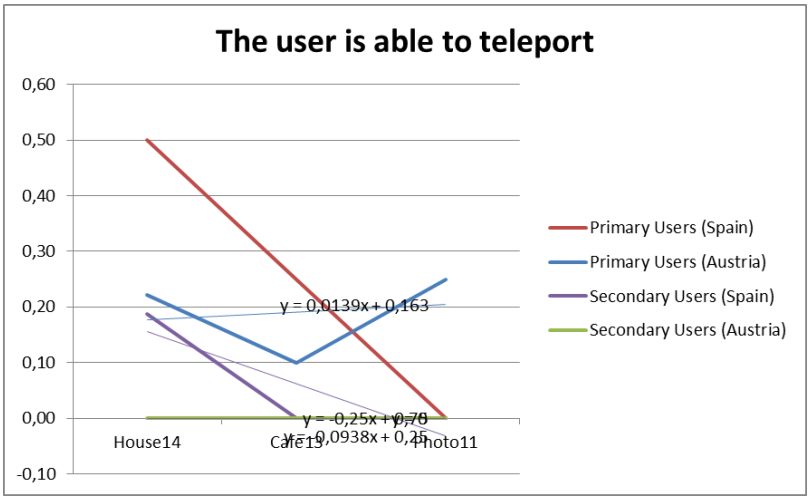

Figure 21: Trend lines and equations to teleport

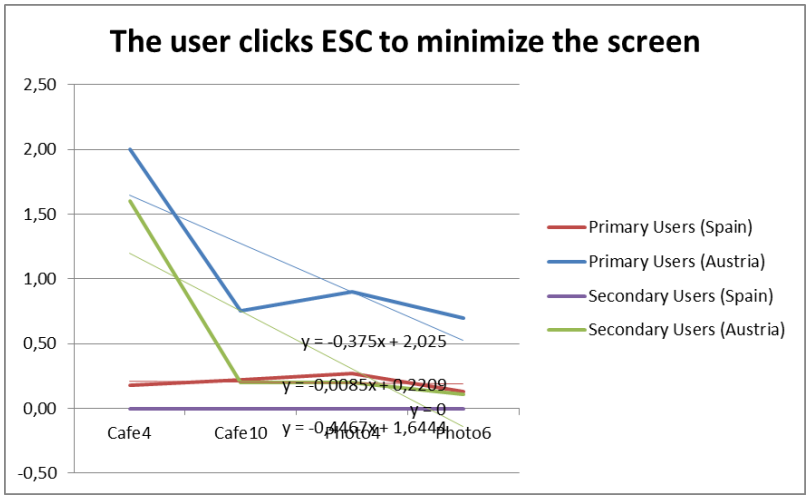

Figure 22: Trend lines and equations to minimize the screen

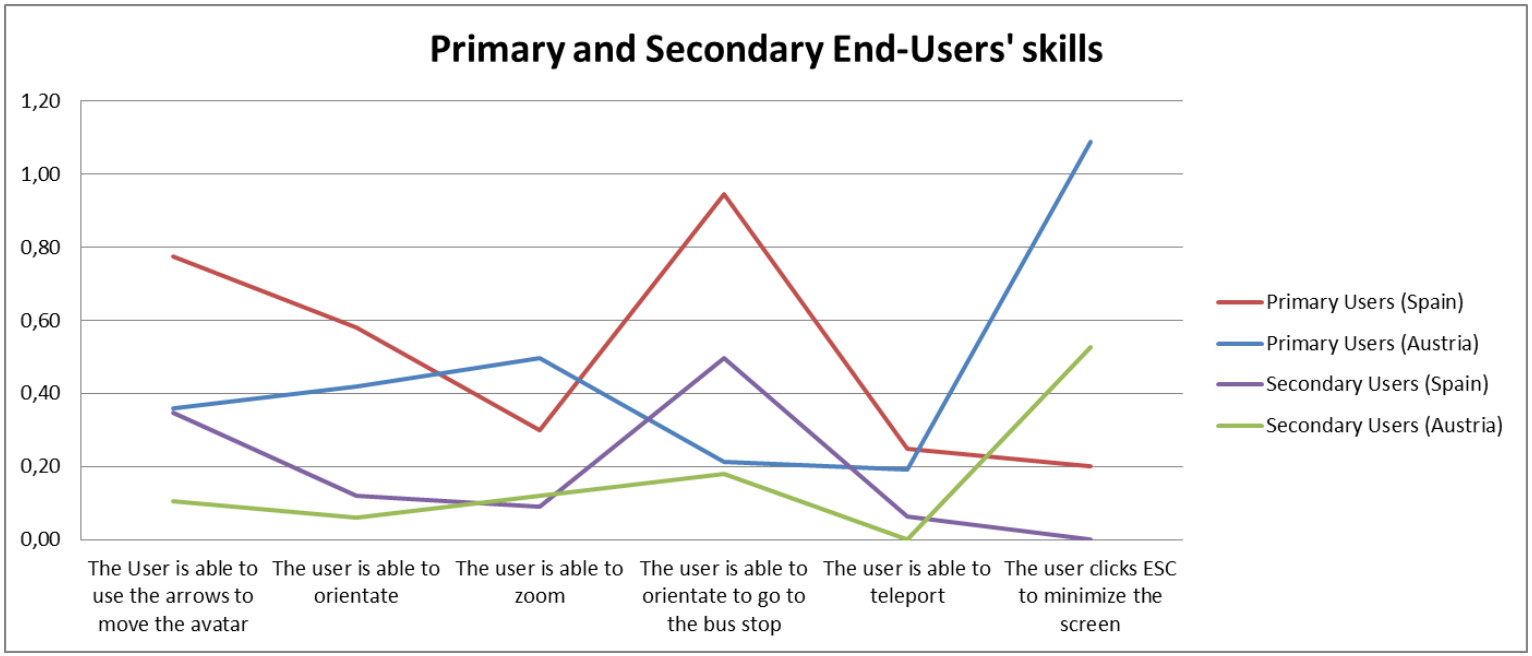

Figure 23: Scores for Primary and Secondary users' skills

Different studies have shown the importance of having a tool that is easy to learn. In a recent literature review it has been found that when an ICT tool is difficult to learn, people refuse to use it (Broady et al) so the developed tool fails to fulfil the purpose it was created for. In this project we have based the development of 3rD-LIFE on the UCD, with the intention to create a tool adapted to the needs of elderly people. On the one hand, results show that the mean of all the variables related to Learning is below 1. with a range from -3 to 3(0 means no learning). This indicates that the operation of the 3rD-Life tool still might too difficult for elderly people. On the other hand, it has been shown that the range of difficulty goes from 0 to 3 (0=no difficulties and 3=impossible to do) and the mean of all the variables related to difficulty range from 0 to 1,09. This means that they have not found many difficulties to develop the entire proposed task on the trial. Is this a contradiction? On the contrary.

Let's suppose that the mean of learning the task "A" is equal 3(no one has been able to complete the task) and at the end the mean is equal 0. In this case the learning span improves about three points of the scale. Users increase their performance because from the beginning until the end of the task. But what happens if the tool is easy to use from the beginning? Let's suppose that most of them do not have many difficulties (mean score =1) at the beginning, but at the end their mean is equal 0. In this case the learning span wouldimprove about 0.5 pionts of the scale. . In this example, who is learning more? There is no doubt that in the first example participants learn more. But what situation is more desirable for the end user? From our point of view, the second option is more interesting.

Taking into account all the data presented, we conclude that the tool is rather easy to learn regarding erlely users. to use that making the learning process easier is not necessary.

The tasks with higher learning ability scores are minimizing, zooming and navigation of the avatar. This implies that these aspects should be taken into a closer consideration with respect to future work on the 3^{rD}-Life platform. Regarding zooming and minimizing the screen, we understand that are two parts of the same action. Because of that a better solution has to be found in order to facilitate these aspects to the end users. Perhaps it could be solved by adding new options for zooming in and out to the ones that are used now. With respect to navigation, it is big challenge to find/create a good device that elderly people could use to interact with their friends and relatives by the use of 3rD-LIFE.

2.2. MULTI-USER TRIAL

2.2.1. INTRODUCTION

At the very beginning of the 3rD-LIFE project, individual interviews and focus groups were carried out in Spain and Austria in order to know which were the preferences, likes and knowledge regarding the use of technology. Both Primary and Secondary Users took part in the interviews and the focus groups. Based on the results, the areas of the Island were established and the different functionalities developed. The next step was to carry out the first user trials. The main objectives of the first trial were to evaluate the first version of the island regarding usability and to have a feedback of the primary and secondary users regarding the functionalities, design etc. of the Island. This way, the consortium would be able to improve the first version of the Island and to have a product aimed at older people. For that purpose, a booklet was written were all the trials were explained and the data to be recorded was specified. Both quantitative and qualitative data were recorded and analysed.

Based on the analysis of the data of the first trials, it was decided to develop a second trial more centred on the interaction between end users. For this trial, 6 end users and 2 guides were involved. Users were recruited and equally tested in Spain and in Austria.

The multi user trial was subdivided in 4 phases:

- Phase 1: Getting trained.
- Phase 2: Interaction with people of the same country.
- Phase 3: Interaction with people of a different country.
- Phase 4: Moving freely in the island.

In the following pages the methodology, technical setup and the scenarios are described.

2.2.2. PURPOSE AND METHODOLOGY

The objective of this trial was to evaluate the interaction between the users in 3rD-LIFE Island. First of all the purpose of the trial was explained again (it was already explained when we contacted them) and the inform consent were signed.

There were 8 people participating in the trial. Six Primary Users were recruited in order to analyse the interaction between them:

- 3 from Spain
- 3 from Austria

The 6 Primary Users will participate in a 4 phase trial described in the Scenarios section. Besides those 6 Primary Users, there were 2 more persons that acted as a guide:

- 1 in Spain
- 1 in Austria

The people acting as guide had different functions such as:

- Guide Primary Users during the trial.
- Act as camera man to record the trial.
- Act as translator in case Primary users of different countries are not able to understand each other due to the lack of a common language.

Each participant was situated in a separated room, so the only way they could get in touch was by the use of the platform. In the next figure a illustration can be seen.

Room 1	Room 2	Room 3	Room 4
Computer 1	Computer 2	Computer 3	Computer 4
PU* 1	PU 2	PU 3	GUIDE 1
Participants in Spain			

Room 5	Room 6	Room 7	Room 8
Computer 5	Computer 6	Computer 7	Computer 8
PU 4	PU 5	PU 6	GUIDE 2
Participants in Austria			

*PU= Primary User

Questionnaire

Pre-interview

- Pre1: Age?
- Pre2: Sex?
- Pre3: Profession?
- Pre4: How often do you use a computer? (every day, once a week, once a month, less often, never)
- Pre5: How often do you use the internet? (every day, once a week, once a month, less often, never)
- Pre6: Do you use social networks? Yes/No. How often? (every day, once a week, once a month, less often, never)
- Pre7: How satisfied are you with currently existing social networks? (very satisfied, satisfied, not satisfied, not satisfied at all)
- Pre8: Why?

Post-interview

- Post1: Regarding the 3rD-Life system, could you please give me 3 positive aspects?
- Post2: Regarding the 3rD-Life system, could you please give me 3 negative aspects?
- Post3: How do you rate the clarity of the system? (very good, good, bad, very bad)
- Post4: How do you rate the graphic design of the system? (very good, good, bad, very bad)
- Post5: In the beginning of the trial, you have chosen an old-/young-looking character. Can you explain that decision? Would you prefer an avatar that looks similar to you or one that looks differently?
- Post6.1 Which of these avatars (show the images) would you like to use 3rD-LIFE (Choose the 3 that you like more and rate them (1 the one they prefer,2 the second one,3 the third one).
- Post 6.2 Which are the ones you do not like (choose the 3 you like less)
- Post7: Comparing text chat and audio chat, which of these communication features do you prefer? What are their pros and cons?
- Post8: How do you rate the quality of the audio communication? (very good, good, bad, very bad)
- Post9: Did you have the chance to try the automatic translation function? Did it help you to communicate with other exhibition visitors?
- Post10: Rate how the translation function helped you to communicate with people who speak a different language. (very well, well, bad, very bad)
- Post11: Do you have any suggestions for improvement?
- Post12: If you would have the chance, would you use 3rD-Life to communicate with other people? Why?
- Post13: Compared to traditional means of communication (e.g. telephone, email, skype), do you see what are the positive aspects when meeting other people in a virtual world? Are there negative aspects as well?
- Post14: Are you willing to pay for this service? If yes, how much would you be willing to pay for this service?
- Post 15: When you were at the exhibition area there were more people. Did the conversations of the others disturb you? Were you able to have a conversation even if there were more people speaking there?
- Post 16: There were more people chatting at the same time. Was it difficult to maintain a conversation when there were more people chatting?

- Questionnaire: TAM3

Avatars

1 

2 

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19  20 

2.2.3. SCENARIOS

All the participants took part in a 4 phase trial:

- ✓ Phase 1: **Getting trained.** As they are not used to interact with other people by the use of this platform, the first step will be to train them with some basic rules regarding interaction:

  "In 3rD-LIFE Island you are represented as an avatar. Here you can see your avatar. In order to move the avatar through the island you will use the arrows. You must use "up arrow" to walk forward; "down arrow" to walk backward; "right arrow" to turn to the right; and "left arrow" to turn to the left. Furthermore, if you press twice the arrows the avatar will run. You can press the direction arrows (right or left) simultaneously with the "impulse" arrows (up and down arrows). In this way the avatar will turn and move at the same time.

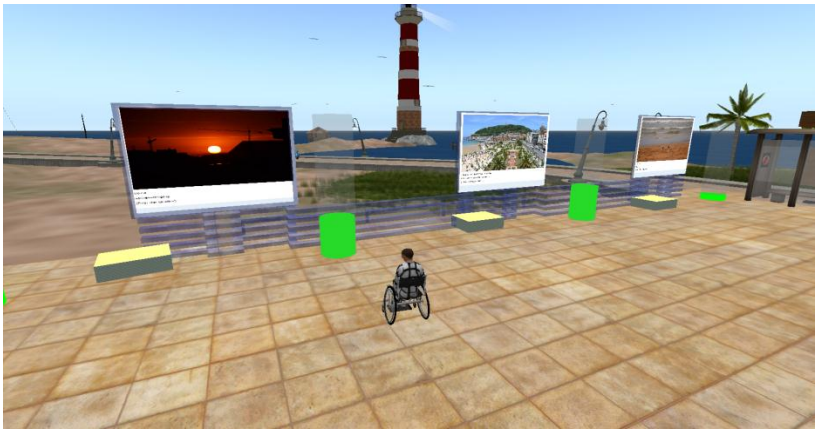
  Regarding the interaction with the 3D objects, you must use the mouse to direct the view of the avatar. If you move the mouse, you will see how the avatar moves his head towards the mouse cursor. By clicking with the mouse you can interact with the objects. When an object is susceptible to be interacted, the cursor will change (for example to a chair if you can sit your avatar in the object). When this happens, you have to press the left button if you want to interact with the object selected. Another

possibility is to press the right button when the cursor will be on the object, a list of possible options will appear, and select the option you want".

"When using the voice chat function (can be activated by the middle button of the mouse) it's important not to speak at the same time with other avatars nearby in order to understand the others."

After some minutes of independent hands-on experience, the participants will be introduced to the next phases of the trial.

- ✓ Phase 2: **Interaction with people of the same country.** The objective of this phase was to have a first interaction experience. As this was the first time that they were going to be in touch with other people from the same user group on the island, they kept in touch with people that speak the same language. To facilitate the interaction, a photo exhibition called "Landscapes" had been created at the exhibition area. This exhibition was divided in two separate areas:
  - Landscapes from Donostia – San Sebastián
  - Landscapes from Vienna
- ✓ A total of 8 landscapes (4 from Donostia – San Sebastían and 4 from Vienna) was shown at the exhibition area. People from Donostia – San Sebastián visited the Donostia – San Sebastián landscapes exhibition while people from Vienna visited the Vienna landscapes exhibition. Primary users could talk about the photos. In this phase the guide of each country took care of the Primary users of his country.



