DELIVERABLE REPORT
D9.4 (revised)
"Evaluation of Final Integrated Prototype"

Collaborative project

MASELTOV
Mobile Assistance for Social Inclusion and Empowerment of Immigrants with Persuasive Learning Technologies and Social Network Services

Grant Agreement No. 288587 / ICT for Inclusion

Project co-funded by the
European Commission
Information Society and Media Directorate-General
Information and Communication Technologies
Seventh Framework Programme (2007-2013)

Due date of deliverable:	March 31, 2015 (month 39)
Actual submission date:	October 7, 2015
Start date of project:	January 1, 2012
Duration:	39 months

Work package	**WP9 – Field Trials and Evaluation**
Task	**T9.4 – Final Field Trials**
Lead contractor for this deliverable	**ATE**
Editor	**Stephanie Schwarz (ATE)**
Authors	**Stephanie Schwarz (ATE), Andrew Brasher (OU), Jan Jones (OU), Ann Jones (OU), Lucy Norris (OU) Estefania Palacio (ATE), Jan Bobeth (ATE), Lucas Paletta, Michael Schwarz, Stefan Ladstätter (JR)**
Quality reviewer	**Lucas Paletta (JR)**

Project co-funded by the European Commission within the Seventh Framework Programme (2007–2013)		
Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

CONTACT

Contact for feedback on this report to the project coordinator:

lucas.paletta@joanneum.at
Lucas Paletta
JOANNEUM RESEARCH Forschungsgesellschaft mbH
Steyrergasse 17
8010 Graz
Austria

Contact for feedback on this report to the editor:

stephanie.schwarz@ait.ac.at
Stephanie Schwarz
AIT - Austrian Institute of Technology GmbH
Giefinggasse 2
1210 Vienna
Austria

MASELTOV partner			organisation name	country code
01	JR		JOANNEUM RESEARCH FORSCHUNGSGESELLSCHAFT MBH	AT
02	CUR		CURE CENTRUM FUR DIE UNTERSUCHUNG UND REALISIERUNG ENDBENUTZER-ORIENTIERTER INTERAKTIVER SYSTEME	AT
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CONTENT

EXECUTIVE SUMMARY

This deliverable contains the detailed description of realized procedures and gathered results of the evaluation activities under the frame of the final field trials in MASELTOV.

Within Task 9.4, MASELTOV realized a strong involvement of end users as the final main assessment activities of the test and evaluation phase within the project. In this task the fully integrated MASELTOV system including all technological components achieved by developing partners was evaluated with target users in the field. In total four long term field studies and an outdoor evaluation study were conducted involving different MASELTOV user groups i.e., Turkish immigrants in Austria, as well as immigrants from Latin American and Arabic countries in the United Kingdom.

By the strong and successful collaboration between NGOs (DAN, MRC), technical partners (AIT, PP, COV, TI, FLU, CTU and JR), the lead partner of user involvement ATE and the researchers from OU four long term field studies with over 60 participants in total were realised, in which immigrants were using the MASELTOV (MApp) services in their daily life. Beside partners´ contribution additional personnel supported the trials in form of native speakers (Turkish, Spanish, Arabic) for workshop and study facilitation, support and realistic deployment of the target scenarios (i.e. volunteers for the Help Radar services).

Trials lasted between three and eight weeks, qualitative and quantitative data were collected from participants in form of discussion feedback, standardized questionnaires, regular online questionnaires (modified experience sampling) as well as usage activity logging.

Research questions focused on user experience (e.g., satisfaction, privacy) and usage behaviour (e.g., usage frequency, variability), as well as on the impact of MApp service usage on immigrants´ language and communication skills and cultural understanding.

In the course of this deliverable MApp services' strengths and limitations are identified in respect with the preferences and experiences of the involved representatives of the three immigrants groups. Recommendations for the further improvement of the services towards higher technology readiness level from a usability and (learning) experience point of view are presented in this deliverable. Final considerations on methodological achievements and challenges accomplish the report towards useful set of implications for future investigation.

1. INTRODUCTION

1.1 BACKGROUND

Usability issues and user experience results that were analysed during the evaluation of selected services in a first integrated MApp version have been reported in D9.3. Based on the recommendations reported in D9.3 the functional prototypes of the MASELTOV (MApp) services were improved and finalized during Summer 2014. The list of comprehensive recommendations based on the user feedback (D9.3) was provided and worked through together with the developing partners in order to eliminate the remaining bugs and usability problems as well as realize final improvements to the services and components for the final trials. By the end of September 2014 all improvements on the components were completed in the work packages 3, 5 to 8 including iterative system integration (D3.3.3), recommendation services (D5.4.2), mobile assistance and information services (D6.1.2), POI navigation (D6.3.2), playful cultural services (D7.4.2) and social learning of language for immigrants (8.2.3, 8.3.3). Finalization of implementation activities allowed us to prepare and set up the MApp services for the long term final field trials.

These trials took place based in 3 cities (London, Graz and Milton Keynes) from the end of October 2014 until the end of February 2015. Over the series of trials we gathered new insights about motivating immigrants to practice the target language, to move around unfamiliar surroundings, to engage them in social networks and from this into concrete communication in the host language.

This deliverable (D9.4) describes how the final evaluation study was conducted and reports the results of the study.

1.2 SCOPE OF THIS DELIVERABLE

This deliverable contains the detailed description of realized procedures and gathered results of the evaluation activities under the frame of the final field trials in MASELTOV.

A long term user experience evaluation study with immigrants from Turkey, Latin-American and Arabic countries was conducted over a eight weeks duration in London (UK) and Graz (AT) (see Section 2. User experience of MApp). Usage activity with MApp services and long term user experience of the MApp services were investigated in contrast to socio-demographic characteristics and aspects of subjective well-being. Beside the *Profile* and Recommendations (WP5) we evaluated services for enhanced

- communication and community building, *Help Radar* (WP8), *Forum* (WP8),
- orientation and mobility, *Navigation service* (WP6), *Pedestrian navigation* (WP4), *Places of interest* (WP6),
- information access, *Information service* (WP6),
- language and cultural learning, *Translation tool* (WP4), *Language lessons* (WP7, WP8), and the *Game* (WP7).

A learning experience evaluation study with immigrants from Latin-American countries was conducted over three week duration in Milton Keynes (UK) (see Section 3. Language learning with MApp). The study focused on the impact of MApp service usage on immigrants´ language

and communication skills and cultural understanding. Beside the *Profile* and *Recommendations* (WP5) we evaluated services for

- language learning, *Translation tool* (WP4), *Forum* (WP8),
- orientation and mobility, *Pedestrian navigation* (WP4), *Places of interest* (WP6), *Language lessons* (WP7, WP8), and the *Game* (WP7).

Qualitative and quantitative evaluation methods and techniques were used to answer the main research questions addressed in Section 2.1 and 3.1., such as usage data logging, questionnaires, and discussion rounds in workshops. Evaluation procedures for these final user involving activities in the MASELTOV project are presented in Section 2.2 and 3.2.

Results from conducted studies are presented and discussed in order to reach a better understanding of the overall user experience and aspects of learning in relation with the MApp services (see Section 2.3 and 3.3). Results on MApp services usability (i.e., effectiveness, ease of use, efficiency) participants´ user experience (i.e., satisfaction, expectation, trust), their learning experience, and implications for the impact of MASELTOV on their quality of life are presented. Finally aspects on the methodological challenges and achievements are reflected and discussed in section 4.

The final evaluations reported in this deliverable close the User Centred design process followed in the MASELTOV project (see D9.1.1 - D9.1.3).

2. USER EXPERIENCE OF MAPP

For a better overview in the following section the main design of the final field trials is presented as predefined in the assessment and evaluation plan which was delivered earlier in the project (D9.1.3).