- ✓ Phase 3: **Interaction with people of a different country.** In this step the participants were advised to follow their guide to meet the exhibition visitors of the other country. Together the group (Spanish and Austrian users) were shown around the exhibition and told about the different photos by the guides. After that, people from different countries could chat with each other by the use of a translator. The guides tried to initiate a discussion between the participants by letting them ask questions concerning the photos.

  The objective of this phase was to evaluate the way primary users interact when people are present that speak a different language. In this case, if Primary Users could not understand each other, the guides of each country acted as translators in case of need.

- ✓ Phase 4: **Moving freely in the island.** The objective of this phase was to let the Primary Users move and interact as they want. The guides still were present to act as observers and translators.

- ✓ Post-experience interview

Half of the participants were from Spain and the other half from Austria, being with more men than women. The age averageaverage of age of for Spanish users is was 69 and for the Austrians ones 68 years. All of them useed the computer daily, and most of them use the internet every day, but most of them don´t use social networks

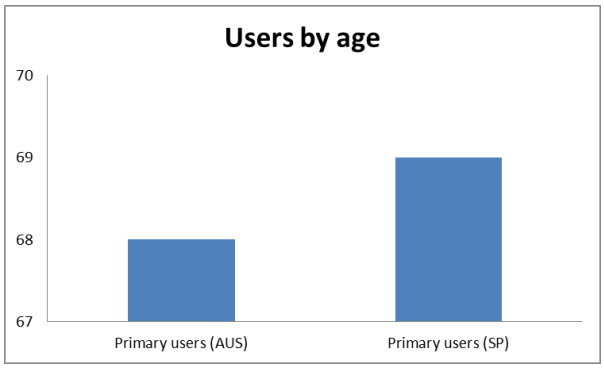


Figure 24: Users by age

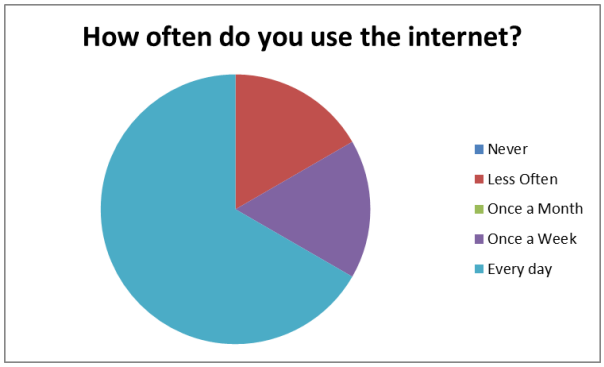


Figure 25: Internet usage

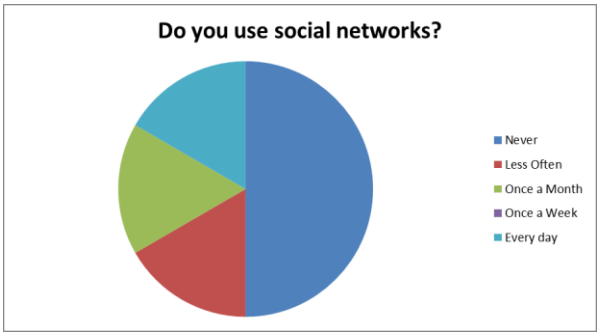


Figure 26: Social networks usage

Regarding the participants' perception of the Island, they think that the graphic design is very good or good and they rate the clarity of the system as very good or good.

There is not a consensus regarding their preferences about the avatars. As it can be seen in the next illustrations, almost the same avatars appear as the first choice of the more liked avatar and the first choice as more disliked avatar.

First choice more liked

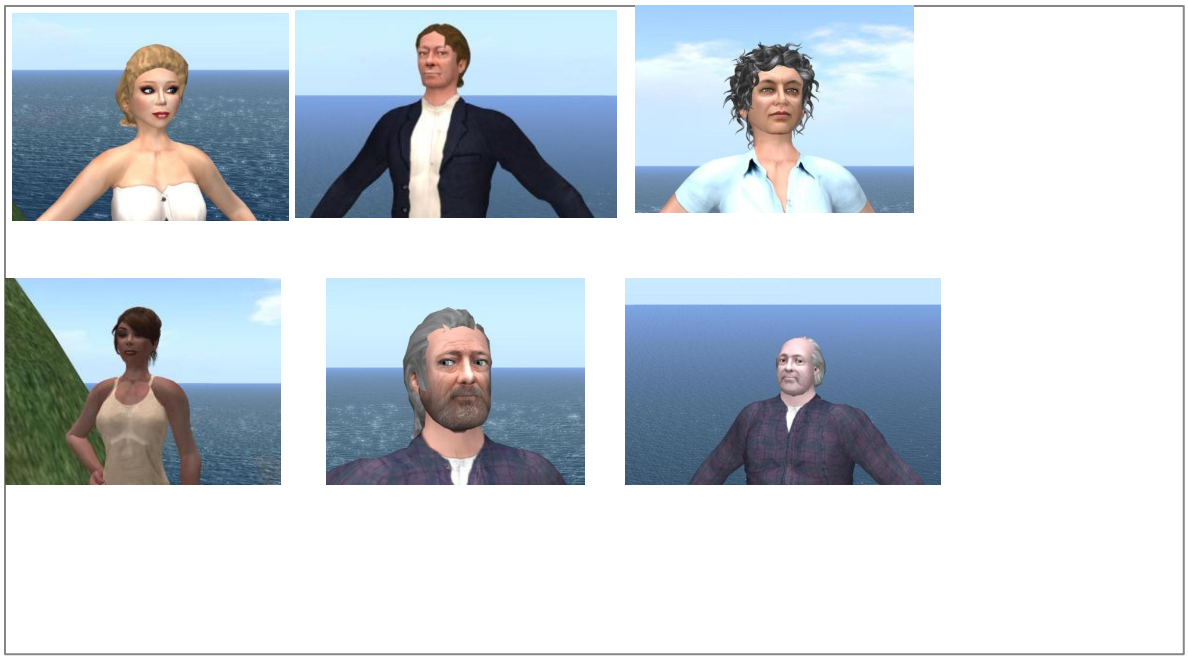


Figure 27: More liked avatars

First choice more disliked

Figure 28: More disliked avatars

The same result is found when we counted the votes that each avatar received as more liked and more disliked. Almost the same avatars appear in both of them.

More liked

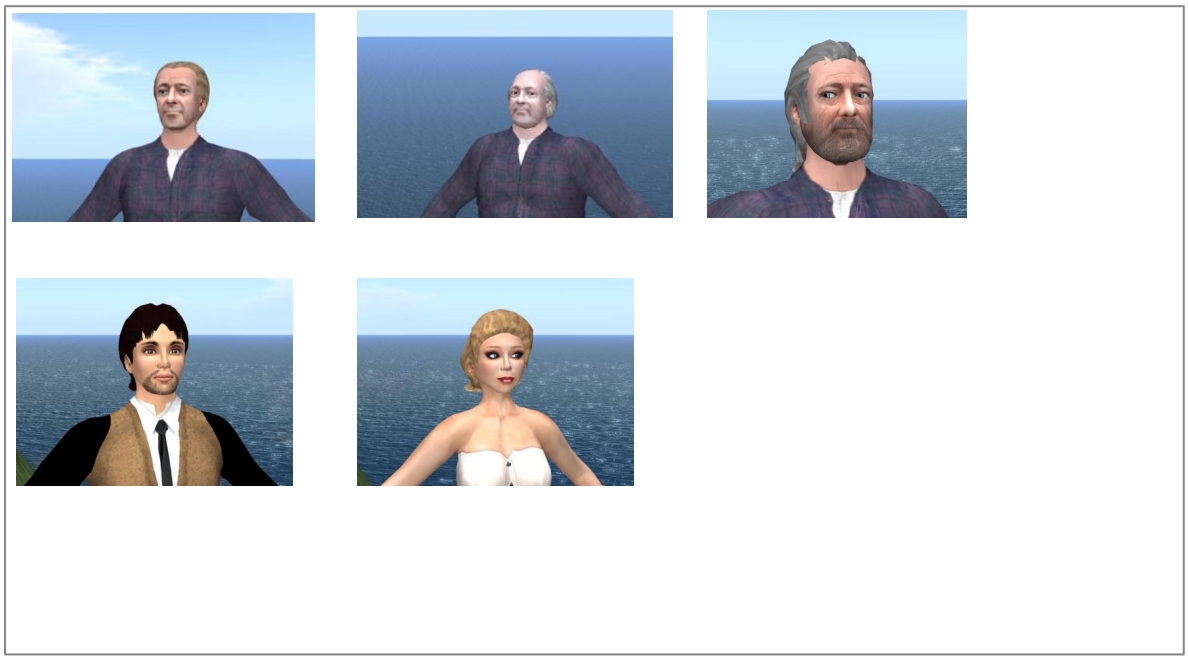


Figure 29: More liked avatars

More disliked

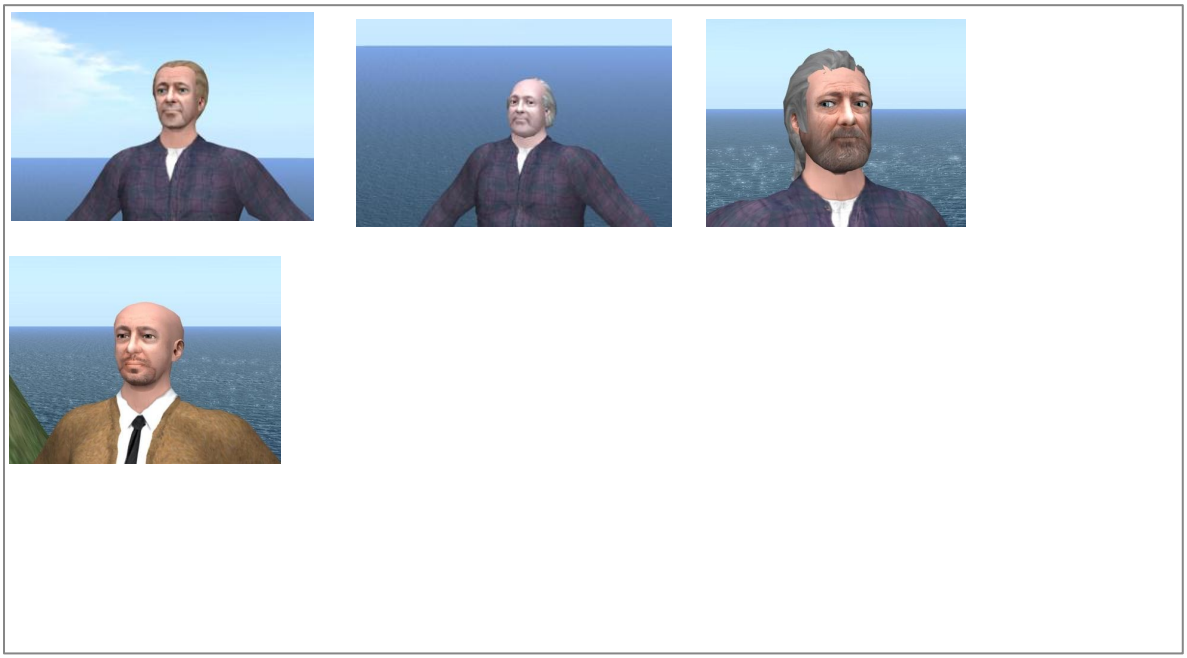


Figure 30: More disliked avatars

As there were only 3 people in each group, these data shouldn't be used as a reference in order to compare Spanish and Austrian Primary Users. Nevertheless, we include this illustration just in order to show the scores they obtained in each of the TAM 3 factors.

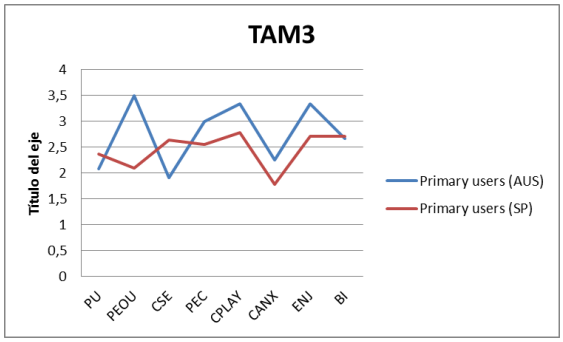


Figure 31: ratings of the TAM3 for both nationalities

Apart from all the statistical data, it has to be mentioned that all the members of the consortium were very surprised about the success of the trial. People from San Sebastian and Vienna spent about an hour talking. As the half of the photos were from San Sebastian and the other half from Vienna, end-users from San Sebastian were explaining to the ones from Vienna were the photos were taken and a little bit of the history of the place; the same happened with end-users from Vienna who spoke about many thing from Vienna that were very interesting to learn. Even if there was a person to translate, end-users began to talk to each other and researchers from INGEMA and CURE become observers with no option to speak, because end-users were speaking all the time.

It was a fantastic experience for all of us.

2.1. END-USER DEVICE TRIAL

2.1.1. INTRODUCTION

Based on the analysis of the data of the first trials, it was decided to develop a second trial more centred on the interaction between end users. For this trial, 11 end users and 5 guides were involved. The results showed that usingarrows and mouse for navigation were rather difficult interact with the system. In order to solve this problem, I&IMS and O2t developed two different devices for system interaction. The touch screen developed by I&IMS can be seen in **¡Error! No se encuentra el origen de la referencia.**.

Figure 32: Touch screen application

O2t has developed software that can be installed in any android device in order to interact with the system (see Figure 33).

Figure 33: Smartphone device for interaction

In this trial the focus will be on the comparison between the use of the three devices: smartphone, touch screen and keyboard (all three combined with mouse input for the interaction with objects) by older users. The main aim is to find out which of these three devices suits best for older people as end users.

In the following pages the methodology, technical setup and the scenarios are described.

2.1.2. EVALUATION AND METHODOLOGY

To evaluate the usability of the three devices the participants were instructed to navigate their avatar through the virtual world of 3rD-LIFE in order to complete three tasks:

a) enter into a house and sit down

b) walk from house to the exhibition area

c) zoom in and out of a picture in the exhibition area.

To avoid any task-sequence-bias the tasks were provided in an alternately order: a)-b)-c) or c)-b)-a).

As an objective measurement of the interaction with the different devices the completion time of each task was recorded. Comparisons were drawn between task completion times of each participantwhen using the tablet, touch screen or keyboard/mouse. Short times indicate better usability of the device.

In addition to the time measurement different questionnaires referring to the user experience and emotional involvement were provided to gain meaningful insights about the interaction with the different devices. The trail included three scenarios where the user has to perform a task with his avatar by using the respective device. The first scenario tookplace in the house of the avatar. The second scenario was the walk from the house to the exhibition area (or vice-versa). The third scenario took place at the exhibition area.

The study was carried out in 6 steps:

1. Introduction & Informed Consent (5 Min)

2. Pre-interview (10 Min)

3. Evaluation based on the scenarios (45 min)

a. Training Phase

b. Task 1(open door and sit down)

    i. Questions & Questionnaires (UMUX & SMEQ)

c. Task 2 (navigate)

    i. Questions & Questionnaires (UMUX & SMEQ)

d. Task3 (zooming)

    i. Questions & Questionnaires (UMUX & SMEQ)

4. Post-Interaction Interview (10 Min)

5. Questionnaires (10 min)

    i. TAM

6. Closing

There were be 11 people participating in the trial. Five Primary Users and six Secondary Users:

- 2 Primary Users from Spain
- 3 Secondary Users from Spain
- 3 Primary Users from Austria
- 3 Secondary Users from Austria

For the evaluation process the following devices were applied: • Arrows and mouse

- Touch screen (developed by I&IMS) and mouse
- Tablet (developed by O2t) and mouse

End-users will do a similar trial with the 3 different devices (i.e. all three tasks have to be performed with all three devices). In order to avoid the effect of the order the applied devices were tested in a different order. The starting point was also randomly changed as it can be seen in the following table:

Table 1: study-design

Participant	1st Device and starting point	2nd Device and starting point	3rd Device and starting point
Primary User 1 (Spain)	Tablet / House	Touch Screen / Exhibit. area	Arrows / House
Primary User 2 (Spain)	Arrows / Exhibit. area	Tablet / House	Touch Screen / Exhibit. area
Primary User 3 (Spain)	Touch Screen / House	Arrows / Exhibit. area	Tablet / House
Secondary User 1 (Spain)	Arrows / Exhibit. area	Touch Screen / House	Tablet / Exhibit. area
Secondary User 2 (Spain)	Tablet / House	Arrows / Exhibit. area	Touch Screen / House
Secondary User 3 (Spain)	Touch Screen / Exhibit. area	Tablet / House	Arrows / Exhibit. area
Primary User 1 (Austria)	Arrows / House	Tablet / Exhibit. area	Touch Screen / House
Primary User 2 (Austria)	Touch Screen / Exhibit. area	Arrows / House	Tablet / Exhibit. area
Primary User 3 (Austria)	Arrows / House	Tablet / Exhibit. area	Touch Screen / House
Secondary User 1 (Austria)	Touch Screen / Exhibit. area	Tablet / House	Arrows / Exhibit. area
Secondary User 2 (Austria)	Arrows / House	Touch Screen / Exhibit. area	Tablet / House
Secondary User 3 (Austria)	Tablet / Exhibit. area	Arrows / House	Touch Screen / Exhibit. area

Different aspects of user experience were evaluated during the trail. . After each task two questionnaires for user experience and one for the mental effort evaluation were provided. Tasks were as follows:

- House: The end-user has to be able to open the door, cross the door and sit down.
- Navigation: The end-user has to be able to move from one place to another.

- Exhibition area: The end-user has to maximize and minimize the photo, like the photo and write a comment.

- Questionnaires

2.1.3. TASKS

Previous to the scenario-based tasks participants had to undergo a short training session in order to get used to the navigation conditions. After logging intoSecond LIFE, they appeared right in this place (Figure 34) of the 3rD-LIFE island which was established as their "Base".

Figure 34: Café

The researcher explained each device to the participants and its certain navigation options:

- **Smartphone:** navigation performed by using the two buttons on the left and right side of the screen.

- **Touch screen:** navigation performed by using the button in the right corner of the display.

- **Keyboard with mouse:** navigation performed by using the arrows and the mouse.

"In 3rD-LIFE island you are represented as an avatar. Here you can see your avatar. In order to move the avatar through the island you will use the buttons/arrows. You must use "upper part of the button"/"up arrow" to walk forward; "lower part of the button"/"down arrow" to walk backward; "right part of the button"/"right arrow" to turn to the right; and "left part of the button"/"left arrow" to turn to the left. Furthermore, if you press twice the middle of the button/arrows the avatar will run. You can press the direction arrows (right or left) simultaneously with the "impulse" arrows (up and down arrows) or wipe from the upper part to left or right side of the button. In this way the avatar will turn and move at the same time."

Keyboard with mouse:

"Regarding the interaction with the 3D objects, you must use the mouse to direct the view of the avatar. If you move the mouse, you will see how the avatar moves his head towards the mouse cursor. By clicking with the mouse you can interact with the objects. When an object is susceptible to be interacted, the cursor will change (for example to a chair if you can sit your avatar in the object). When this happens, you have to press the left button if you want to interact with the object selected. Another possibility is to press the right button when the cursor will be on the object, a list of possible options will appear, and select the option you want".

Smartphone/Touch screen:

"For interacting with objects you can use your finger instead of the mouse. You can just tap on the object to initiate an interaction."

The researcher asked the user to walk around a little bit (5 minutes) to get accustomed to the respective navigation condition.

After the learning phase, users started completing the following tasks:

Task 1 (House):

Starting position: The user's avatar started in front of the houses.

End position: Avatar sits down on the couch.

Figure 35: Start point

"Now you can see three houses. Your house is the one on the left. Go there and try to get into it. When you have entered the house you will find a big couch on the left hand side. Take a break and sit down on the couch."

Questionnaires: UMUX & SMEQ

Figure 36: walk from house to exhibition area

"Now it is time to get up again and explore more of the island! Go out of your house and try to navigate your avatar towards the exhibition area."

Questionnaires: UMUX & SMEQ

Task 3 (zooming and liking):

Starting point: In front of 4th picture on the left side (Viennese Fiaker).

End point: In front of 4th picture on the left side (Viennese Fiaker), after liking the picture.

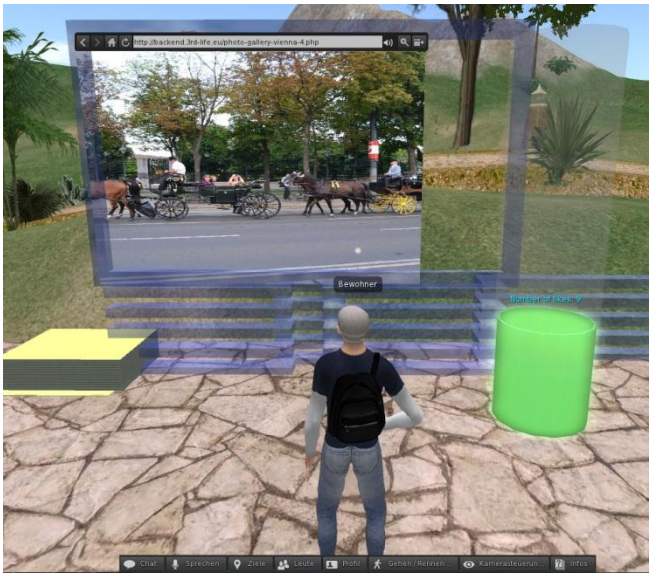


Figure 37: End point

"Here at the exhibition area you will find same photographs of Spain and Austria. Go to the one in the middle (forth from the left: FIAKER) and try to zoom in so you can observe some details of the picture. Then zoom out again and leave a note for other visitors. At the end you can "like" the photograph."

Questionnaires: UMUX & SMEQ

2.1.4. RESULTS

As it is shown in the following illustrations, seven women and four men took part in this trial (six end users from Austria and five from Spain). The average age of Primary Users was 65.4 and 33.5 years for Secondary users. All of them use the computer daily and most of them use the internet everyday although some of them use it less than once a month. Secondary users access regularly to social networks, but Primary users are not used to connect of this kind of services.

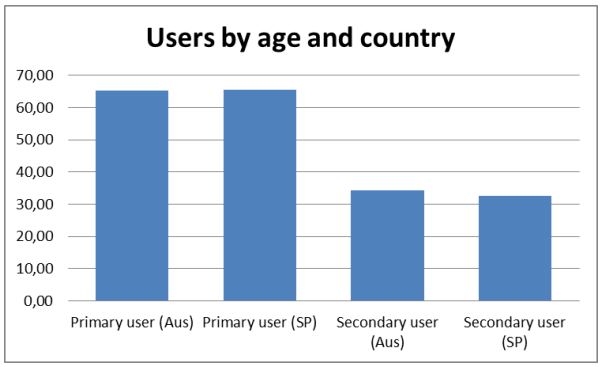


Figure 38: Users by age and Country

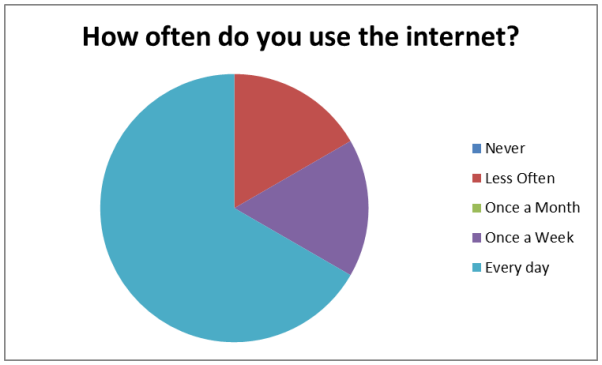


Figure 39: Usage of the Internet

Regarding the opinions of the participants about the Island, the majority of the users scored it as very good or good. There were also two people who rated it average and two that rated it as bad. Both end users that rated it as bad, were young Secondary users, therefore we have to think

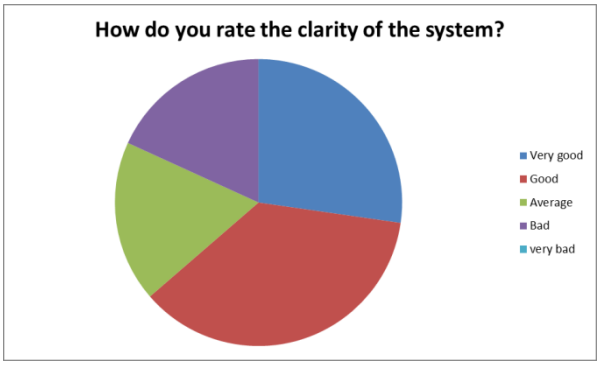


Figure 40: Clarity of the system

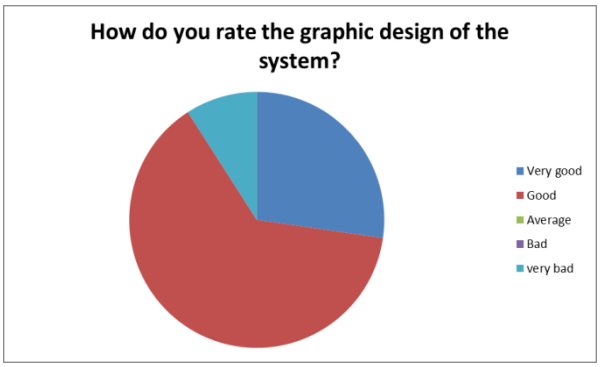


Figure 41: Graphic design of the system

Devices rating

As it is shown in the following illustrations, the device that end users liked more was the smartphone, followed by the keyboard + mouse. No one selected the touchscreen as a first option. When we asked them which was the device they liked less, the touchscreen was the one most selected. From our point of view, this happens because it is quite difficult to maintain the arm pointing to the touchscreen for a long time. Perhaps if this device would have been used in a horizontal way (lying on the table) the results would be more positive. On the other hand, we think that the smartphone has a promising potential as a way to interact with the system, but still further research work is required to improve the interaction by smartphone devices.

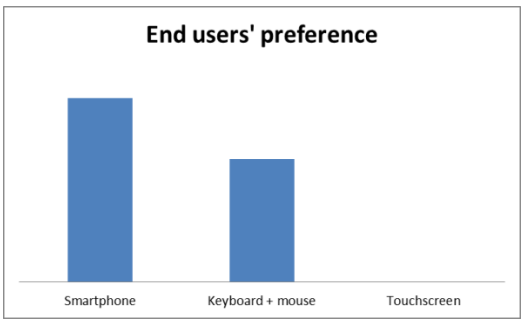


Figure 42: End-users preference for the device

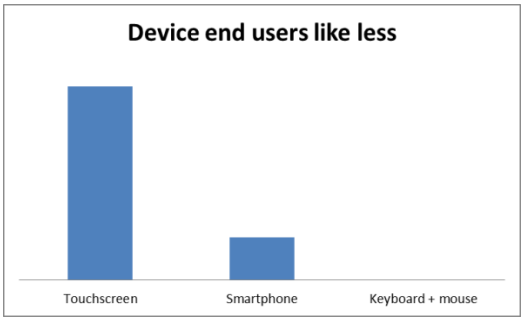


Figure 43: Devices End-users like less

2.2. FINAL TRIAL

2.2.1. GENERAL PROCEDURE

For the trials 36 end users will have been involved. Users were recruited and equally tested in Spain and in Austria. The virtual island was prepared and equipped with various developed applications and functions. Users were instructed to walk their avatar around the virtual island by following a predestined route, as described in section 3 under "Evaluation with scenarios". During the walk, the user wasguided by an assisting person that was physically presented to make them feel more comfortable during the trial.

The 3rD-LIFE island is subdivided into six areas (see figure 1 below). In area named "A" users have private houses which they can share access to with the people they know well. "B" is the Exhibition Area, the place where users can view their photography collections previously uploaded to an internal server property of the 3rD-LIFE Consortium. The area labelled with "C" is The Café, where the users are able to interact with each other. Furthermore, they are able to watch real events through the video streaming application. Finally, The Café is the place in where the user can find out more about events and activities going on in the 3rD-LIFE island. Additionally, there were several announcement boards providing information about on-going or coming-up events. "D" is the port and dock of the island, a place with no specific functionality besides the aesthetical one. This application was chosen in order to make the island more attractive for the end users in the final trial. "E" is the learning area. This area serves as a public place where users have the opportunity to attend to different types of courses such as language, art, literature, etc. "F" is the gaming area. There are games that can be played alone as well as interactive games for more than just one player. The selection of games includes both cognitive and ludic games. Finally,

some roads can be found within the island. Their function is to connect the different areas in order to ensure some coherency within the island's areas and facilitate navigation.

This trial is the result of combined the focus groups with the personal interviews, the first trial, the multi user trial and the end-user device trial. More specifically, most of the scenarios have been taken from the focus groups, personal interviews and the first trial. Some new ones have been added. Based on the positive result of the multi user trial, more than one user was performing the tasks at the same time. This set-up offered them the opportunity to interact with each other. The input method for navigation was keyboard (arrows) and mouse. This choice of input methods based on the results obtained in the end-user device trial. Therefore the final trial combines the results of all the knowledge that has been acquired during the project and the last step of the iterative process.

Figure 44: 3rD-LIFE Island's map

In the final trial the following features of 3rD-LIFE have been evaluated:

- Usability
- Usefulness
- Learning ability
- Navigation
- Communication
- Interaction with other users
- Interaction with the system
- Graphic design
- Preference on the avatar appearance

The study has been carried out in 6 steps:

1. Introduction & Informed Consent
2. Pre-Interaction Interview
3. Evaluation based on the scenarios
4. Post-Interaction Interview
5. Questionnaires
    a. Questionnaire on System Usability
    b. Questionnaire/s on Technology acceptance/ User Experience
6. Closing

2.2.2. EVALUATION

The objective of the final trial is to evaluate usability of the features that have been developed so far, as a last step of the iterative circle. For that purpose, groups of 2 persons were formed to participate at the same time in the trial. The amount of end-users involved is 40 people distributed as follows:

- Spain
  - o 10 Primary Users
  - o 10 Secondary Users
- Austria
  - o 10 Primary Users
  - o 10 Secondary Users

Related to the multi-user trial, pairs of users evaluated the system at the same time, to make them feel that 3rD-LIFE is a place to interact with other people.

2.2.3. PROTOCOL

The users are carried out some tasks, which were developed based on the scenarios of D.2.4. They were accompanied by two assistants:

- A person that explained the consent form and provided help if they are not able to perform a task after trying to do it. Users were not helped before they tried to develop a task by themselves.
- A guide represented as an avatar in the Island.

The starting point of each participant was always the same. Each scenario contained some tasks for the participants that are shown in the evaluation section.

Before starting the trial, a consent form had been explained to the participants. This was a prerequisite to take part in the trials. Test persons will not be able to participate until the consent form had been explained and signed by them.

Once the consent form has been signed, the evaluation started:

1. Think aloud, observation.

2. Semi-structured interviews after each scenario

- What did you find positive while you used X
- What did you find negative while you used X
- What would you change?
- ….

3. Questionnaires

- Ad hoc questions
- ASQ
- SMEQ
- UMUX
- TAM 3
- PSSUQ

2.2.4. EVALUATION WITH SCENARIOS

All the end-users followed the same route in order to be able to interact with other participants. The route can be seen below:

Learning area (Starting point)

Teleport

Houses

Walking

Gaming area

Walking to the teleport near the exhibition area

Café

Teleport

Exhibition area (Ending point)

Pre-interview:

- Pre1: Age?
- Pre2: Sex?
- Pre3: Profession?
- Pre4: How often do you use a computer? (every day, once a week, once a month, less often, never)
- Pre5: How often do you use the internet? (every day, once a week, once a month, less often, never)
- Pre6: Do you use social networks? Yes/No. How often? (every day, once a week, once a month, less often, never)
- Pre7: How satisfied are you with currently existing social networks? (very satisfied, satisfied, not satisfied, not satisfied at all)
- Pre8: Why?

2.2.4.1.LEARNING AREA

Participants had the opportunity to interact with each other at the learning area as it is shown below.

The final trial will start in the learning area.

Figure 45: Starting point

When they logged in Second LIFE, they started right at this place which will be established as their "Base".