In T9.4 the fully integrated MASELTOV system was evaluated with target users in the field. For the trials the services were available in the immigrants' native language. In their final version the prototypes for the access to all services developed in WP 5 to 8 were tested one last time in a real world context with the goal to investigate usability and user experience aspects during long term usage of the main service components. A special focus was set on the evolution of different learning and user experience aspects over time. Hence, the purpose of this task was to evaluate not only the functionality of the services but also the infrastructure they are based upon which serve to fostering the empowerment and social inclusion of the immigrant target groups. Table 1 depicts the services and components, which were evaluated in T9.4. With the support of ATE and OU, the two remaining MASELTOV NGOs DAN in Austria and MRC in United Kingdom conducted the trials in their country with relevant users in the appropriate language (see Table 1).

Table 1. Overview of location and language settings for the conducted service evaluations.

Services and Modules	evaluated in (by participants)		
	United Kingdom (Latin American)	United Kingdom (Arabic)	Austria (Turkish)
Profile	x	x	x
Translation tool	x	x	x
Help Radar	x	x	x
Forum	x		x
Navigation service	x	x	
Pedestrian navigation	x	x	x
Places of interest	x	x	x
Information service	x		
Language lessons	x	x	x
Game	x		x
Recommendations	x	x	x

A detailed guideline for the field evaluation was provided by ATE and reviewed for ethical issues by ICMPD before the user studies took place.

In the following sections the research questions and planned methodological approaches are described in more detail.

2.1 BACKGROUND AND RESEARCH QUESTIONS

With the following main research questions we aimed at investigating the user experience, learning experience immigrants had during the interaction with the MASELTOV services over the duration of eight weeks. Table 2 depicts the list of main research questions (mapped to the planned method) which were investigated in the trial.

Table 2. Mapping research questions to methods and data sources

Research question	Data source/ methods
1. Are there differences in the **usage activity** of immigrants with different origins in different European countries when using MASELTOV services over time?	
1.1. Which services of the system do immigrants use?	Data logging
1.2. Which services do the different immigrant groups prefer? Why? What combinations?	Closing workshop (open discussion)
2. What **user experience** do immigrants have when using MASELTOV services over time?	
2.1. How satisfied are immigrants when using the provided services over time?	ESM week 1, 4, 8 (User experience questionnaire)
2.2. Do immigrants have privacy concerns towards the use of the MApp services? If yes what are they?	Data logging (*Profile – settings*) Closing workshop (privacy questionnaire)

2.2 METHOD AND PARTICIPANTS

2.2.1 STUDY PREPARATION

2.2.1.1 FACILITATOR AND VOLUNTEER INVOLVEMENT

To be able to communicate with immigrants having different mother tongues i.e. Turkish, Spanish and Arabic a network of local supporters and volunteers with according language skills had to be built up in the test cities i.e. Graz, London, and Milton Keynes.

As direct communication was not possible due to the language barrier each cultural group was supported by a facilitator who acted as a liaison officer between the leading researchers at ATE and recruitment coordinators at NGOs. As for the evaluation of the Help Radar service under real world conditions, in addition two volunteers were acquired for the trial. Table 3 shows the main tasks and responsibilities of the involved personnel in more detail. Both facilitators and volunteers were introduced in using the MApp services. They were instructed by ATE and NGOs about the purpose and functionality of each service to make sure that they would be able to provide support to participants in case of problems at any moment of the field phase.

Facilitators who had access to the local immigrant community were responsible for the recruitment of study participants (see 2.2.2). As the central contact person between the study researchers and participants, facilitators moderated the introduction and closing workshops in the mother tongue of the immigrant users.

As further preparation work facilitators were engaged in translating study materials including the update of the informed consent forms, pre-questionnaire, questionnaires (ESM, privacy) in Spanish, Turkish and Arabic. Figure 1 illustrates the applied translation procedure during the trial. In the preparation phase materials were produced in English.

Table 3. Roles and tasks dedicated to involved facilitators and volunteers

	Facilitators	Volunteers
Introduction to MApp apps	• Learn how to use MApp services	• Learn how to use MApp services
Preparation	• Check services in target language • Training in how to support the field trial • Translation of study materials (questionnaires, forms)	• Training in how to support the field trial • Back-translation of study materials (questionnaires, forms)
Recruitment	• Recruitment of participants who only speak mother tongue	-
Introduction workshop	• Participant introduction workshop briefing and conduction	-
Field phase	• Organizing modified Experience Sampling Method (ESM) data collection, sending survey links via the *Forum* • Responding to posts in the *Forum* • Acting as help if somebody gets stuck and needs support using the services"	• Responding to posts in the *Forum* • Walking out to meet assistance seekers with Help Radar (approx. for meeting five to eight participants) • Acting as help if somebody gets stuck and needs support using the services
Final workshop	Participants final workshop briefing and conduction	-
Data pre processing	• Transcription and translation of Final workshop inputs • Facilitator final feedback	• Documentation and translation of *Forum* posts/ discussion • Volunteer final feedback

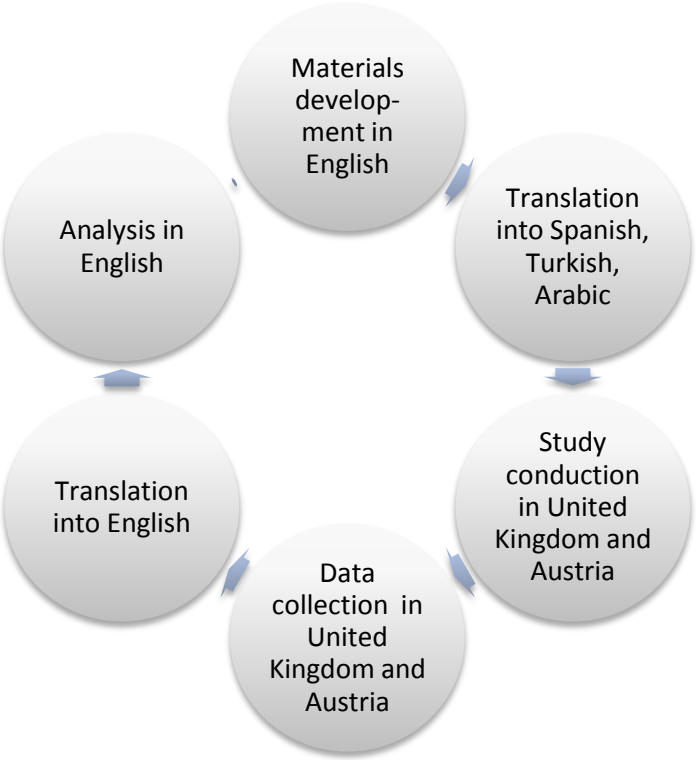

Figure 1. Procedure for the translation of study materials

After internal approvals and review by the ICMPB board they were translated from English into the target language in order to enable immigrant participants to use them. After completion and provided feedback in the target language, most materials were translated back into English (except the Turkish closing workshop due the lacking availability of the Turkish facilitator).

2.2.2 PARTICIPANT RECRUITMENT

The criteria for the recruitment were defined according to the adapted characteristics of the MASELTOV target groups, as follows:

a. Number of participants in total:
   - 18-24 participants with an Arabic background
   - 18-24 participants with a Latin American background
   - 18-24 participants with a Turkish background

b. Working age (i.e. between 18 and 60 years old)

c. Education level: max 8 years in school

d. Sex: equally distributed

e. 1 to 5 years of stay in the UK / Austria

f. Language skills
   - Arabic speaking participants from Arabic countries
   - Spanish speaking participants from Latin American countries
   - Turkish speaking participants from Turkey
   - Experience with using smartphones

Following the exit of one of the end user partners in Summer 2014 (FUNDESO, Spain), final field trials were not conducted in Spain, respectively with immigrants from Arabic countries in Spain. Instead through additional efforts were invested from the side of MRC in order to involve that user group within the final trials in London.

An Arabic-speaking facilitator was recruited by MRC in London. MRC advertised the opportunity via MRC's Facebook and that of a colleague who used to work for an Arabic TV station here in London. Through that one candidate was interviewed and selected. The facilitator was responsible for recruitment. She advertised the role via MRC's own network, via our social media but also through her own friends and other contacts, other migrant organisations in London, including those working specifically with Arabic speakers.

A Colombian social worker in London who formerly had collaborated with MRC in the course of the MASELTOV project (T9.3) was recruited to involve Latin American participants, who she recruited through her network and also via MRC's users.

2.2.3 METHODS

In the final field trial a mixed method approach was used in order to address the exact target groups and to gather qualitative and quantitative data through self-documentation, interrogation in workshops and mobile data logging mechanisms by researchers.

Used methods and techniques were:

Questionnaires: In a short paper-pencil pre-questionnaire participants provided basic demographics and information about their usage habits with different mobile technologies. Additionally, after the first week of MApp service usage a user experience assessment was conducted using the UMUX scale (Finstad, 2010). Further self-assessment instruments aimed to collect participants´ feedback on privacy concerns toward the MASELTOV services (Malhotra, 2004), subjective well-being and self-esteem (Schnell, 2014).

Usage activity logs. App logs were collected via event logging in the User Profile (provided by the partner AIT) and consisted of the usage events of all MApp services, including system apps (Do et al., 2011). Each time the user accesses a MApp service the client software captures the event and stores it together with the timestamp. The usage duration is considered while the analysis also focuses on usage frequency. The number and duration of MApp service accesses are analysed to find out about the popularity of each service, as the ratio of the time spent interacting with the service and the total time spent interacting with the smartphone.

Experience Sampling Method. The Experience Sampling Method (ESM) is a method for collecting information about both the context and content of the daily life of individuals. In the study a modified approach was used to gather subjective user-feedback in the course of the field phase on a regular base. Users received weekly notifications on their test device (Motorola Moto G) via text messaging and the MASELTOV *Forum*, sent from the facilitators. After having followed the link they answered to 3 to 7 short questions about subjective satisfaction and usability aspects (see Table 4). Triggers of notifications were time-based according to a predefined time schedule (Larson et al., 1983).

Figure 2. Screenshots from a mini-questionnaire (all three languages) sent to participants by facilitators.

Questionnaires were implemented online using the free and open source on-line survey application LimeSurvey[1] which allows to conducting surveys in different languages including Turkish, Spanish and Arabic. Data from online mini-questionnaires were stored online and extracted at the end of the field phase. In Figure 2 screenshots of the three language versions are shown.

Content analysis. The qualitative feedback which was provided by users during the workshops was content analysed in order to deepen and accomplish findings from quantitative data.

2.2.3.1 STUDY PROCEDURE

The overall study procedure followed a four phase approach: a face-to-face introduction with participants, a field phase for the duration of eight weeks, a preliminary analysis of MApp usage data, and finally a series of closing workshops with a reduced and selected number of participants.

Introduction Workshops

An introduction workshop was held in each target city (London, Graz) at the NGOs facilities. Workshops were held in the mother tongue of the participants.

- in Spanish for the Latin-American participants
- in Arabic for the Arab participants
- in Turkish for the Turkish participants

Participants were invited to appear at pre-defined time slots in small groups (4-6 people) in order to avoid too much crowding. In total four workshops with each six participants were held on one

[1] https://www.limesurvey.org/de/start

day at the NGOs facilities. Researchers and supporters from NGOs were present the whole day to present the project, the study as well as the services to all participants. Participants filled a short questionnaire on basic demographic information and previous technology experience. Each workshop followed the same procedure:

- Introduction
  - Welcome and introduction to the MASELTOV project
  - Informed consent: explanation and signature
  - Filling questionnaire on demographics
  - Information on data logging
- Device and service introduction
  - Profile: Filling of preferences section
  - Introduction and training of MApp services
- Explanation of the overall study procedure
  - Online questionnaires, final workshops
  - Rewards and study failure conditions
- Questions & answers
- Workshop end

After a brief introduction to MASELTOV and the study background, facilitators handed out the test devices (Motorola Moto G) to the participants. All services (system language) to be used by participants in the following field phase were introduced in their mother tongue (see Table 1). Services were shown on a smartphone display which was mirrored from the smartphone to a projector. App interaction was trained, starting with a guided registration process in the *Profile*. Then all services were introduced subsequently with room for questions and answers.

As in the first field trials procedure (see D9.3), participants were asked to anticipate their personal goals that could be achieved with the help of the MASELTOV services. To support participants in the elaboration of their personal goals or sub-goals, a list of suggested goals was sent to them (in form of a mini-questionnaire, see Table 4). Each participant was asked to choose among the goals to focus on.

Figure 3. Introduction workshop with Arabic immigrants: Translated informed consent forms were distributed to participants (left) before devices and MApp services were introduced (right).

Participants were instructed that when they receive text messages and *Forum* posts from facilitators during the field phase they should follow the instructions (e.g. follow a link in a text message and fill a short online questionnaire in the smartphone).

After final remarks on the handling of data volume and devices participants were dismissed to use the MApp services for the next eight weeks. Participants were informed that the exact date of the closing workshops would be announced by facilitators by the end the field phase (i.e. around week 7).

Evaluation in the field

Participants were to use the MApp services between the mid of October and the mid of December 2014 in their daily life. In this period facilitators and volunteers were available for giving support.

On a weekly base the technical partners (AIT, FLU) provided log file data to ATE and the NGOs in order to be able to monitor user activities with MApp, and, if necessary motivating the users to interact via the developed services, e.g. by raising an interesting discussion topic in the *Forum*. Furthermore participants received short questions on their smartphone to allow them to give immediate and real time feedback (e.g. on their experience, mood or location). Table 4 depicts the different phases along with the study duration, methods and related measures.

Table 4. Overview of the modified ESM procedure and related design

Related measures	Timing	Method	Instrument
Experience with mobile communication technologies	Start	Introduction workshop	Pre questionnaire (print)
Subjective usability	week 1, 4, 7	ESM (mini-questionnaires)	UMUX questionnaire (online)
User Experience: Satisfaction	week 2, 5, 8	ESM(mini-questionnaires)	Questions on subjective satisfaction with MApp services (online)
User Experience: Privacy concerns	Week 6	ESM (mini-questionnaires), closing workshop	Privacy questionnaire (online, print)
Personal goals	Week 1, 8	ESM (mini-questionnaires)	Questions on personal goals (emphasized, achieved) online

Preliminary analysis of results

At the end of the field phase, in a preliminary analysis ATE processed the collected log files and data from weekly questionnaires to extract the first results. Usage activity of all participants was screened according to their participation in the field phase. This first overview served both

- To select participants for the closing workshops enabling us to gather feedback from both types of users, those who had used the services more frequently and those who had used them less.
- To deal with study exclusion criteria according to the overall usage frequency (Users who had used the services less than 120 minutes during the field phases did not receive any additional reward in the form of shopping vouchers).

Final workshops

After the preliminary analysis of the field study results final workshops would be conducted with a reduced number of participants (selected on the basis of a screening of user activities from the preliminary analysis) in order to deepen and further elaborate the findings on the user experience of the MASELTOV services. In the workshops participants should be enabled to share thoughts and reflect on each other's activities.