Once there, the researcher who is physically near to the user explained themhow to navigate and interact with the objects as follows:

"In 3rD-LIFE island you are represented as an avatar. Here you can see your avatar. In order to move the avatar through the island you will use the arrows and the mouse. You must use the up button to walk forward; the down button to walk backward; the right button to turn to the right; and left button to turn to the left. You can press the left/right button simultaneously with the "impulse" arrows (up and down arrows). In this way the avatar will turn and move at the same time. You can press the Fwr page button if you want the avatar to jump."

"Regarding the interaction with the 3D objects, you must use the mouse to direct the view of the avatar. If you move the mouse, you will see how the avatar moves his head towards the mouse cursor. By clicking with the mouse you can interact with the objects. When an object is susceptible to be interacted, the cursor will change (for example to a chair if you can sit your avatar in the object). When this happens, you have to press the left button if you want to interact with the object selected. Another possibility is to press the right button when the cursor will be on the object, a list of possible options will appear, and select the option you want".

After this explanation, participants that are at the learning area were asked to talk about a photo at the blackboard.

Once they have learned how to move and interact in the Island, the purpose of the Learning Area have been explained to them and users were asked to perform the following tasks:

- Task 1: You have to walk inside the learning area
- Task 2: Now you have to sit down on the bank
- Task 3 Please maximize the blackboard
- Task 4 Please minimize the blackboard

After this, participants were conducted to the teleport in front of the Exhibition Area in order to teleport to the Houses:

1. The User is able to use the arrows to move the avatar
2. The user is able to sit down on the bank.
3. The user is able to zoom into the screen
4. The user is able to zoom out of the screen

	Strongly disagree	Disagree	Agree	Strongly agree
Overall, I am satisfied with the ease of completing the tasks in this scenario				
Overall, I am satisfied with the amount of time it took to complete the tasks in this scenario				
Overall, I am satisfied with the support information (online-line help, messages, documentation) when completing the tasks				
This system's capabilities meets my requirements				
Using this system is a frustrating experience				
I have to spend too much time correcting things with the system				
	Tremendously hard to do	Hard	Easy	Very easy
Overall, this task was				

2.2.4.2.HOUSES

From here, they went to the houses to get into the corresponding one through the back door. This task was chosen in order to test, navigation (open the door, get into the house), web browser and mail.

Figure 46: Houses

Figure 47: Computer inside the house

Figure 48: 3rD-LIFE's mail

The user left the house through the front door

Task 1: "Now you can see six houses in this street. Your house is (Choose the one you prefer). Please, go to your house, enter through the back door and use the computer. Once you are there, you want to surf in the internet. For that purpose you have three buttons on the left side of the screen. Please click on the one to navigate (They should be able to know which one is it without asking)."

5. The User is able to use the arrows to move the avatar
6. The user is able to go to the through the back door of the house
7. The user is able to sit on the chair in front of the computer

8. The user is able to zoom in and out of the screen
9. The user is able to know which of the buttons is the one to navigate
10. The user is able to navigate using the web browser
11. The user is able to read the content of the web

Task 2: "Imagine that after surfing in the web, you want to write a mail to a friend about a new one you have already read. To access to the mail you have to push the appropriate button. You will find a table with the tools you need to send it."

12. The user is able to go to the mail address
13. The user is able to write a mail

Task 3: "Once you have done this, get out using the front door and go f by feet to the gaming area."

Questions:

- What did you find negative while carrying out this task? (tell up to 3 aspects)
- What did you find positive while carrying out this task? (tell up to 3 aspects)
- What would you change and how?
- Any other comments?

	Strongly disagree	Disagree	Agree	Strongly agree
Overall, I am satisfied with the ease of completing the tasks in this scenario				
Overall, I am satisfied with the amount of time it took to complete the tasks in this scenario				
Overall, I am satisfied with the support information (online-line help, messages, documentation) when completing the tasks				
This system's capabilities meets my requirements				
Using this system is a frustrating experience				
I have to spend too much time correcting things with the system				
	Tremendously hard to do	Hard	Easy	Very easy
Overall, this task was				

2.2.4.3.GAMING AREA

At the Gaming Area they were requested to play connect 4 with another user. If a second test person was missing, the test guide (sitting in another room) overtook the role to play and interact with the participant.

"This is the place where users can play together or alone. Just to make an idea of what can be done here, let's play connect 4."

Figure 49: Gaming area

After playing → "Now we will go to the teleport near the Learning Area/Starting point and there you have to choose the "Café" option"

1. The User is able to use the arrows to move the avatar
2. The user is able to orientate
3. The user is able to play the game
4. The user is able to teleport

	Strongly disagree	Disagree	Agree	Strongly agree
Overall, I am satisfied with the ease of completing the tasks in this scenario				
Overall, I am satisfied with the amount of time it took to complete the tasks in this scenario				
Overall, I am satisfied with the support information (online-line help, messages, documentation) when completing the tasks				
This system's capabilities meets my requirements				
Using this system is a frustrating experience				
I have to spend too much time correcting things with the system				
	Tremendously hard to do	Hard	Easy	Very easy
Overall, this task was				

2.2.4.4.CAFÉ

At the Café video streaming has been tested and the purpose of this space was shown. *"Here you are at The Café, this is the place of the island where you can interact with other users, watch events and get to know what is going-on in the island."*

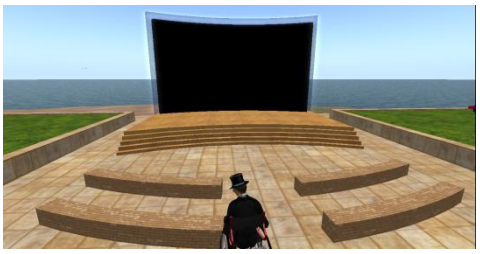


Figure 50: Café

In the panels situated in the café, there is an announcement of a photo exhibition at the Exhibition Area.

Figure 51: Announcement panels

The Guide invited the end-user to visit that exhibition and requested him/her to go to the Teleport (The end-user should be able to orientate without help) and use it to attend the exhibition area.

First at all, you want to know if there is some event shown in the big screen. For this, you must go just right in front of the big black screen. [By clicking on it, it grows up. Now you have to click on the "play" button and wait for the video to load completely. Once you have seen the video, you have to press "escape" for the screen to minimize.]

5. The User is able to use the arrows to move the avatar
6. The user is able to orientate
7. The user clicks on the screen to zoom
8. The user clicks ESC to minimize the screen

"Now you want to check if there is some interesting event that takes place on the island right now. In order to do this, you must go to the announcement boards on the left of the big black screen. These boards show you the information about the 3rD-LIFE events. [By clicking once in the board, it zooms in.]"

9. The User is able to use the arrows to move the avatar
10. The user is able to orientate
11. The user clicks on the screen to zoom
12. The user clicks ESC to minimize the screen

"In the announcement board you can see that now there is a photography exhibition about Vienna and San Sebastián that a friend of you has uploaded.

Finally, you must walk to the bus stop and teleport to the exhibition centre."

13. The user is able to use the arrows to move the avatar
14. The user is able to orientate
15. The user is able to use the teleport to move to the exhibition area

Questions

- What did you find negative while carrying out this task? (tell up to 3 aspects)
- What did you find positive while carrying out this task? (tell up to 3 aspects)
- What would you change and how?
- Any other comments?

	Strongly disagree	Disagree	Agree	Strongly agree
Overall, I am satisfied with the ease of completing the tasks in this scenario				
Overall, I am satisfied with the amount of time it took to complete the tasks in this scenario				
Overall, I am satisfied with the support information (online-line help, messages, documentation) when completing the tasks				
This system's capabilities meets my requirements				
Using this system is a frustrating experience				
I have to spend too much time correcting things with the system				
	Tremendously hard to do	Hard	Easy	Very easy
Overall, this task was				

2.2.4.5.EXHIBITION AREA

After arriving at the Exhibition area the participants were instructed to watch the photos, use the "like" option and add a comment to the photo.

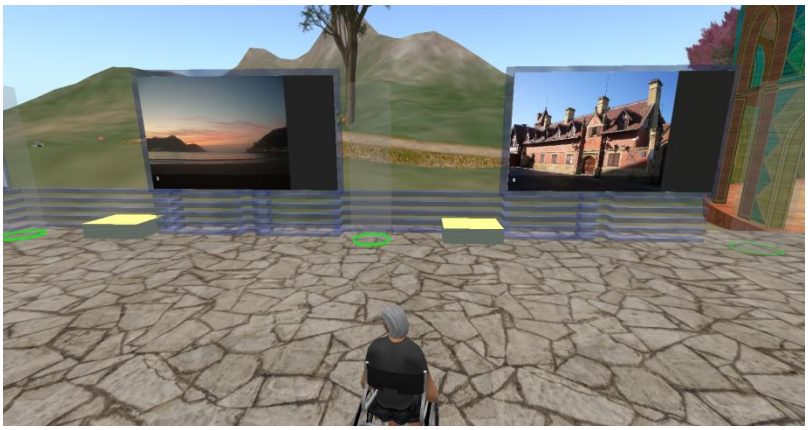


Figure 52: Exhibition area

Figure 53: Teleport

Now you are at the exhibition area; first you must walk around the photos in order to have an initial impression of the place and the whole photo collection.

1. The User is able to use the arrows to move the avatar
2. The user is able to orientate
3. The user clicks on the screen to zoom
4. The user clicks ESC to minimize the screen

"You are interested in one of the photos and you want to see it bigger. [To maximize the photo you must to click on it. Now you must press "Escape" to minimize the photo.]"

5. The user clicks on the screen to zoom
6. The user presses ESC to minimize the screen

"Now, you decide that this is the photo you like most and you want to express your opinion (that you like the photo) [by clicking once in the green tube you can do it]."

7. The user is able to click the photo "like" option

"Furthermore, you want to upload a comment saying that you know very well the beach because you used to go there since you were 5 years old. [By click in the yellow cards you can write a comment and post it to the photo.]"

8. The user is able to add a comment

Questions

- What did you find negative while carrying out this task? (tell up to 3 aspects)
- What did you find positive while carrying out this task? (tell up to 3 aspects)
- What would you change and how?
- Any other comments?

	Strongly disagree	Disagree	Agree	Strongly agree
Overall, I am satisfied with the ease of completing the tasks in this scenario				
Overall, I am satisfied with the amount of time it took to complete the tasks in this scenario				
Overall, I am satisfied with the support information (online-line help, messages, documentation) when completing the tasks				
This system's capabilities meets my requirements				
Using this system is a frustrating experience				
I have to spend too much time correcting things with the system				
	Tremendously hard to do	Hard	Easy	Very easy
Overall, this task was				

2.2.5. GENERAL RESULTS

The following illustrations show the descriptive results of the final trial in both countries.

As the half of the participants were Primary Users and the other half Secondary Users, the mean age in both Spain and Austria is around 45 years old. Men and women were distributed equally.

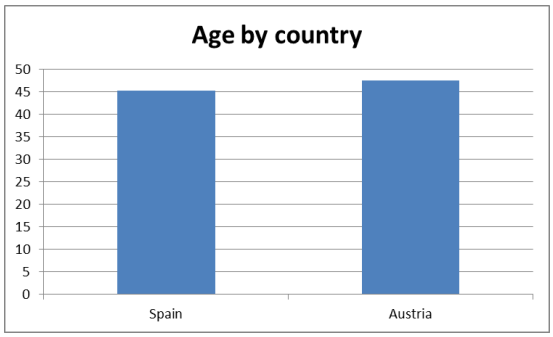


Figure 54: Age by country

As it has happened in previous trials most of the users that take part in the trials use the computer quite often. In the following illustration is shown that most of them use the computer daily.

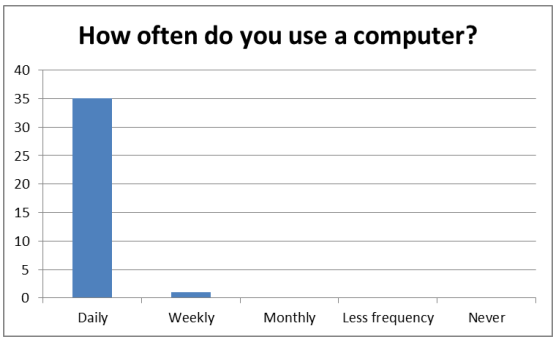


Figure 55: Computer usage

The same situation was found when they were asked about the use of the Internet.

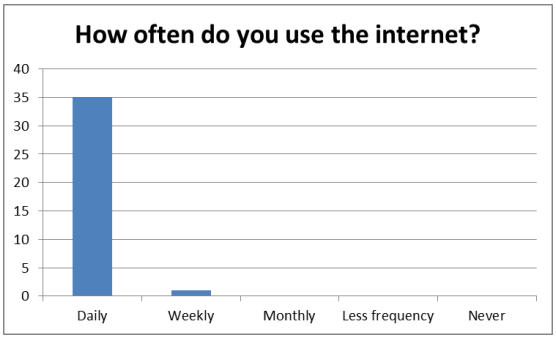


Figure 56: Internet usage

When they were asked about social networks, the distribution is a little bit different. There are some end users who never have used them.

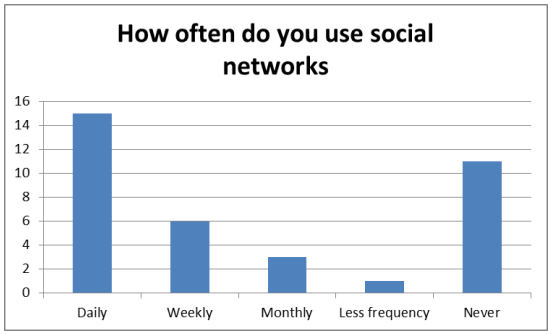


Figure 57: Social networks usage

2.2.6. TAM 3 (TECHNOLOGY ACCEPTANCE MODEL)

The TAM 3 was proposed by Venkatesh & Bala in 2008. This questionnaire measures the technology acceptance and intention to use it based on the following 9 factors:

- PU= Perceived Usefulness
- PEOU= Perceived Ease of Use
- CES= Computer Self-efficacy
- PEC= Perception of external Control
- Cplay= Computer Playfulness
- CANX= Computer anxiety
- ENJ= Perceived Enjoyment
- BI= Behavioral Intention

For the purpose of this study the range of the answers has been shortened because in previous studies it has been found that a Likert scale of more than 5 values is confusing for older people. In our case, the range goes from 1 to 4.

For all the questionnaires, the following results have been analysed:

- Mean of Spain Vs Austria and total mean.
- Mean of Primary Vs Secondary users
- Mean Spanish Primary Users Vs Austrian Primary Users
- Mean Spanish Secondary Users Vs Austrian Secondary Users
- Mean Spanish Primary Vs Secondary users
- Mean Austrian Primary Vs Secondary users

A significant difference has been found between Spanish and Austrian end users regarding computer anxiety ($p<0.05$), being the Spanish end users the ones who feel more anxiety.