Figure 4. Final Workshops with Turkish (left) and Arabic participants (right)

2.2.4 VALIDATION

The validation of the trials results contained quantitative and qualitative analyses:

Quantitative Analyses: The data outputs from weekly mini-questionnaires (modified ESM) were collected in a cumulated data file and preprocessed including data cleaning (missing entries, duplicate entries) for each measure i.e. UMUX, satisfaction, privacy questions, goal achievement (see Table 4). Further the logging data which had been extracted from stored events in the User Profile were pre-processed by AIT and provided to ATE for further analyses. Where the data allowed parametric analysis this was conducted (ANOVA, t-test), otherwise Kruskal Wallis-Test was used to compare the results between the cultural groups. For selected measures the sample sizes differ due to missing entries or invalid feedback from some of the participants. In this case the actual sample size is indicated next to the results in the following sections.

Qualitative Analyses: Video files from the closing workshops with Latin American participants (Spanish) and Arabic participants (English) were transcribed and documented. The main outcomes from the workshops were extracted including reported likes, dislikes, and preferences towards the MASELTOV services. Selected users provided additional feedback from closing interviews (those who could not attend the closing workshop but wanted to provide more detailed feedback).

Validation activities lasted from January until March 2015.

2.2.5 RISK AND ETHICAL MANAGEMENT

In this section the risks especially related to the final field trials are presented and the risk management strategies are introduced.

Damage of the devices used in field trial

MApp prototypes were standard Android applications that did not pose any particular danger to the users' privacy. Moreover participants received test devices (Motorola Moto G) and so the trial did not affect the use of any of their private devices. At the introduction workshops participants were told that they would be given the test device to keep at the end of the trial. In exchange participants gave additional written consent to:

- Use the MApp services over the trials duration
- Respond to *Forum* posts and messages from facilitators

- Allow the MASELTOV consortium to use the logging data from MApp usage stored in the User Profile for the analysis of the study results.

Risk of financial or physical harm for participants

Using the MApp services caused no particular risks to the participants.

Financially, users were provided with a data plan with sufficient data limits. They were informed about the average data consumption of the application and were advised that they would not be compensated for any costs arising from exceeding their data plan limits or using the system outside of Austria or the United Kingdom.

Drop-out risk avoidance

Concerning the long period of the trial the following drop-out avoidance strategy was applied:

- **Balanced study workload:** Although the study comprised the interaction with multiple components (eight to eleven MApp services) the workload required by the users during the field trials such as questionnaires or workshops was arranged so that it would not cause frustrations and therefore dropouts.
- **Voluntariness of participation:** Participation in the final field trials was voluntary and participants could terminate their participation anytime without having to give a reason. Participants only signed up for the final trial.
- **Activity monitoring**: Facilitators sent weekly reminders in form short messages to remind participants to engage in the usage of the MApp services. Where a participant did not use the services (as visible from survey tool monitoring the fillings of the mini-questionnaires, and weekly activity logs provided by AIT) following procedure was used:

Table 5. Participant engagement procedure.

Week of inactivity	Communication channel (done by facilitator)	Message
0	*Forum* Post/ "Coins" thread	Announcement
1	*Forum* Private message Text message	Friendly reminder to use MApp more frequently
2	Call	Friendly reminder to use MApp more frequently
3	Call	Failure to complete the trial

2.3 FINDINGS

2.3.1 DEMOGRAPHICS

Originally sixty-two participants joined the introduction workshops. Six participants from Latin American countries were not able to fill the pre-questionnaire on the spot (Introduction workshop) and did not provide the required information later, this is why Table 7 comprises the data from fifty-six participants who were enrolled for the purpose of this study. Out of these, twenty-one were part of the Turkish group, thirteen of the Latin-American group and the rest of the Arabic group. 57.81% were female, 29.69% were men and the rest was not determined.

Although it turned out that some participants quit the trial during the field phase (i.e. by not making use of the MApp services), demographic information from all initially invited participants are shown in Table 7. As for the following sections, reported data were taken from varying sample sizes between the user groups, due to partly missing data. To always keep the user base transparent in the following, the exact sample sizes are indicated in each depiction of results (see Table 7). The distribution's comparison across groups was made through the Kruskal-Wallis test.

Age. The mean age of the participants was 34.94 $\pm$ 9.52 with a minimum of 19 and a maximum of 64. No significant differences between cultural groups or men and women were found ($p > 0.05$). Age of the participants was ranged between 19 and 60 years (see Table 6). As clarified in D2.3.2 Use Cases and Service Scenarios and further in the Appendix 1 of the D9.3 First Field Trials report, participants should not be younger than 18 and not older than 60 years.

Table 6. Age distribution among the final sample

Age (years) / User group	Under 20	21 - 30	31 - 40	41 - 50	Over 51
Turkish	-	8	5	8	-
Lat.American	1	3	4	2	1
Arabic	-	8	8	3	1
TOTAL	**1**	**19**	**17**	**13**	**1**

Overall among the initial sample of immigrants who came to Introduction Workshops and who provided demographic information, age distribution of the Latin American participants was quite balanced for the age categories between 20 and 50 years. Most Arabic users were under 41 years old while the Turkish sample contained younger participants (21-30) and middle-aged participants (41-50).

Sex. At the beginning of the field phase in total 47 female and 19 male immigrants came to the introduction workshops in Graz and London. Especially the Turkish group in Graz was dominantly female which can be explained by the fact that mainly women join the courses offered by the local NGO Danaida.

After the first field trials the search for male participants was strengthened. For example in Graz women in Danaida-courses were invited to distribute the information sheets in their circle of friends and acquaintances with a specific emphasis on male friends and acquaintances. Additionally other NGOs (namely Omega, Somm, Isop, Jukus and the "Marienstüberl" at

Caritas) were contacted with mails and personally, information sheets were provided to several other NGOs working with the target group and they agreed to spread the information especially to male immigrants. Information sheets were also left in waiting rooms of the NGOs working with immigrants and co-workers of the NGOs agreed to spread the information.

As Danaida is an organisation for women, men are not very familiar with the name and the cause of Danaida. Most husbands and family friends of women who take courses at Danaida came to Austria before their wives and therefore did not meet the inclusion criteria. As the information day was taking place during working hours, it is possible that some could not take part due to work. Though an information sheet was very useful, it seemed not enough to gain trust of people, who did not know Danaida. After the end of the final field trials some men asked for participation, because they had heard about the compensation from other participants.

Table 7. Demographics of the final study sample.

	Turkish (N=21)	Latin-American (N=13)	Arabic (N=22)	*p* value
Age	39.19 ± 9.59	34.92 ± 10.72 N(12)	34.7 ± 9.20 N(20)	0.963
Female	18	8	11	
Male	3	5	11	
Length of stay in the hosting country	4.55 ± 2.06 N(22)	1.93 ± 0.96 N(15)	5.19 ± 5.78 N(21)	**0.001**
Language skills	2.4 ± 0.94 N(20)	2.31 ± 1.11	3.89 ± 1.29 N(19)	**0.001**
Education level*	1.64 ± 1.14 N(22)	3.38 ± 0.87	5 ± 0.53	**0.000**
Years in school	5.85 ± 2.80 N(20)	-	17.33 ± 3.12 N(9)	**0.000**

** education level: 0… no school attainment; 1… primary school; 2… lower secondary; 3… upper secondary; 4… high school; 5… bachelor or equivalent; 6… master or equivalent; 7… doctoral or equivalent.*

*** Six participants from Latin American countries were not able to fill the pre-questionnaire on the spot and did not provide these information later.*

Length of stay in the host country. The average length of stay in the hosting country was significantly lower for the Latin-American group ($p < 0.05$). Among the Turkish group there was one 49 year old woman who had been in Austria already for 11 years. With low language and education levels (five years in school) she

Language skills and education. Regarding the average language skills, the education level and the years spent in school, were significantly higher for the Arabic group. This deviation from the initially defined user group characteristic was caused by the following conditions for recruitment:

- Due to the exit of the partner FUNDESO from the project in Summer 2014, the consortium lost the contact with the target group of Arabic immigrants in Spain, who were planned to be involved within the final trials. As a consequence the consortium decided to try to include Arabic immigrants in the London trial, which was realized by MRC in London.
- By investing intense search and recruiting efforts MRC managed to acquire Arabic immigrant users. However due to lacking access to the low educated immigrant community, the Arabic immigrants in the final field trials were better educated than the initial recruitment criteria would have suggested.