Ranks

	country	N	Mean Rank	Sum of Ranks
Perceived Usefulness	Spain	15	19,47	292,00
	Austria	20	16,90	338,00
	Total	35		
Perceived Ease of Use	Spain	15	19,67	295,00
	Austria	20	16,75	335,00
	Total	35		
Computer Self-efficacy	Spain	15	19,47	292,00
	Austria	20	16,90	338,00
	Total	35		
Perception of external Control	Spain	16	19,72	315,50
	Austria	20	17,53	350,50
	Total	36		
Computer Playfulness	Spain	16	14,97	239,50
	Austria	20	21,33	426,50
	Total	36		
Computer anxiety	Spain	16	23,00	368,00
	Austria	20	14,90	298,00
	Total	36		
Perceived Enjoyment	Spain	16	19,81	317,00
	Austria	20	17,45	349,00
	Total	36		
Behavioral Intention	Spain	16	18,28	292,50
	Austria	20	18,68	373,50
	Total	36		

Test Statistics[b]

	Perceived Usefulness	Perceived Ease of Use	Computer Self-efficacy	Perception of external Control	Computer Playfulness	Computer anxiety	Perceived Enjoyment	Behavioral Intention
Mann-Whitney U	128,000	125,000	128,000	140,500	103,500	88,000	139,000	156,500
Wilcoxon W	338,000	335,000	338,000	350,500	239,500	298,000	349,000	292,500
Z	-,738	-,844	-,746	-,635	-1,834	-2,391	-,689	-,112
Asymp. Sig. (2-tailed)	,460	,399	,456	,526	,067	,017	,491	,911
Exact Sig. [2*(1-tailed Sig.)]	,479[a]	,419[a]	,479[a]	,539[a]	,072[a]	,021[a]	,519[a]	,912[a]

a. Not corrected for ties.

b. Grouping Variable: country

Figure 58: U Man Whitney. Tam 3 diferences between Spanish and Austrian End-users

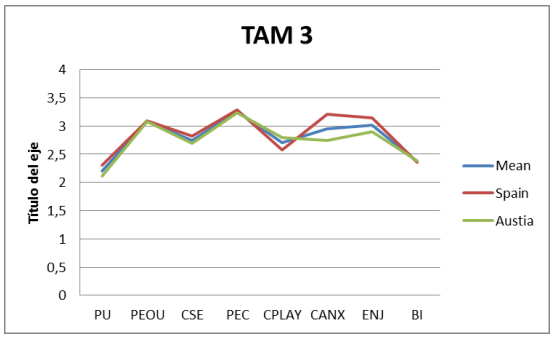


Figure 59: TAM 3 Scores for Spanish and Austrian End-users

As it is shown in the following table, there are no significant differences between Primary and Secondary Users in almost all of the measured factors. The only significant difference was found for the Behavioural Intention factor. The Primary Users have more intention to use it than the Secondary ones. From our point of view this is a success of the project because this platform has been developed for them.

Ranks

	user_type	N	Mean Rank	Sum of Ranks
Perceived Usefulness	Secondary User	19	16,00	304,00
	Primary User	16	20,38	326,00
	Total	35		
Perceived Ease of Use	Secondary User	19	18,32	348,00
	Primary User	16	17,63	282,00
	Total	35		
Computer Self-efficacy	Secondary User	19	18,47	351,00
	Primary User	16	17,44	279,00
	Total	35		
Perception of external Control	Secondary User	19	19,47	370,00
	Primary User	17	17,41	296,00
	Total	36		
Computer Playfulness	Secondary User	19	19,21	365,00
	Primary User	17	17,71	301,00
	Total	36		
Computer anxiety	Secondary User	19	19,03	361,50
	Primary User	17	17,91	304,50
	Total	36		
Perceived Enjoyment	Secondary User	19	16,92	321,50
	Primary User	17	20,26	344,50
	Total	36		
Behavioral Intention	Secondary User	19	15,00	285,00
	Primary User	17	22,41	381,00
	Total	36		

Test Statistics[b]

	Perceived Usefulness	Perceived Ease of Use	Computer Self-efficacy	Perception of external Control	Computer Playfulness	Computer anxiety	Perceived Enjoyment	Behavioral Intention
Mann-Whitney U	114,000	146,000	143,000	143,000	148,000	151,500	131,500	95,000
Wilcoxon W	304,000	282,000	279,000	296,000	301,000	304,500	321,500	285,000
Z	-1,267	-,201	-,303	-,600	-,436	-,331	-,980	-2,124
Asymp. Sig. (2-tailed)	,205	,841	,762	,549	,663	,741	,327	,034
Exact Sig. [2*(1-tailed Sig.)]	,217[a]	,857[a]	,781[a]	,573[a]	,684[a]	,754[a]	,346[a]	,035[a]

a. Not corrected for ties.

b. Grouping Variable: user_type

Figure 60: U Man Whitney. TAM 3 differences between Primary and Secondary End-users

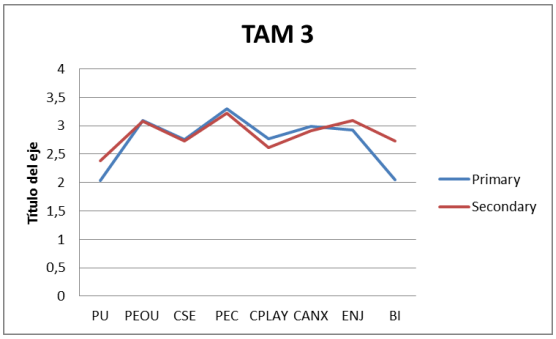


Figure 61: TAM3 scores for primary and Secondary End-users

Even if there are some differences between the Spanish and Austrian Primary Users (PU, CANX and ENJ), no significant differences were found between them (P>0.05).

Ranks

	group	N	Mean Rank	Sum of Ranks
Perceived Usefulness	Primary User Spain	6	7,42	44,50
	Primary User Austria	10	9,15	91,50
	Total	16		
Perceived Ease of Use	Primary User Spain	6	8,75	52,50
	Primary User Austria	10	8,35	83,50
	Total	16		
Computer Self-efficacy	Primary User Spain	6	10,25	61,50
	Primary User Austria	10	7,45	74,50
	Total	16		
Perception of external Control	Primary User Spain	7	9,79	68,50
	Primary User Austria	10	8,45	84,50
	Total	17		
Computer Playfulness	Primary User Spain	7	7,21	50,50
	Primary User Austria	10	10,25	102,50
	Total	17		
Computer anxiety	Primary User Spain	7	9,00	63,00
	Primary User Austria	10	9,00	90,00
	Total	17		
Perceived Enjoyment	Primary User Spain	7	7,86	55,00
	Primary User Austria	10	9,80	98,00
	Total	17		
Behavioral Intention	Primary User Spain	7	8,36	58,50
	Primary User Austria	10	9,45	94,50
	Total	17		

Test Statistics[b]

	Perceived Usefulness	Perceived Ease of Use	Computer Self-efficacy	Perception of external Control	Computer Playfulness	Computer anxiety	Perceived Enjoyment	Behavioral Intention
Mann-Whitney U	23,500	28,500	19,500	29,500	22,500	35,000	27,000	30,500
Wilcoxon W	44,500	83,500	74,500	84,500	50,500	90,000	55,000	58,500
Z	-,710	-,165	-1,169	-,559	-1,252	,000	-,829	-,444
Asymp. Sig. (2-tailed)	,478	,869	,242	,576	,211	1,000	,407	,657
Exact Sig. [2*(1-tailed Sig.)]	,492[a]	,875[a]	,263[a]	,601[a]	,230[a]	1,000[a]	,475[a]	,669[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 62: U Man Whitney. TAM 3 differences between Spanish and Austrian Primary End-users

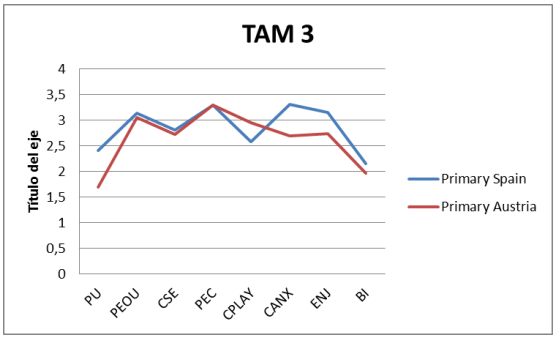


Figure 63: TAM 3 scores for Spanish and Austrian Primary End-users

A difference was found between Secondary Users from Spain and Austria regarding anxiety ($p<0.05$). Spanish felt more anxious when using the platform. Nevertheless, the level of anxiety shown by the Spanish Secondary users in not high.

Ranks

	group	N	Mean Rank	SumofRanks
Perceived Usefulness	Secondary User Spain	9	12,56	113,00
	Secondary User Austria	10	7,70	77,00
	Total	19		
Perceived Ease of Use	Secondary User Spain	9	11,22	101,00
	Secondary User Austria	10	8,90	89,00
	Total	19		
Computer Self-efficacy	Secondary User Spain	9	10,11	91,00
	Secondary User Austria	10	9,90	99,00
	Total	19		
Perception of external Control	Secondary User Spain	9	10,44	94,00
	Secondary User Austria	10	9,60	96,00
	Total	19		
Computer Playfulness	Secondary User Spain	9	8,28	74,50
	Secondary User Austria	10	11,55	115,50
	Total	19		
Computer anxiety	Secondary User Spain	9	13,67	123,00
	Secondary User Austria	10	6,70	67,00
	Total	19		
Perceived Enjoyment	Secondary User Spain	9	12,00	108,00
	Secondary User Austria	10	8,20	82,00
	Total	19		
Behavioral Intention	Secondary User Spain	9	10,61	95,50
	Secondary User Austria	10	9,45	94,50
	Total	19		

Test Statistics[b]

	Perceived Usefulness	Perceived Ease of Use	Computer Self-efficacy	Perception of external Control	Computer Playfulness	Computer anxiety	Perceived Enjoyment	Behavioral Intention
Mann-Whitney U	22,000	34,000	44,000	41,000	29,500	12,000	27,000	39,500
Wilcoxon W	77,000	89,000	99,000	96,000	74,500	67,000	82,000	94,500
Z	-1,903	-,912	-,083	-,334	-1,291	-2,809	-1,500	-,454
Asymp. Sig. (2-tailed)	,057	,362	,934	,738	,197	,005	,134	,650
Exact Sig. [2*(1-tailed Sig.)]	,065[a]	,400[a]	,968[a]	,780[a]	,211[a]	,006[a]	,156[a]	,661[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 64: U Man Whitney. TAM 3 differences between Spanish and Austrian Secondary End-users

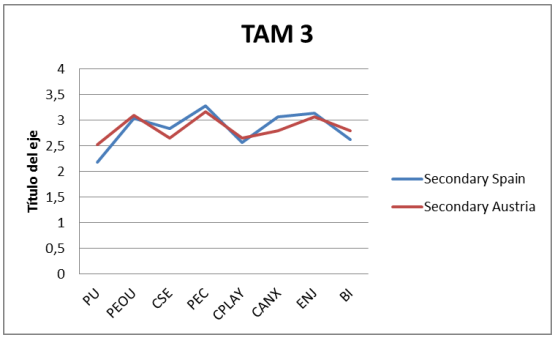


Figure 65: TAM 3 Scores for Spanish and Austrian Secondary End-users

No significant differences have been found for Spanish Primary and Secondary Users.

Ranks

	group	N	Mean Rank	Sum of Ranks
Perceived Usefulness	Primary User Spain	6	7,08	42,50
	Secondary User Spain	9	8,61	77,50
	Total	15		
Perceived Ease of Use	Primary User Spain	6	7,67	46,00
	Secondary User Spain	9	8,22	74,00
	Total	15		
Computer Self-efficacy	Primary User Spain	6	8,67	52,00
	Secondary User Spain	9	7,56	68,00
	Total	15		
Perception of external Control	Primary User Spain	7	8,07	56,50
	Secondary User Spain	9	8,83	79,50
	Total	16		
Computer Playfulness	Primary User Spain	7	8,21	57,50
	Secondary User Spain	9	8,72	78,50
	Total	16		
Computer anxiety	Primary User Spain	7	6,57	46,00
	Secondary User Spain	9	10,00	90,00
	Total	16		
Perceived Enjoyment	Primary User Spain	7	7,71	54,00
	Secondary User Spain	9	9,11	82,00
	Total	16		
Behavioral Intention	Primary User Spain	7	9,79	68,50
	Secondary User Spain	9	7,50	67,50
	Total	16		

Test Statistics[b]

	Perceived Usefulness	Perceived Ease of Use	Computer Self-efficacy	Perception of external Control	Computer Playfulness	Computer anxiety	Perceived Enjoyment	Behavioral Intention
Mann-Whitney U	21,500	25,000	23,000	28,500	29,500	18,000	26,000	22,500
Wilcoxon W	42,500	46,000	68,000	56,500	57,500	46,000	54,000	67,500
Z	-,653	-,239	-,485	-,328	-,221	-1,517	-,672	-,965
Asymp. Sig. (2-tailed)	,513	,811	,627	,743	,825	,129	,501	,335
Exact Sig. [2*(1-tailed Sig.)]	,529[a]	,864[a]	,689[a]	,758[a]	,837[a]	,174[a]	,606[a]	,351[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 66: U Man Whitney. TAM 3 differences between Spanish Primary and Secondary End-users

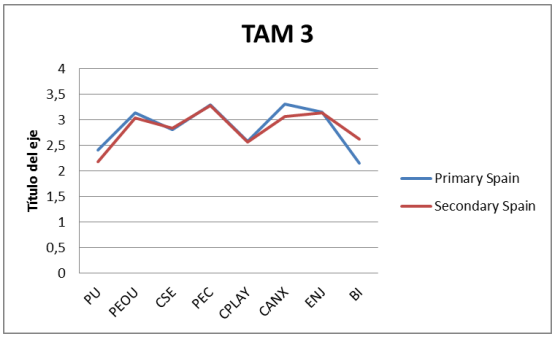


Figure 67: TAM 3 Scores for Spanish Primary and Secondary End-users

No significant differences have been found between Austrian Primary and Secondary Users.

Ranks

	group	N	Mean Rank	SumofRanks
Perceived Usefulness	Primary User Austria	10	13,40	134,00
	Secondary User Austria	10	7,60	76,00
	Total	20		
Perceived Ease of Use	Primary User Austria	10	10,85	108,50
	Secondary User Austria	10	10,15	101,50
	Total	20		
Computer Self-efficacy	Primary User Austria	10	9,75	97,50
	Secondary User Austria	10	11,25	112,50
	Total	20		
Perception of external Control	Primary User Austria	10	9,85	98,50
	Secondary User Austria	10	11,15	111,50
	Total	20		
Computer Playfulness	Primary User Austria	10	9,20	92,00
	Secondary User Austria	10	11,80	118,00
	Total	20		
Computer anxiety	Primary User Austria	10	11,95	119,50
	Secondary User Austria	10	9,05	90,50
	Total	20		
Perceived Enjoyment	Primary User Austria	10	12,35	123,50
	Secondary User Austria	10	8,65	86,50
	Total	20		
Behavioral Intention	Primary User Austria	10	13,00	130,00
	Secondary User Austria	10	8,00	80,00
	Total	20		

Test Statistics[b]

	Perceived Usefulness	Perceived Ease of Use	Computer Self-efficacy	Perception of external Control	Computer Playfulness	Computer anxiety	Perceived Enjoyment	Behavioral Intention
Mann-Whitney U	21,000	46,500	42,500	43,500	37,000	35,500	31,500	25,000
Wilcoxon W	76,000	101,500	97,500	98,500	92,000	90,500	86,500	80,000
Z	-2,225	-,269	-,573	-,511	-,994	-1,140	-1,418	-1,901
Asymp. Sig. (2-tailed)	,026	,788	,566	,609	,320	,254	,156	,057
Exact Sig. [2*(1-tailed Sig.)]	,029[a]	,796[a]	,579[a]	,631[a]	,353[a]	,280[a]	,165[a]	,063[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 68: U Man Whitney. TAM 3 differences between Austrian Primary and Secondary End-users

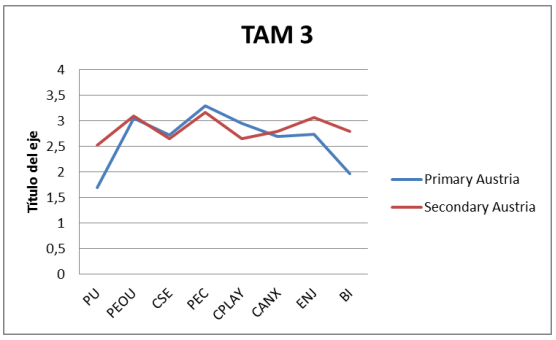


Figure 69: TAM 3 Scores for Austrian Primary and Secondary End-users

2.2.7. PSSUQ

The Post-Study System Usability Questionnaire (PSSUQ) is a research instrument that was developed for scenario-based usability evaluation at IBM. This questionnaire has also been adapted to older people.

No significant differences have been found for Primary and Secondary Users regarding the usability evaluation of the system (P>0.05).

Ranks

	user_type	N	Mean Rank	SumofRanks
Post-Study SystemUsability Questionnaire (PSSUQ)	Secondary User	19	16,74	318,00
	Primary User	17	20,47	348,00
	Total	36		

Test Statistics[b]

	Post-Study System Usability Questionnaire (PSSUQ)
Mann-Whitney U	128,000
Wilcoxon W	318,000
Z	-1,063
Asymp. Sig. (2-tailed)	,288
Exact Sig. [2*(1-tailed Sig.)]	,300[a]

a. Not corrected for ties.

b. Grouping Variable: user_type

Figure 70: U Man Whitney. PSSUQ differences between Primary and Secondary End-users

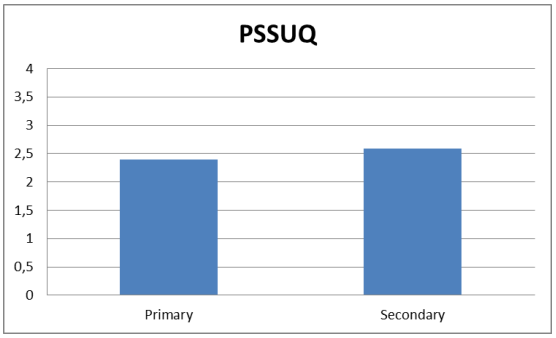


Figure 71: PSSUQ Scores for Primary and Secondary End-users

Austrian Primary Users seem to find it more usable than Spanish ones (P<0.05)

Ranks

	group	N	Mean Rank	SumofRanks
Post-Study SystemUsability Questionnaire (PSSUQ)	Primary User Spain	7	4,21	29,50
	Primary User Austria	10	12,35	123,50
	Total	17		

Test Statistics[b]

	Post-Study System Usability Questionnaire (PSSUQ)
Mann-Whitney U	1,500
Wilcoxon W	29,500
Z	-3,277
Asymp. Sig. (2-tailed)	,001
Exact Sig. [2*(1-tailed Sig.)]	,000[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 72: U Man Whitney. PSSUQ differences between Spanish and Austrian Primary End-users

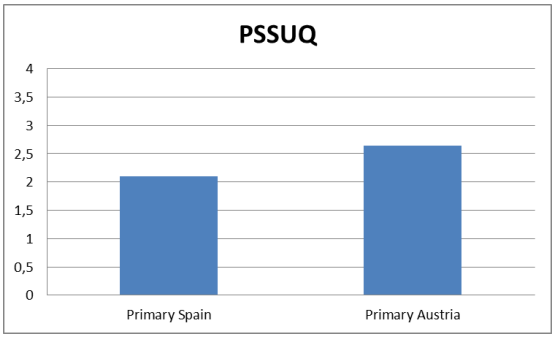


Figure 73: PSSUQ scores for Spanish and Austrian Primary End-users

The same situation than the previous one is found between Spanish and Austrian Secondary Users (P< 0.05)

Ranks

	group	N	Mean Rank	Sum of Ranks
Post-Study System Usability Questionnaire (PSSUQ)	Secondary User Spain	9	6,56	59,00
	Secondary User Austria	10	13,10	131,00
	Total	19		

Test Statistics[b]

	Post-Study System Usability Questionnaire (PSSUQ)
Mann-Whitney U	14,000
Wilcoxon W	59,000
Z	-2,541
Asymp. Sig. (2-tailed)	,011
Exact Sig. [2*(1-tailed Sig.)]	,010[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 74: U Man Whitney. PSSUQ differences between Spanish and Austrian Secondary End-users

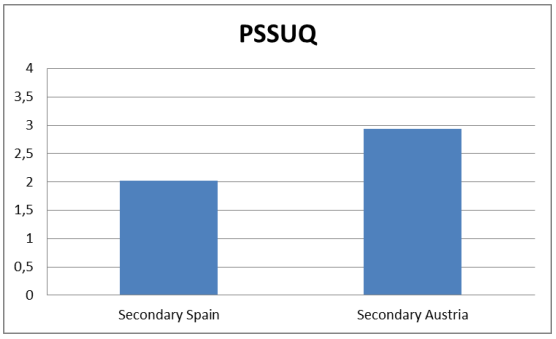


Figure 75: PSSUQ Scores for Spanish and Austrian Secondary End-users

No significant differences have been found between Spanish Primary and Secondary Users. (p> 0,05)

Ranks

	group	N	Mean Rank	Sum of Ranks
Post-Study System Usability Questionnaire (PSSUQ)	Primary User Spain	7	8,57	60,00
	Secondary User Spain	9	8,44	76,00
	Total	16		

Test Statistics[b]

	Post-Study System Usability Questionnaire (PSSUQ)
Mann-Whitney U	31,000
Wilcoxon W	76,000
Z	-,053
Asymp. Sig. (2-tailed)	,958
Exact Sig. [2*(1-tailed Sig.)]	1,000[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 76: U Man Whitney. PSSUQ differences between Spanish Primary and Secondary End-users

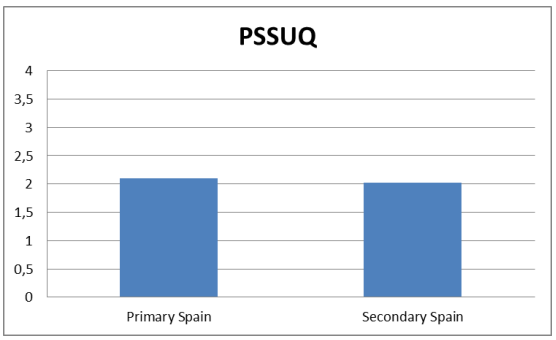


Figure 77: PSSUQ Scores for Spanish Primary and Secondary End-users

The same result has been obtained when comparing Austrian Primary and Secondary users (p> 0.05)

Ranks

	group	N	Mean Rank	Sum of Ranks
Post-Study System Usability Questionnaire (PSSUQ)	Primary User Austria	10	12,20	122,00
	Secondary User Austria	10	8,80	88,00
	Total	20		

Test Statistics[b]

	Post-Study System Usability Questionnaire (PSSUQ)
Mann-Whitney U	33,000
Wilcoxon W	88,000
Z	-1,288
Asymp. Sig. (2-tailed)	,198
Exact Sig. [2*(1-tailed Sig.)]	,218[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 78: U Man Whitney. PSSUQ differences between Austrian Primary and Secondary End-users

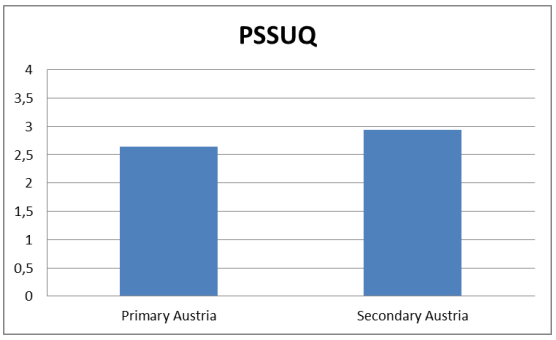


Figure 79: PSSUQ Scores for Austrian Primary and Secondary End-users

2.2.8. UMUX

Usability Metric for User Experience (UMUX) is a four-item Likert scale used for the subjective assessment of an application's perceived usability. This questionnaire has been used in each of the scenarios of the final trial. As it is shown in the following tables and illustrations, no significant differences have been found between any of the groups (p>0.05). Even if some differences can be seen in the illustrations, these differences are not statistically significant.

Ranks

	country	N	Mean Rank	Sum of Ranks
UMUX Learning Area	Spain	16	20,00	320,00
	Austria	20	17,30	346,00
	Total	36		
UMUX Houses	Spain	16	20,06	321,00
	Austria	20	17,25	345,00
	Total	36		
UMUX Gaming Area	Spain	16	21,00	336,00
	Austria	20	16,50	330,00
	Total	36		
UMUX Cafe	Spain	16	19,31	309,00
	Austria	20	17,85	357,00
	Total	36		
UMUX Exhibition Area	Spain	16	21,25	340,00
	Austria	20	16,30	326,00
	Total	36		

Test Statistics[b]

	UMUX Learning Area	UMUX Houses	UMUX Gaming Area	UMUX Cafe	UMUX Exhibition Area
Mann-Whitney U	136,000	135,000	120,000	147,000	116,000
Wilcoxon W	346,000	345,000	330,000	357,000	326,000
Z	-,776	-,809	-1,309	-,425	-1,424
Asymp. Sig. (2-tailed)	,438	,418	,191	,671	,154
Exact Sig. [2*(1-tailed Sig.)]	,459[a]	,440[a]	,211[a]	,694[a]	,168[a]

a. Not corrected for ties.

b. Grouping Variable: country

Figure 80: U Man Whitney. UMUX differences between Spanish and Austrian End-users

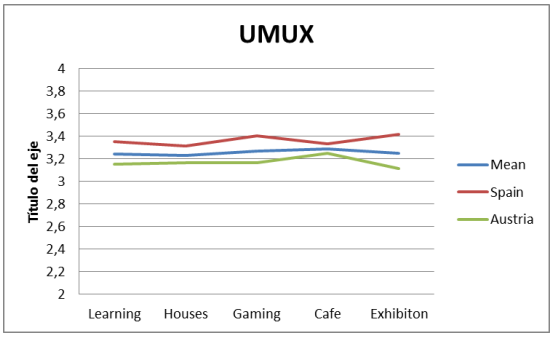


Figure 81: UMUX Scores for Spanish and Austrian End-users

Ranks

	user_type	N	Mean Rank	SumofRanks
UMUX Learning Area	Secondary User	19	18,74	356,00
	Primary User	17	18,24	310,00
	Total	36		
UMUX Houses	Secondary User	19	18,03	342,50
	Primary User	17	19,03	323,50
	Total	36		
UMUX Gaming Area	Secondary User	19	19,95	379,00
	Primary User	17	16,88	287,00
	Total	36		
UMUX Cafe	Secondary User	19	19,71	374,50
	Primary User	17	17,15	291,50
	Total	36		
UMUX Exhibition Area	Secondary User	19	19,03	361,50
	Primary User	17	17,91	304,50
	Total	36		

Test Statistics[b]

	UMUX Learning Area	UMUX Houses	UMUX Gaming Area	UMUX Cafe	UMUX Exhibition Area
Mann-Whitney U	157,000	152,500	134,000	138,500	151,500
Wilcoxon W	310,000	342,500	287,000	291,500	304,500
Z	-,145	-,290	-,896	-,748	-,322
Asymp. Sig. (2-tailed)	,885	,772	,370	,455	,747
Exact Sig. [2*(1-tailed Sig.)]	,900[a]	,778[a]	,397[a]	,471[a]	,754[a]

a. Not corrected for ties.

b. Grouping Variable: user_type

Figure 82: U Man Whitney. UMUX differences between Primary and Secondary End-users

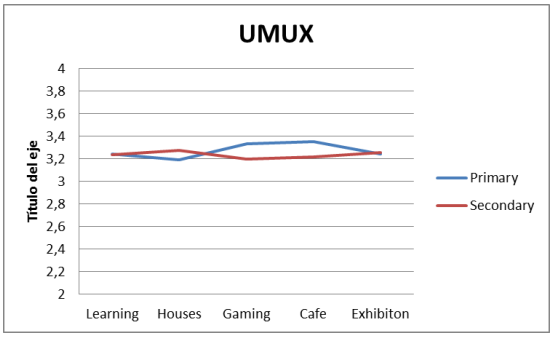


Figure 83: UMUX Scores for Primary and Secondary End-users

Ranks

	group	N	Mean Rank	Sum of Ranks
UMUX Learning Area	Primary User Spain	7	8,86	62,00
	Primary User Austria	10	9,10	91,00
	Total	17		
UMUX Houses	Primary User Spain	7	9,50	66,50
	Primary User Austria	10	8,65	86,50
	Total	17		
UMUX Gaming Area	Primary User Spain	7	9,57	67,00
	Primary User Austria	10	8,60	86,00
	Total	17		
UMUX Cafe	Primary User Spain	7	8,14	57,00
	Primary User Austria	10	9,60	96,00
	Total	17		
UMUX Exhibition Area	Primary User Spain	7	9,50	66,50
	Primary User Austria	10	8,65	86,50
	Total	17		

Test Statistics[b]

	UMUX Learning Area	UMUX Houses	UMUX Gaming Area	UMUX Cafe	UMUX Exhibition Area
Mann-Whitney U	34,000	31,500	31,000	29,000	31,500
Wilcoxon W	62,000	86,500	86,000	57,000	86,500
Z	-,099	-,353	-,399	-,600	-,348
Asymp. Sig. (2-tailed)	,921	,724	,690	,548	,727
Exact Sig. [2*(1-tailed Sig.)]	,962[a]	,740[a]	,740[a]	,601[a]	,740[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 84: U Man Whitney. UMUX differences between Spanish and Austrian Primary End-users

As it has been mentioned before, even if the answers of these two groups are different, this is not statistically significant.

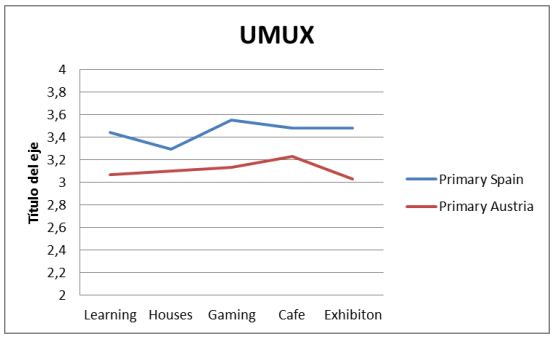


Figure 85: UMUX Scores for Spanish and Austrian Primary End-users

Ranks

	group	N	Mean Rank	Sum of Ranks
UMUX Learning Area	Secondary User Spain	9	11,50	103,50
	Secondary User Austria	10	8,65	86,50
	Total	19		
UMUX Houses	Secondary User Spain	9	10,94	98,50
	Secondary User Austria	10	9,15	91,50
	Total	19		
UMUX Gaming Area	Secondary User Spain	9	11,72	105,50
	Secondary User Austria	10	8,45	84,50
	Total	19		
UMUX Cafe	Secondary User Spain	9	11,56	104,00
	Secondary User Austria	10	8,60	86,00
	Total	19		
UMUX Exhibition Area	Secondary User Spain	9	11,78	106,00
	Secondary User Austria	10	8,40	84,00
	Total	19		

Test Statistics[b]

	UMUX Learning Area	UMUX Houses	UMUX Gaming Area	UMUX Cafe	UMUX Exhibition Area
Mann-Whitney U	31,500	36,500	29,500	31,000	29,000
Wilcoxon W	86,500	91,500	84,500	86,000	84,000
Z	-1,122	-,702	-1,344	-1,186	-1,333
Asymp. Sig. (2-tailed)	,262	,482	,179	,236	,183
Exact Sig. [2*(1-tailed Sig.)]	,278[a]	,497[a]	,211[a]	,278[a]	,211[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 86: U Man Whitney. UMUX differences between Spanish and Austrian Secondary End-users

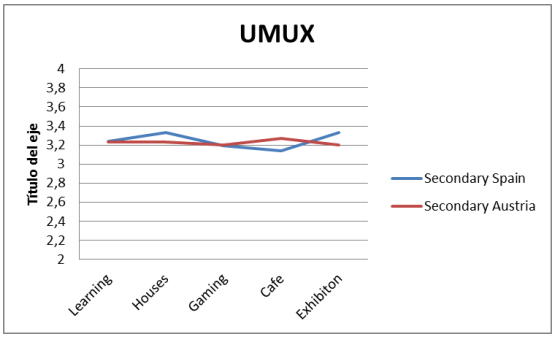


Figure 87: UMUX Scores for Spanish and Austrian Secondary End-users

Ranks

	group	N	Mean Rank	Sum of Ranks
UMUX Learning Area	Primary User Spain	7	7,57	53,00
	Secondary User Spain	9	9,22	83,00
	Total	16		
UMUX Houses	Primary User Spain	7	8,29	58,00
	Secondary User Spain	9	8,67	78,00
	Total	16		
UMUX Gaming Area	Primary User Spain	7	6,43	45,00
	Secondary User Spain	9	10,11	91,00
	Total	16		
UMUX Cafe	Primary User Spain	7	6,50	45,50
	Secondary User Spain	9	10,06	90,50
	Total	16		
UMUX Exhibition Area	Primary User Spain	7	7,00	49,00
	Secondary User Spain	9	9,67	87,00
	Total	16		

Test Statistics[b]