Regarding these significant differences between the participants from Arabic speaking countries compared to those from Turkey and Latin American countries, direct comparison between the three groups would be illegitimate. On average Arabic participants had a significant higher education level, better host language skills and more years in school than the two other groups. It can be assumed that these facts might have direct impact on mobile technology and app experience, but more importantly on the MApp services usage and user experience feedback. As a consequence in the following sections, the results for the Arabic groups will be reported but differently visualized (greyed) in order to alert the reader and to reduce the possibility of misleading interpretations of the between group differences.

From the total of participants, 38.46% rated their language skills as poor/very poor, 30.77% as acceptable and 30.7% as good/very good. 52.6% of the participants finished high school and got a bachelor/master's degree or equivalent, 21% did lower or upper secondary and only 1.75% did not complete compulsory schooling.

Comparing the gender's distribution of demographical data, on average, women $_{N(37)}$ have significantly been living longer than men $_{N(18)}$ in the hosting country (♀ 4.30 $\pm$ 2.62 and ♂ 3.94 $\pm$ 5.94, *p* value 0.037) and men $_{N(8)}$ have spent more years in school than women $_{N(22)}$ (♀ 8.10 + 5.86 and ♂ 12.88 + 5.67, *p* value 0.041).

2.3.2 MOBILE TECHNOLOGY EXPERIENCE

The information in this regard was collected through the pre-questionnaires during the introduction workshop.

From the whole sample (N=56), 71.9% owns a smartphone, 14.1% does not own one and 14.1% did not answer. 73.4% uses a smartphone and 12.5% does not use one (see Table 8). The distribution's comparison across groups was made through the Kruskal-Wallis test. The mean frequency and length of usage (in months) of a smartphone are equally distributed across the groups ($p > 0.05$). 70.59% use the smartphone at least once per hour, followed by at least once a day with 15.69% and the rest uses it less frequently.

Table 8. Descriptive results on pre-experience with mobile (smartphone) technology usage

	Turkish (N=21)	Latin-American (N=13)	Arabic (N=22)	*p* value
Owns a smartphone	**Yes: 71.9%** No: 14.1%	Yes: 50% No: 10% N(12)	Yes: 95% No:5%	
Uses a smartphone	**Yes: 71.9%** No: 14.1%	Yes: 50% No: 10% N(12)	Yes: 100%	
Frequency of usage of smartphone*	3.28 ± 1.18 N(18)	**3.82** ± 0.40 N(11)	3.45 ± 1.01	0.429
Months using smartphone	22.5 ± 19.88 N(16)	22.29 ± 16.14 N(7)	34.59 ± 30.72 N(17)	0.159
Uses mobile internet	**Yes: 54.54%** No: 22.72% N(17)	Yes: 45% No: 10% N(11)	Yes: 86.36% No: 4.54% N(20)	
Frequency of usage of mobile internet*	2.56 ± 1.62 N(18)	**3.73** ± 0.65 N(11)	3.5 ± 0.89 N(20)	**0.028**
Uses apps	**Yes: 59.09%** No: 31.81% N(20)	Yes: 55% No: 10%	Yes: 100%	
Downloads apps	**Yes: 54.54%** No: 36.36% N20)	Yes: 50% No: 10% N(12)	Yes: 100%	

**Answer formats ranged from 1 for "at least once per hour", 2 "at least once a day", 3 for "at least once a week", 4 for "less often" to 5 for "never".*

Regarding the mobile internet, the 62.5% uses it, 12.5% does not use it and the rest did not answer. 61.22% uses it at least once per hour and 18.37% at least once a day, the rest uses it less frequently.

Regarding applications (apps) on the smartphone, 71.9% does use them and 14.1% does not, the remainder did not answer. The 68.8% have already downloaded apps to the smartphone and 15.6% have not.

Furthermore participants were asked about what kind of mobile apps they have been using in the past. As shown in Figure 5 overall Arabic users were most familiar in using various mobile apps. Main differences between Latin-American and Turkish participants occurred for navigation and route planning apps as well as the use of digital libraries and information services. About the half of the Turkish and more than half of the Latin-American users were experienced with playing games on the smartphone.

Overall **Latin-American users had more experience with the use of selected mobile apps** as collected in the pre-questionnaire. In addition one Latin-American user reported to be used to watching TV on the smartphone, while five Arabic users also mentioned that they are used to listening to music and do mobile shopping.

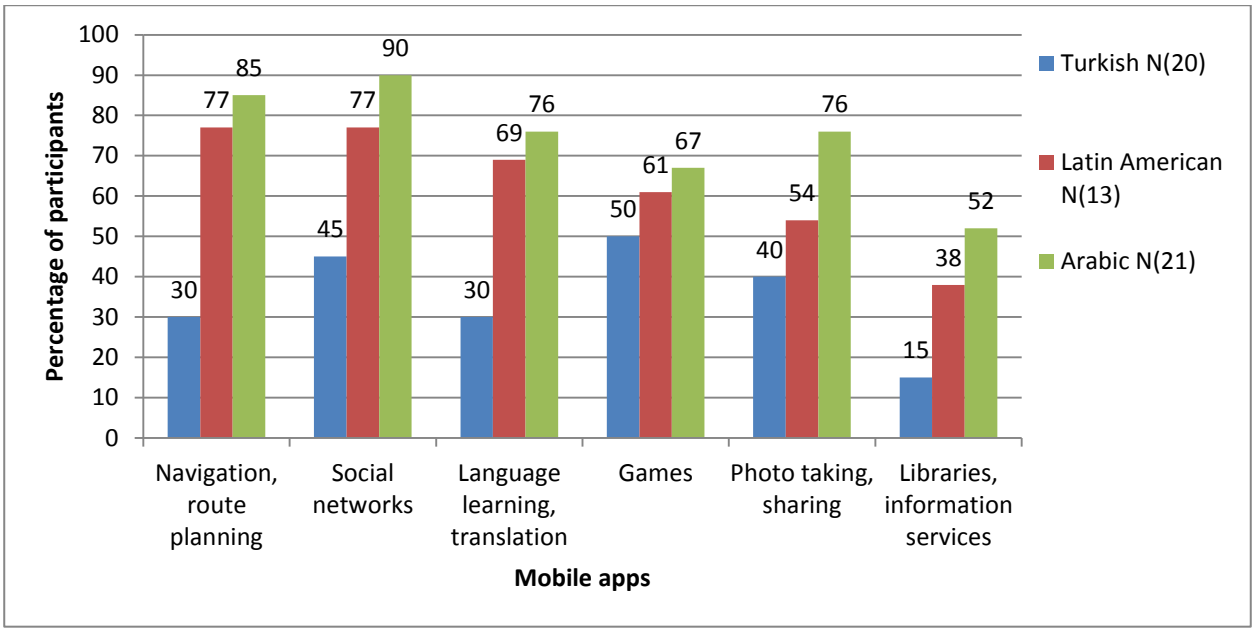

Figure 5. Pre-experience of mobile apps usage

2.3.3 FIRST USAGE MAPP SERVICES

After having been introduced to the MApp services, all participants answered a short question on their subjective expectations toward the integrated system (ease of use and usefulness).