	UMUX Learning Area	UMUX Houses	UMUX Gaming Area	UMUX Cafe	UMUX Exhibition Area
Mann-Whitney U	25,000	30,000	17,000	17,500	21,000
Wilcoxon W	53,000	58,000	45,000	45,500	49,000
Z	-,711	-,162	-1,607	-1,522	-1,141
Asymp. Sig. (2-tailed)	,477	,871	,108	,128	,254
Exact Sig. [2*(1-tailed Sig.)]	,536[a]	,918[a]	,142[a]	,142[a]	,299[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 88: U Man Whitney. UMUX differences between Spanish Primary and Secondary End-users

The same situation is found in this case. As it can be seen in the previous table, the difference is not statistically significant (p> 0.05)

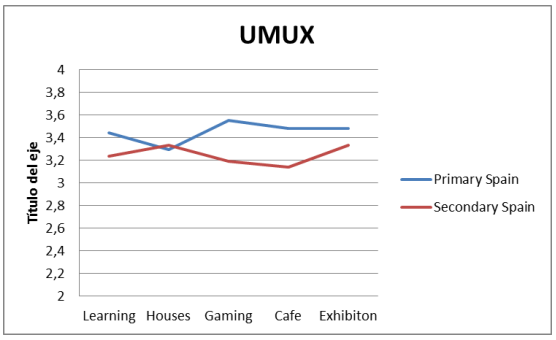


Figure 89: UMUX Scores for Spanish Primary and Secondary End-users

Ranks

	group	N	Mean Rank	Sum of Ranks
UMUX Learning Area	Primary User Austria	10	11,05	110,50
	Secondary User Austria	10	9,95	99,50
	Total	20		
UMUX Houses	Primary User Austria	10	11,15	111,50
	Secondary User Austria	10	9,85	98,50
	Total	20		
UMUX Gaming Area	Primary User Austria	10	10,65	106,50
	Secondary User Austria	10	10,35	103,50
	Total	20		
UMUX Cafe	Primary User Austria	10	10,90	109,00
	Secondary User Austria	10	10,10	101,00
	Total	20		
UMUX Exhibition Area	Primary User Austria	10	11,20	112,00
	Secondary User Austria	10	9,80	98,00
	Total	20		

Test Statistics[b]

	UMUX Learning Area	UMUX Houses	UMUX Gaming Area	UMUX Cafe	UMUX Exhibition Area
Mann-Whitney U	44,500	43,500	48,500	46,000	43,000
Wilcoxon W	99,500	98,500	103,500	101,000	98,000
Z	-,421	-,503	-,117	-,312	-,537
Asymp. Sig. (2-tailed)	,674	,615	,907	,755	,591
Exact Sig. [2*(1-tailed Sig.)]	,684[a]	,631[a]	,912[a]	,796[a]	,631[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 90: U Man Whitney. UMUX differences between Austrian Primary and Secondary End-users

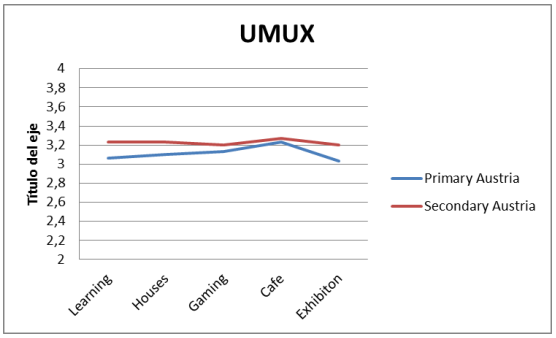


Figure 91: UMUX Scores for Austrian Primary and Secondary End-users

2.2.9.ASQ

The After-Scenario Questionnaire (ASQ) tests the overall ease of task completion, satisfaction with completion time, and satisfaction with support information. Some differences have been found between the groups as it is shown below.

The next tables and illustration show that there is a significant difference between Spanish and Austrian end users. The illustration shows that, in general, Spanish users are more satisfied with the scenarios than Austrian end users. Specifically are more satisfied with the Exhibition Area scenario and find it easier to complete the task than the Austrian ones ($P< 0.05$)

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Ranks

	country	N	Mean Rank	Sum of Ranks
ASQ Learning Area	Spain	16	20,69	331,00
	Austria	20	16,75	335,00
	Total	36		
ASQ Houses	Spain	16	21,34	341,50
	Austria	20	16,23	324,50
	Total	36		
ASQ Gaming Area	Spain	16	22,28	356,50
	Austria	20	15,48	309,50
	Total	36		
ASQ Cafe	Spain	16	21,63	346,00
	Austria	20	16,00	320,00
	Total	36		
ASQ Exhibition Area	Spain	16	23,56	377,00
	Austria	20	14,45	289,00
	Total	36		

Test Statistics[b]

	ASQ Learning Area	ASQ Houses	ASQ Gaming Area	ASQ Cafe	ASQ Exhibition Area
Mann-Whitney U	125,000	114,500	99,500	110,000	79,000
Wilcoxon W	335,000	324,500	309,500	320,000	289,000
Z	-1,135	-1,480	-1,957	-1,631	-2,627
Asymp. Sig. (2-tailed)	,256	,139	,050	,103	,009
Exact Sig. [2*(1-tailed Sig.)]	,276[a]	,149[a]	,053[a]	,116[a]	,009[a]

a. Not corrected for ties.

b. Grouping Variable: country

Figure 92: U Man Whitney. ASQ differences between Spanish and Austrian End-users

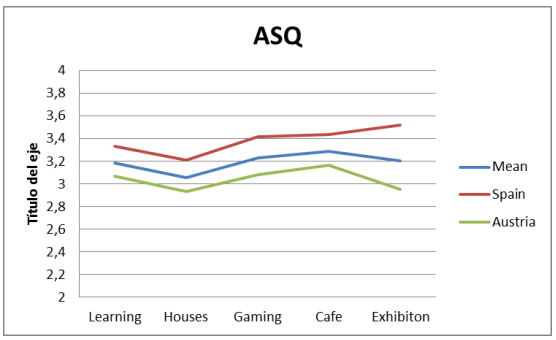

Figure 93: ASQ Scores for Spanish and Austrian End-users

No significant differences (p> 0.05) have been found between Primary and Secondary end users.

Ranks

	user_type	N	Mean Rank	SumofRanks
ASQ Learning Area	Secondary User	19	18,50	351,50
	Primary User	17	18,50	314,50
	Total	36		
ASQ Houses	Secondary User	19	17,66	335,50
	Primary User	17	19,44	330,50
	Total	36		
ASQ Gaming Area	Secondary User	19	17,37	330,00
	Primary User	17	19,76	336,00
	Total	36		
ASQ Cafe	Secondary User	19	19,47	370,00
	Primary User	17	17,41	296,00
	Total	36		
ASQ Exhibition Area	Secondary User	19	16,16	307,00
	Primary User	17	21,12	359,00
	Total	36		

Test Statistics[b]

	ASQ Learning Area	ASQ Houses	ASQ Gaming Area	ASQ Cafe	ASQ Exhibition Area
Mann-Whitney U	161,500	145,500	140,000	143,000	117,000
Wilcoxon W	314,500	335,500	330,000	296,000	307,000
Z	,000	-,518	-,692	-,601	-1,437
Asymp. Sig. (2-tailed)	1,000	,604	,489	,548	,151
Exact Sig. [2*(1-tailed Sig.)]	1,000[a]	,616[a]	,510[a]	,573[a]	,165[a]

a. Not corrected for ties.

b. Grouping Variable: user_type

Figure 94: U Man Whitney. ASQ differences between Primary and Secondary End-users

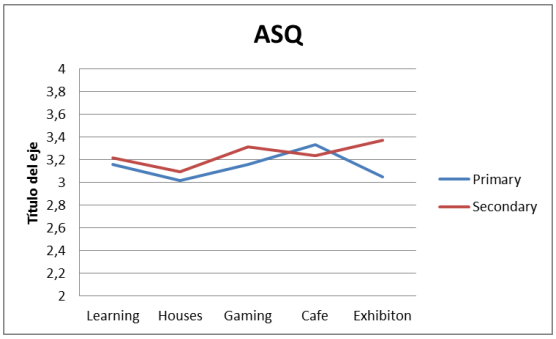

Figure 95: ASQ Scores for Primary and Secondary End-users

No differences have been found in any of the scenarios between Spanish and Austrian Primary Users (p> 0.05) even if the Spanish ones seem to be more satisfied.

Ranks

	group	N	Mean Rank	Sum of Ranks
ASQ Learning Area	Primary User Spain	7	8,86	62,00
	Primary User Austria	10	9,10	91,00
	Total	17		
ASQ Houses	Primary User Spain	7	8,07	56,50
	Primary User Austria	10	9,65	96,50
	Total	17		
ASQ Gaming Area	Primary User Spain	7	10,71	75,00
	Primary User Austria	10	7,80	78,00
	Total	17		
ASQ Cafe	Primary User Spain	7	9,57	67,00
	Primary User Austria	10	8,60	86,00
	Total	17		
ASQ Exhibition Area	Primary User Spain	7	10,93	76,50
	Primary User Austria	10	7,65	76,50
	Total	17		

Test Statistics[b]

	ASQ Learning Area	ASQ Houses	ASQ Gaming Area	ASQ Cafe	ASQ Exhibition Area
Mann-Whitney U	34,000	28,500	23,000	31,000	21,500
Wilcoxon W	62,000	56,500	78,000	86,000	76,500
Z	-,104	-,651	-1,192	-,414	-1,358
Asymp. Sig. (2-tailed)	,917	,515	,233	,679	,174
Exact Sig. [2*(1-tailed Sig.)]	,962[a]	,536[a]	,270[a]	,740[a]	,193[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 96: U Man Whitney. ASQ differences between Spanish and Austrian Primary End-users

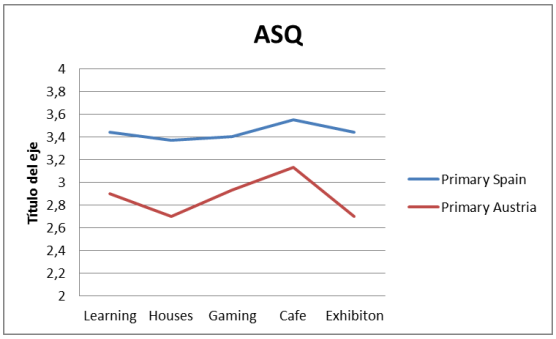

Figure 97: ASQ Scores for Spanish and Austrian Primary End-users

Significant differences have been found between Spanish and Austrian Secondary users for the Houses and Exhibition Area Scenarios. The Austrian Secondary Users are more satisfied than the Spanish ones in the Houses scenario ($p<0.05$). The opposite situation is found for the Exhibition area scenario where the Spanish ones feel more satisfied ($p<0.05$).

Ranks

	group	N	Mean Rank	SumofRanks
ASQ Learning Area	Secondary User Spain	9	12,33	111,00
	Secondary User Austria	10	7,90	79,00
	Total	19		
ASQ Houses	Secondary User Spain	9	13,22	119,00
	Secondary User Austria	10	7,10	71,00
	Total	19		
ASQ Gaming Area	Secondary User Spain	9	12,17	109,50
	Secondary User Austria	10	8,05	80,50
	Total	19		
ASQ Cafe	Secondary User Spain	9	12,50	112,50
	Secondary User Austria	10	7,75	77,50
	Total	19		
ASQ Exhibition Area	Secondary User Spain	9	13,33	120,00
	Secondary User Austria	10	7,00	70,00
	Total	19		

Test Statistics[b]

	ASQ Learning Area	ASQ Houses	ASQ Gaming Area	ASQ Cafe	ASQ Exhibition Area
Mann-Whitney U	24,000	16,000	25,500	22,500	15,000
Wilcoxon W	79,000	71,000	80,500	77,500	70,000
Z	-1,737	-2,413	-1,625	-1,877	-2,496
Asymp. Sig. (2-tailed)	,082	,016	,104	,061	,013
Exact Sig. [2*(1-tailed Sig.)]	,095[a]	,017[a]	,113[a]	,065[a]	,013[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 98: U Man Whitney. ASQ differences between Spanish and Austrian Secondary End-users

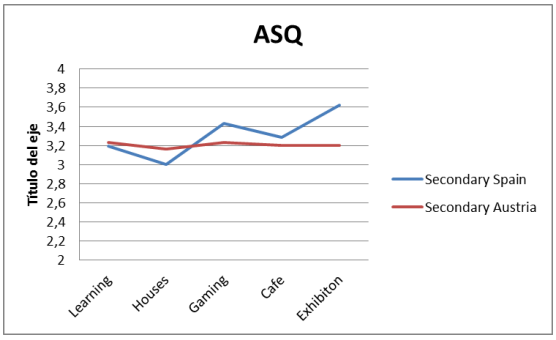

Figure 99: ASQ Scores for Spanish and Austrian Secondary End-users

No differences have been found between Spanish Primary and Secondary Users ($p>0.05$).

Ranks

	group	N	Mean Rank	Sum of Ranks
ASQ Learning Area	Primary User Spain	7	7,57	53,00
	Secondary User Spain	9	9,22	83,00
	Total	16		
ASQ Houses	Primary User Spain	7	6,79	47,50
	Secondary User Spain	9	9,83	88,50
	Total	16		
ASQ Gaming Area	Primary User Spain	7	8,21	57,50
	Secondary User Spain	9	8,72	78,50
	Total	16		
ASQ Cafe	Primary User Spain	7	6,93	48,50
	Secondary User Spain	9	9,72	87,50
	Total	16		
ASQ Exhibition Area	Primary User Spain	7	9,64	67,50
	Secondary User Spain	9	7,61	68,50
	Total	16		

Test Statistics[b]

	ASQ Learning Area	ASQ Houses	ASQ Gaming Area	ASQ Cafe	ASQ Exhibition Area
Mann-Whitney U	25,000	19,500	29,500	20,500	23,500
Wilcoxon W	53,000	47,500	57,500	48,500	68,500
Z	-,710	-1,297	-,222	-1,205	-,876
Asymp. Sig. (2-tailed)	,478	,195	,825	,228	,381
Exact Sig. [2*(1-tailed Sig.)]	,536[a]	,210[a]	,837[a]	,252[a]	,408[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 100: U Man Whitney. ASQ differences between Spanish Primary and Secondary End-users

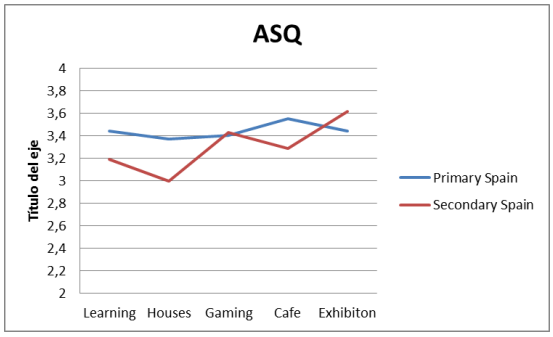

Figure 101: ASQ Scores for Spanish Primary and Secondary End-users

Almost the same situation is found between Austrian Primary and Secondary Users ($p>0.05$).