To the question "how easy to use do you think the presented services should be for future users?, the Latin-American and the Arabic groups answered through a six points Likert scale, where 1 stood for "not easy at all", 5 for "very easy to use". The *p* value was calculated through the Kruskal-Wallis test.

Table 9. Subjective assessment of expected ease of use of MApp services (LA, Arabic participants)

Service	Latin-American	Arabic	*p* value
Profile	$4.08 \pm 1.38_{N(12)}$	$4.33 \pm 0.49_{N(15)}$	0.905
Forum	$4.58 \pm 0.79_{N(12)}$	$4.27 \pm 0.46_{N(15)}$	0.114
Help Radar	$4.33 \pm 0.89_{N(12)}$	$4.31 \pm 0.48_{N(16)}$	0.568
Translation tool	$3.92 \pm 1.62_{N(12)}$	$4 \pm 1.21_{N(16)}$	0.507
Pedestrian navigation	$4.33 \pm 1.07_{N(12)}$	$3.69 \pm 1.49_{N(13)}$	0.168
Places of interest	$4.55 \pm 0.69_{N(11)}$	$4 \pm 1.0_{N(13)}$	0.134
Language lessons	$2.58 \pm 2.19_{N(12)}$	$3.08 \pm 1.98_{N(12)}$	0.713
Game	$2 \pm 1.79_{N(11)}$	$4 \pm 1.25_{N(15)}$	**0.006**
Recommendations	$2 \pm 2.31_{N(10)}$	$3.42 \pm 1.68_{N(12)}$	0.254

Looking at Table 9 after having been introduced to the services for the first time during the introduction workshop, Latin American participants answered that they expected most MApp services to be easy to use, especially the *Forum*, *Pedestrian navigation* and *Places of interest* as

well as the *Help Radar*. The *Game* seems to afford more personal effort. The purpose of the *Recommendations* was more difficult to anticipate as to that moment, no recommendations were shown on the devices so far and so the service could not be properly introduced to participants, which might have influenced overall expectations.

As this service was not available at the moment of the assessment, ratings for the *Language lessons* were between 2.58 and 3.08 showing that participants expected this service to be neither easy nor difficult to use.

Arabic users expected the *Game* being significantly easier to use than the Latin-American users. They were more familiar in using mobile apps (i.e. games) on the smartphone.

2.3.4 SUBJECTIVE ASSESSMENT OF SOCIAL WELLBEING

In the literature, social well-being has been associated with separate indicators such as feelings of belonging, out-group trust and individual self-esteem (Schnell, 2014). These indicators of social well-being are "important in determining social cohesion since they are known to be strongly related to pro-social behaviour and social ties at all levels" (Dion et al., 2009: 70).

These indicators were collected in order to explore patterns of social well-being and subjective perceptions of belonging within the Turkish community in Graz, as well as the Latin-American and Arabic communities in London. It is noteworthy that the analysis focused on differences between the three cultural groups, at this point the influence of gender and other socio-economic aspects was not analyzed in detail here.

2.3.4.1 SELF-ESTEEM

The information was collected in the ESM-questionnaire in the first week of the field phase. The degrees of agreement of the second statement were reversed in order to calculate the overall degree of agreement. The results were then averaged for each statement. From a 4 point Likert scale, where 1 stood for "strongly disagree" and 4 for "strongly agree", the mean degree of agreement was 3.26. In Table 10 subjective assessments concerning the selected statements are listed. Beside mean and standard deviation results the percentage of participants is shown who actually agreed to the statements (i.e. chose the answers 3 for "agree" and 4 for "strongly agree").

Table 10. Subjective assessment of perceived self-esteem.

	Turkish		Latin-American		Arabic	
Statement	**Mean ± SD**	**Agree (%)**	**Mean ± SD**	**Agree (%)**	**Mean ± SD**	**Agree (%)**
On the whole I am satisfied with myself	3.4 ± 0.88 N(20)	85	3.82 ± 0.40 N(11)	100	2.83 ± 1.11 N(12)	66.7
At times I think I am not good at all (score reversed)	3.15 ± 0.93 N(20)	75	3.92 ± 0.28 N(13)	100	2.45 + 1.21 N(11)	45.4
I am able to do things as well as other people	2.95 ± 1.05 N(20)	75	4 ± 0 N(11)	100	3 ± 1.10 N(11)	81.8
Average	3.17 ± 0.96		**3.91 ± 0.23**		2.76 ± 1.14	

The average self-esteem of the Latin-American group was significantly higher than the one of the Turkish or the Arabic group ($p < 0.05$).

2.3.4.2 FEELING OF BELONGING

The measure of "feelings of belonging" was made of 2 survey items: How strongly do you feel that you belong to... "host country (Austria/United Kingdom)" and "the survey city (Graz/London)". Answering categories ranged from 1 for "Not at all" to 4 for "very strong" (Schnell 2014).

- From this four level response scale the average value for feelings of belonging in the category "country" was 3.25 for the Turkish group $_{N(20)}$, 2.4 for the Latin-American $_{N(10)}$ and 3.25 for the Arabic $_{N(12)}$; for the group in general was 3.05.
- In the category "city", the mean value was 3.5 for the Turkish $_{N(20)}$, 3 for the Latin-American $_{N(7)}$ and 3.64 for the Arabic $_{N(11)}$, the general one was 3.45.

Overall Turkish and Arabic immigrants reported slightly stronger feelings of belonging to their host country than Latin-American Immigrants did.

2.3.4.3 OUTGROUP TRUST

The participants were asked to indicate their feelings towards the Austrian/English population through a 0° to 100° Celsius thermometer. The average degree of outgroup trust was 65.11 $\pm$ 26.88 $_{N(45)}$ with an equal distribution across the groups ($p > 0.05$). The Turkish group had a mean of 64.85 $\pm$ 27.4 $_{N(20)}$, the Latin-American group of 63.79 $\pm$ 20.91 $_{N(14)}$ and the Arabic group had the highest mean of 67.27 $\pm$ 24.88 $_{N(11)}$.

2.3.5 LONG TERM MAPP USAGE

In the following part of the document the analysis of the quantitative data i.e. data logs and responses to mini-questionnaires from participants collecting during the 9 weeks field phase are reported. Main research questions formulated in Section 2.1 were addressed in order to identify i) how frequently and for how long did the participants use the MASELTOV services, and ii) how did the user experiencethe usability of the MASELTOV Toolbox for smartphones that provides immigrants with various aids such as ubiquitous language translation, navigation, administrative and emergency health services developed over the project time. Finally we emphasize the discussion about which demographical factors are associated with user experience and usage preferences in relation with the MApp services.

2.3.5.1 DATA LOGGING AND PRE-PROCESSING

Log files were made available per week. In general reasons for missing data could be:

- the user did not add the particular information in their profile
- the backend server did not receive the event (maybe due to network problems)
- the event might contain wrong data

Furthermore during the first weeks we experienced a number of problems with the data Mapp components were sending to the User Profile Content Provider. These problems caused wrong data from Translation tool for several weeks, wrong data from at timestamp that was transmitted using the Arabic format, and other problems either in the mobile app or the api (webservice). Later we discovered a hidden character transmitted by a MApp component that caused wrong reporting for earned coins. The first few weeks the translation tool (due to that bug) reported crazy numbers.

During these two weeks in question (week 3 and 4) we experienced a problem that was logging incorrectly the duration in all MApp components (a webservice problem), thus the data in our database report zeros in the excel log. Hence for the weeks 3 and 4 of log data collection there are no data available for analysis of results presented in the following sections. As in week 3 introduction workshops for Latin-American and Arabic participants took place, usage data from these two groups in the early field phase is missing and could not be processed in the following results sections.