Ranks

	group	N	Mean Rank	Sum of Ranks
ASQ Learning Area	Primary User Austria	10	11,55	115,50
	Secondary User Austria	10	9,45	94,50
	Total	20		
ASQ Houses	Primary User Austria	10	13,10	131,00
	Secondary User Austria	10	7,90	79,00
	Total	20		
ASQ Gaming Area	Primary User Austria	10	12,05	120,50
	Secondary User Austria	10	8,95	89,50
	Total	20		
ASQ Cafe	Primary User Austria	10	10,80	108,00
	Secondary User Austria	10	10,20	102,00
	Total	20		
ASQ Exhibition Area	Primary User Austria	10	12,50	125,00
	Secondary User Austria	10	8,50	85,00
	Total	20		

Test Statistics[b]

	ASQ Learning Area	ASQ Houses	ASQ Gaming Area	ASQ Cafe	ASQ Exhibition Area
Mann-Whitney U	39,500	24,000	34,500	47,000	30,000
Wilcoxon W	94,500	79,000	89,500	102,000	85,000
Z	-,806	-2,011	-1,199	-,232	-1,549
Asymp. Sig. (2-tailed)	,420	,044	,231	,816	,121
Exact Sig. [2*(1-tailed Sig.)]	,436[a]	,052[a]	,247[a]	,853[a]	,143[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 102: U Man Whitney. ASQ differences between Austrian Primary and Secondary End-users

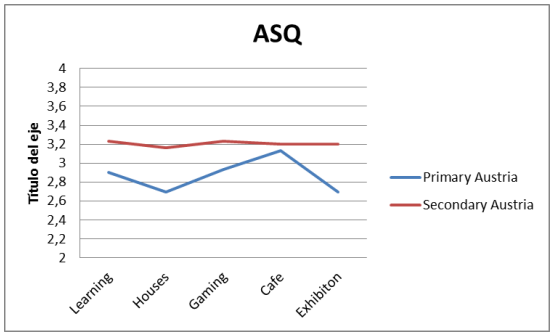

Figure 103: ASQ Scores for Austrian Primary and Secondary End-users

2.2.10. SMEQ

The Subjective Mental Effort Question (SMEQ) is a Single-Item questionnaire that tests the mental effort to complete a task. In this case, the higher the score, the lower the effort. Regarding the results of this questionnaire, many significant differences have been found.

Spanish end users report a lower effort needed to complete the tasks. A significant difference has been found between Spanish and Austrian end users (P<0.05) in all the scenarios.

Ranks

	country	N	Mean Rank	Sum of Ranks
SMEQ Learning Area	Spain	16	25,69	411,00
	Austria	20	12,75	255,00
	Total	36		
SMEQ Houses	Spain	16	26,19	419,00
	Austria	20	12,35	247,00
	Total	36		
SMEQ Gaming Area	Spain	16	26,25	420,00
	Austria	20	12,30	246,00
	Total	36		
SMEQ Cafe	Spain	15	23,80	357,00
	Austria	20	13,65	273,00
	Total	35		
SMEQ Exhibition Area	Spain	16	25,41	406,50
	Austria	20	12,98	259,50
	Total	36		

Test Statistics[b]

	SMEQ Learning Area	SMEQ Houses	SMEQ Gaming Area	SMEQ Cafe	SMEQ Exhibition Area
Mann-Whitney U	45,000	37,000	36,000	63,000	49,500
Wilcoxon W	255,000	247,000	246,000	273,000	259,500
Z	-3,806	-4,065	-4,132	-3,057	-3,671
Asymp. Sig. (2-tailed)	,000	,000	,000	,002	,000
Exact Sig. [2*(1-tailed Sig.)]	,000[a]	,000[a]	,000[a]	,003[a]	,000[a]

a. Not corrected for ties.

b. Grouping Variable: country

Figure 104: U Man Whitney. SMEQ differences between Spanish and Austrian End-users

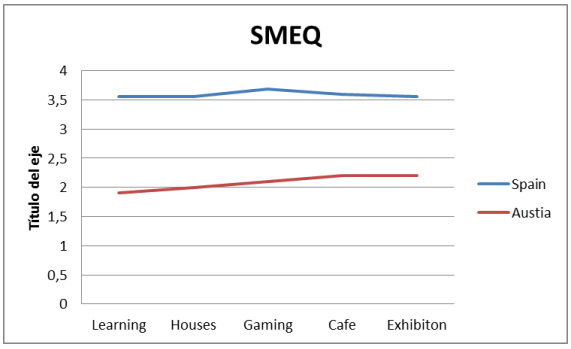

Figure 105: SMEQ Scores for Spanish and Austrian End-users

No differences have been found between Primary and Secondary end users (p>0.05).

Ranks

	user_type	N	Mean Rank	Sum of Ranks
SMEQ Learning Area	Secondary User	19	20,79	395,00
	Primary User	17	15,94	271,00
	Total	36		
SMEQ Houses	Secondary User	19	20,68	393,00
	Primary User	17	16,06	273,00
	Total	36		
SMEQ Gaming Area	Secondary User	19	19,42	369,00
	Primary User	17	17,47	297,00
	Total	36		
SMEQ Cafe	Secondary User	19	20,39	387,50
	Primary User	16	15,16	242,50
	Total	35		
SMEQ Exhibition Area	Secondary User	19	19,11	363,00
	Primary User	17	17,82	303,00
	Total	36		

Test Statistics[b]

	SMEQ Learning Area	SMEQ Houses	SMEQ Gaming Area	SMEQ Cafe	SMEQ Exhibition Area
Mann-Whitney U	118,000	120,000	144,000	106,500	150,000
Wilcoxon W	271,000	273,000	297,000	242,500	303,000
Z	-1,433	-1,365	-,580	-1,588	-,380
Asymp. Sig. (2-tailed)	,152	,172	,562	,112	,704
Exact Sig. [2*(1-tailed Sig.)]	,175[a]	,196[a]	,594[a]	,133[a]	,731[a]

a. Not corrected for ties.

b. Grouping Variable: user_type

Figure 106: U Man Whitney. SMEQ differences between Primary and Secondary End-users

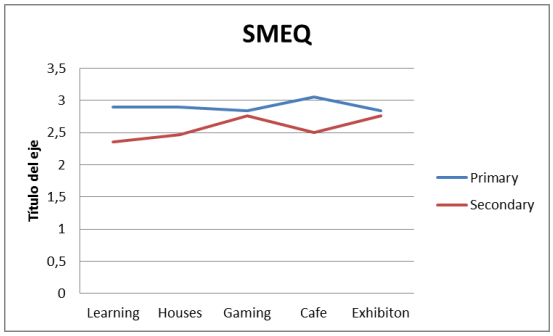

Figure 107: SMEQ Scores for Primary and Secondary End-users

Spanish Primary End Users report less effort needed to complete the tasks of all the scenarios than Austrian ones ($p<0.05$).

Ranks

	group	N	Mean Rank	Sum of Ranks
SMEQ Learning Area	Primary User Spain	7	12,14	85,00
	Primary User Austria	10	6,80	68,00
	Total	17		
SMEQ Houses	Primary User Spain	7	12,64	88,50
	Primary User Austria	10	6,45	64,50
	Total	17		
SMEQ Gaming Area	Primary User Spain	7	12,36	86,50
	Primary User Austria	10	6,65	66,50
	Total	17		
SMEQ Cafe	Primary User Spain	6	11,67	70,00
	Primary User Austria	10	6,60	66,00
	Total	16		
SMEQ Exhibition Area	Primary User Spain	7	11,93	83,50
	Primary User Austria	10	6,95	69,50
	Total	17		

Test Statistics[b]

	SMEQ Learning Area	SMEQ Houses	SMEQ Gaming Area	SMEQ Cafe	SMEQ Exhibition Area
Mann-Whitney U	13,000	9,500	11,500	11,000	14,500
Wilcoxon W	68,000	64,500	66,500	66,000	69,500
Z	-2,220	-2,622	-2,410	-2,138	-2,107
Asymp. Sig. (2-tailed)	,026	,009	,016	,033	,035
Exact Sig. [2*(1-tailed Sig.)]	,033[a]	,010[a]	,019[a]	,042[a]	,043[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 108: U Man Whitney. SMEQ differences between Spanish and Austrian Primary End-users

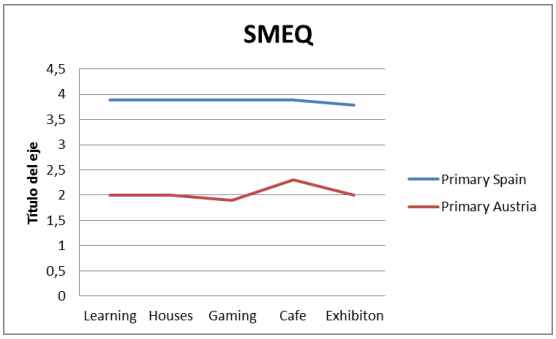

Figure 109: SMEQ Scores for Spanish and Austrian Primary End-users

The same situation is found between Spanish and Austrian Secondary End Users. There is a significant difference in all the scenarios ($p<0.05$).

Ranks

	group	N	Mean Rank	SumofRanks
SMEQ Learning Area	Secondary User Spain	9	14,28	128,50
	Secondary User Austria	10	6,15	61,50
	Total	19		
SMEQ Houses	Secondary User Spain	9	14,28	128,50
	Secondary User Austria	10	6,15	61,50
	Total	19		
SMEQ Gaming Area	Secondary User Spain	9	14,28	128,50
	Secondary User Austria	10	6,15	61,50
	Total	19		
SMEQ Cafe	Secondary User Spain	9	12,78	115,00
	Secondary User Austria	10	7,50	75,00
	Total	19		
SMEQ Exhibition Area	Secondary User Spain	9	13,78	124,00
	Secondary User Austria	10	6,60	66,00
	Total	19		

Test Statistics[b]

	SMEQ Learning Area	SMEQ Houses	SMEQ Gaming Area	SMEQ Cafe	SMEQ Exhibition Area
Mann-Whitney U	6,500	6,500	6,500	20,000	11,000
Wilcoxon W	61,500	61,500	61,500	75,000	66,000
Z	-3,373	-3,373	-3,399	-2,387	-2,966
Asymp. Sig. (2-tailed)	,001	,001	,001	,017	,003
Exact Sig. [2*(1-tailed Sig.)]	,001[a]	,001[a]	,001[a]	,043[a]	,004[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 110: U Man Whitney. SMEQ differences between Spanish and Austrian Secondary End-users

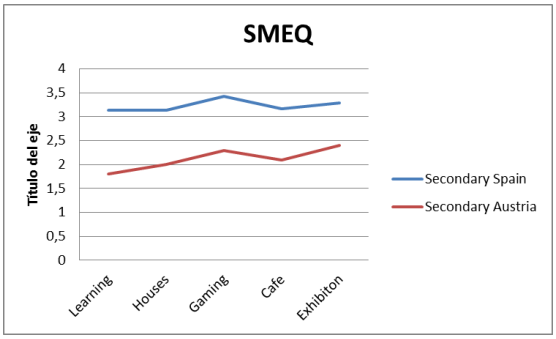

Figure 111: SMEQ Scores for Spanish and Austrian Secondary End-users

Spanish Primary users needed less effort to complete many of the tasks (Learning Area, Houses and Café) than Secondary ones ($p<0.05$). This result is very positive because it indicates that the adaptation done for older people seems to be giving back good results.

Ranks

	group	N	Mean Rank	SumofRanks
SMEQ Learning Area	Primary User Spain	7	5,14	36,00
	Secondary User Spain	9	11,11	100,00
	Total	16		
SMEQ Houses	Primary User Spain	7	5,14	36,00
	Secondary User Spain	9	11,11	100,00
	Total	16		
SMEQ Gaming Area	Primary User Spain	7	6,43	45,00
	Secondary User Spain	9	10,11	91,00
	Total	16		
SMEQ Cafe	Primary User Spain	6	4,75	28,50
	Secondary User Spain	9	10,17	91,50
	Total	15		
SMEQ Exhibition Area	Primary User Spain	7	6,29	44,00
	Secondary User Spain	9	10,22	92,00
	Total	16		

Test Statistics[b]

	SMEQ Learning Area	SMEQ Houses	SMEQ Gaming Area	SMEQ Cafe	SMEQ Exhibition Area
Mann-Whitney U	8,000	8,000	17,000	7,500	16,000
Wilcoxon W	36,000	36,000	45,000	28,500	44,000
Z	-2,889	-2,889	-1,908	-2,702	-1,906
Asymp. Sig. (2-tailed)	,004	,004	,056	,007	,057
Exact Sig. [2*(1-tailed Sig.)]	,012[a]	,012[a]	,142[a]	,018[a]	,114[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 112: U Man Whitney. SMEQ differences between Spanish Primary and Secondary End-users

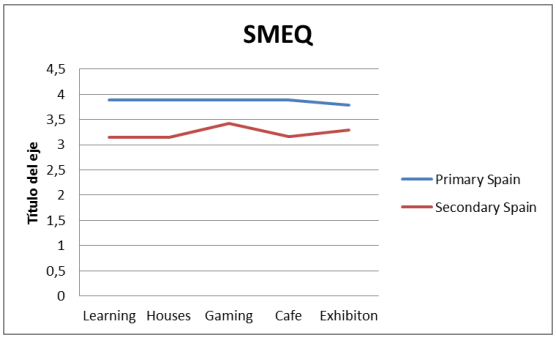

Figure 113: SMEQ Scores for Spanish Primary and Secondary End-users

No differences have been found between Austrian Primary and Secondary End Users (p>0.05).

Ranks

	group	N	Mean Rank	SumofRanks
SMEQ Learning Area	Primary User Austria	10	10,05	100,50
	Secondary User Austria	10	10,95	109,50
	Total	20		
SMEQ Houses	Primary User Austria	10	10,70	107,00
	Secondary User Austria	10	10,30	103,00
	Total	20		
SMEQ Gaming Area	Primary User Austria	10	11,70	117,00
	Secondary User Austria	10	9,30	93,00
	Total	20		
SMEQ Cafe	Primary User Austria	10	10,60	106,00
	Secondary User Austria	10	10,40	104,00
	Total	20		
SMEQ Exhibition Area	Primary User Austria	10	11,90	119,00
	Secondary User Austria	10	9,10	91,00
	Total	20		

Test Statistics[b]

	SMEQ Learning Area	SMEQ Houses	SMEQ Gaming Area	SMEQ Cafe	SMEQ Exhibition Area
Mann-Whitney U	45,500	48,000	38,000	49,000	36,000
Wilcoxon W	100,500	103,000	93,000	104,000	91,000
Z	-,359	-,159	-,955	-,080	-1,146
Asymp. Sig. (2-tailed)	,719	,874	,340	,936	,252
Exact Sig. [2*(1-tailed Sig.)]	,739[a]	,912[a]	,393[a]	,971[a]	,315[a]

a. Not corrected for ties.

b. Grouping Variable: group

Figure 114: U Man Whitney. SMEQ differences between Austrian Primary and Secondary End-users

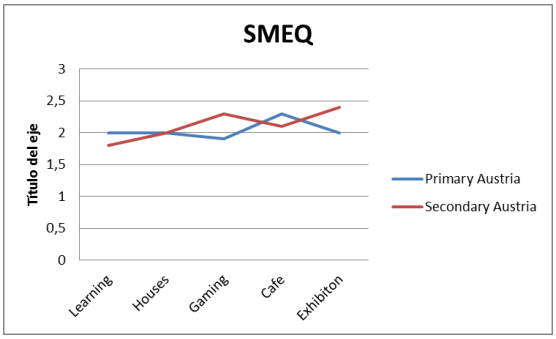

Figure 115: SMEQ Scores for Austrian Primary and Secondary End-users

3. FINAL CONCLUSIONS

Even if there were two evaluations planned for this period, the consortium agreed to make 4 different evaluations:

1. First evaluation: this was a planned evaluation in order to assess if the user requirements obtained by the focus groups was well expressed in the first development of the Island. This step was necessary to have a feedback from the end-users to continue developing the Island.
2. Multi-User trial: this assessment was planned by the consortium. The idea of the Island is the interaction between people and no one of the trials had taken that into account so the consortium wanted to see how older people react. This experience was very enriching for the consortium when we saw how older people from two different countries interacted in a very natural way.
3. End-user device trial: this trial was not planned for this project and was organized with the aim of finding a better way to interact with the system. The consortium found and developed two new ways to interact with the Island: one to be used from the smartphone and the other one to be used from a touchscreen. Unfortunately, even if some ideas have been very inspiring and promising for the future, this objective was out of the scope of this project and the consortium didn't have enough time to develop it during 3rD-LIFE project.
4. Final trial: the objective of this project was to have a final feedback about the project and analyse whether the challenges of the project were reached. The results showed the consortium that the developed Island was what end-users wanted. Nevertheless it would have been nice to have more time to have a final version of an end-user device even if was not an objective of the project. Because of the good results of the trials, some companies have shown their interest on using or buying 3rD-LIFE Island.

As general conclusion, the consortium has organised the double of the trials that were planned in order to assure that the development was a good platform for older people.

Because of that, now we can say that we have developed a platform for the target group of this project. As a consequence, before ending this project we have found two different companies interested on buying our project. Hope that we reach an agreement during 2013.