2.3.5.2 MAPP USAGE

In this study we characterized usage of MApp services by the main metrics i) overall MApp access time, defined as the total usage duration summed across weeks generated by the logs in the user Profile, and ii) overall MApp service usage, defined as the total usage duration of each evaluated service by the groups.

Before engaging in the interpretation of the quantitative data some technical aspects and organizational aspects that have to be considered are outlined.

- Due to the missing data logs for the week 3 the absolute values for usage, duration results do not reflect the exact usage duration. However these logs were not available for all groups.
- By week 2 Turkish as well as UK participants had spent their data credits which were not upgraded automatically due to a mistake at the network providers UK and AT. Data volume was immediately upgraded.
- In week 9 the trial with Turkish users was finalized. Due to private reasons the Arabic facilitator had to leave the trial in week 8. Arabic users were informed via the *Forum* and text messages that they would not be supported by Arabic-speaking facilitator for the remaining field phase.

Overall MApp access time

The Turkish group used the system the most completing 95 hours and 56 minutes, followed by the Latin-American with 36 hours and 32 minutes and at least the Arabic group with 18 hours and six minutes, as shown in the graphic. The *p* value was calculated though the Kruskal-Wallis test for independent samples. Usage duration differed significantly between the groups ($p < 0.001$).

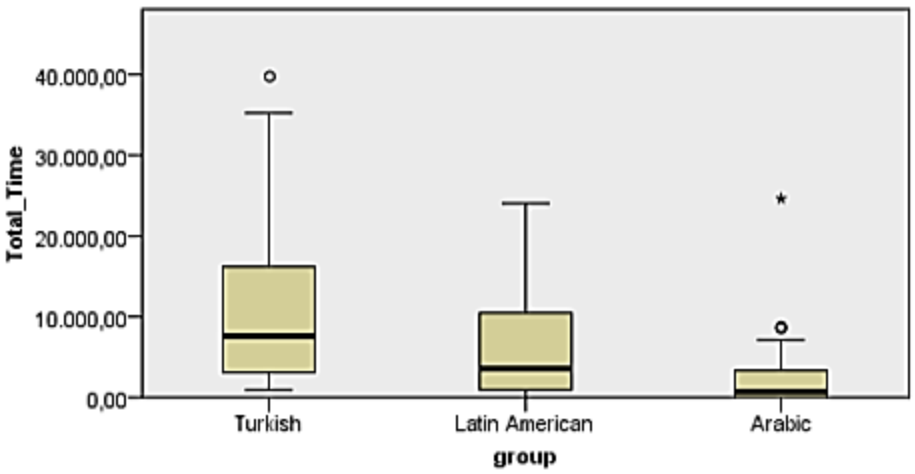

Figure 6. Overall MApp usage duration in seconds from week 1 to week2, from week 5 to week 9.

Figure 6 shows that Turkish participants used the MApp services significantly longer (total usage time: 5756:09 min.; mean + SD: 261:39 ± 235:32 min.) than the Latin-American (total usage time: 2192:05 min.; mean + SD: 109:36 ± 123:41 min.) and the Arabic (total usage time: 1086:43 min.; mean + SD: 49:24 ± 92:52 min.) group. Usage duration for Arabic participants was shorter than for Latin-American users. A possible explanation for this result can be that they were more familiar in using various mobile apps before (see Figure 5), hence other usage routines existed and the MApp services were used less often.

Looking at Figure 7 the significant drop of usage duration by Turkish users in week 2 can be explained by the issues concerning reached maximum data consumption level. Due to logging issues there are no data available from Latin American and Arabic users in week 3.

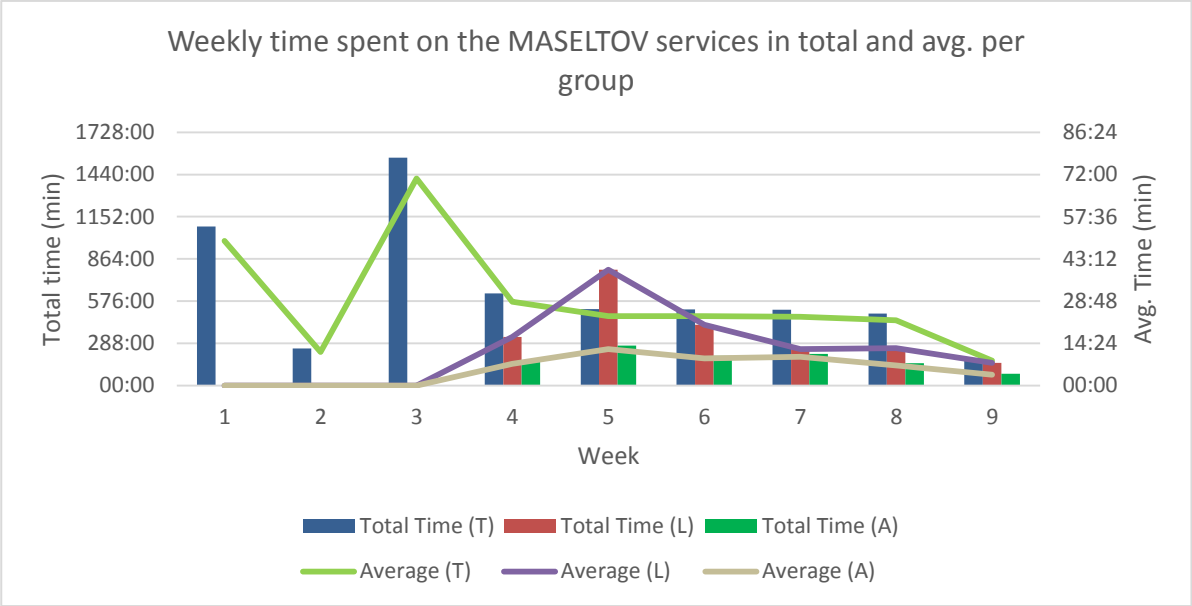

Figure 7. Overall MApp usage duration per week and immigrant group

For further analysis, the people that used the system more than two hours were chosen. Twenty-five people remained as follows: 12 of the Turkish group, 9 of the Latin-American group and 4 of the Arabic group. From these, 18 are women, 5 are men and the rest are unknown.

Overall the system's usage reached its peak in the fifth week with 26 hours and 23 minutes (see Figure 7). From the people who used the system the most, 22 hours and four minutes were completed.

Overall MApp service usage

For further analysis, only data from participants who had used the system more than two hours in total were chosen. This processing step was decided in order to be able to provide a clearer picture of the actual usage patterns by users who were motivated to using the services. Logging data revealed that not all participants who initially had committed to the study did actually use the tools during the field phase. After extraction of invaluable data twenty-five people remained as follows:

- 12 of the Turkish group,
- 9 of the Latin-American group and
- 4 of the Arabic group.

From these, 18 are women, 5 are men and the rest are unknown. Figure 8 below shows the time spent on each service from the whole sample.

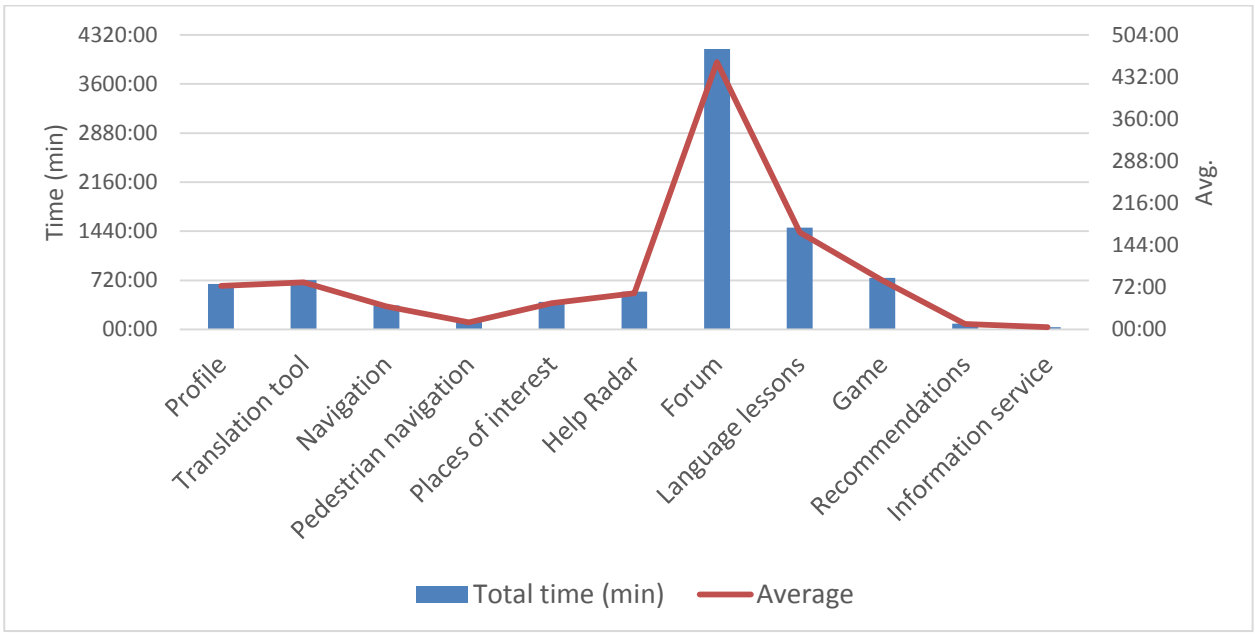

Figure 8. Overall usage duration per service.

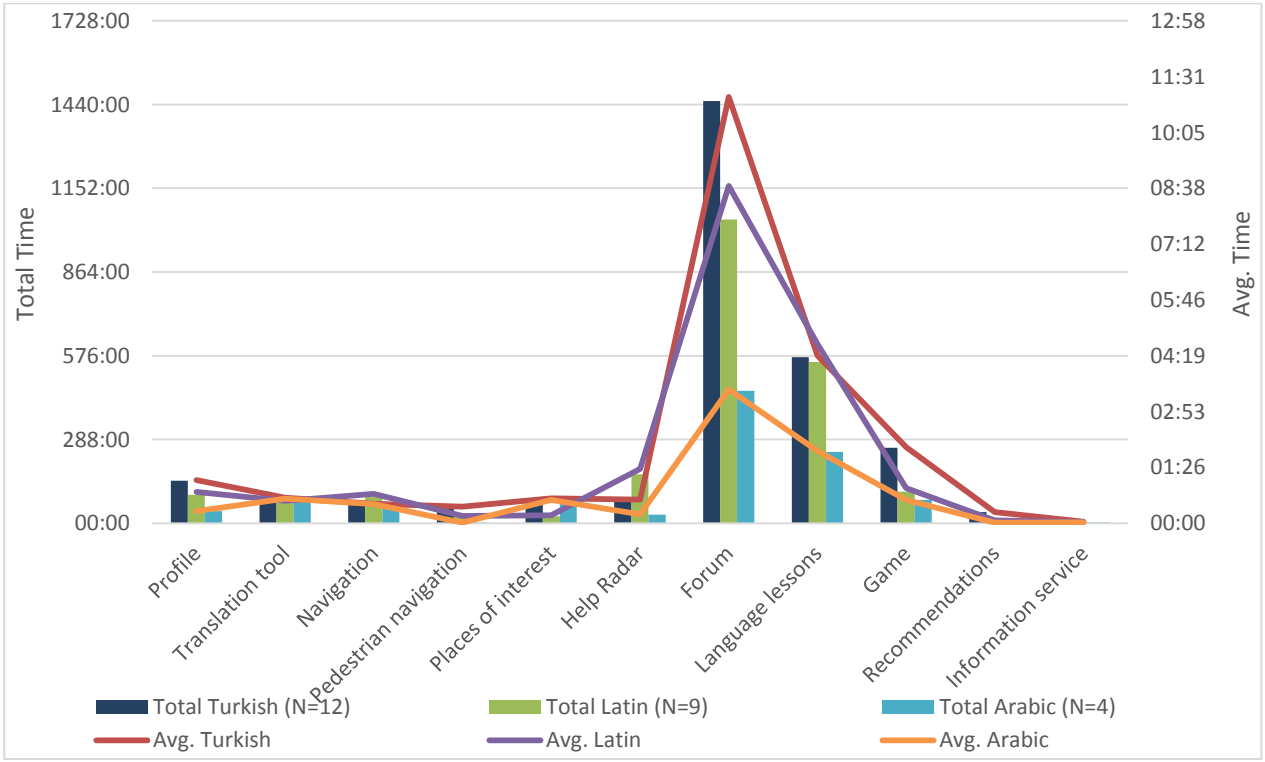

Figure 9. Usage duration (total, average in min.) of each MApp service per group from week 4 to week 9.

Figure 9 shows the time in total and in average the whole sample spent on the MASELTOV services filtered by groups. It is important to bear in mind that the Latin-American and the Arabic groups joined the trial-phase two weeks after the Turkish group; as well as the lack of data for the third week for the Latin-American and the Arabic groups. In order to be able to compare usage activity over time Figure 9 covers only weeks 4 to 9 of the field phase, in which activity logging data for all three groups was produced.

Among all provided services the *Forum* was frequented most, where participants were engaged in online discussions with members of their group. Especially the Turkish community profited from the social network tool to keep connected with each other. The second most used service

was the *Language lessons* service, used most by Turkish and Latin-American users. As Arabic users in London had better English skills, they probably lacked the motives to using the language learning tool.

Help Radar was most frequented by the Latin American group, followed by Turkish and then Arabic participants. While Latin American users profited from the *Help Radar* service in their everyday life, Arabic users barely asked for assistance from a volunteer. As Arabic users had higher education level (and English language skills) and had been in the host country for a longer period than the other two groups, they apparently did not have the need for external help as much as one year arrival Latin American immigrants and Turkish immigrants in Graz did.

Turkish participants engaged most in *Game* play compared to Latin American and Arabic participants. Some women reported that they had given the *Game* to their children to play, so they were not too enthusiastic themselves to play.

The *Translation tool* was mostly explored by Turkish users. However due to missing data from Latin American and Arabic users for usage activity in week 3, exploration and usage of the tools in the first week of trial are not reflected in this result.

Places of interest were preferably used by Turkish users and Arabic users, less by Latin American, similar with the *Pedestrian navigation* service. *Navigation* service worked in London only and was mostly used by the Latin American group. Arabic users pointed they would prefer to use Google Maps, hence they perceived no benefit for using another navigation tool.

Information service (available in Spanish only) was not used at all by Latin American users. *Recommendations* service was barely used, only by Turkish users.

2.3.6 USER EXPERIENCE OF MAPP SERVICES

Within mini-questionnaires repetitively sent out during the field phase, participants estimated their perceived user experience in terms of satisfaction with each of the tested MApp services. Analysis of results aimed at finding out how did the user experience and the usability of the MASELTOV Toolbox for smartphones that provides immigrants with various aids such as ubiquitous language translation, navigation, administrative and emergency health services develop over time. Results on satisfaction, privacy and trust are reported for each participant group, depending on the availability of valid data.

2.3.6.1 SATISFACTION

Satisfaction was measured for each service at the end of the second, the fifth and the final weeks through a 5 degree Likert scale, where 5 stood for “very satisfied” and 1 for “not satisfied at all”. The results have been averaged from the respondents who used the system more than two hours and are presented together with the standard deviation.

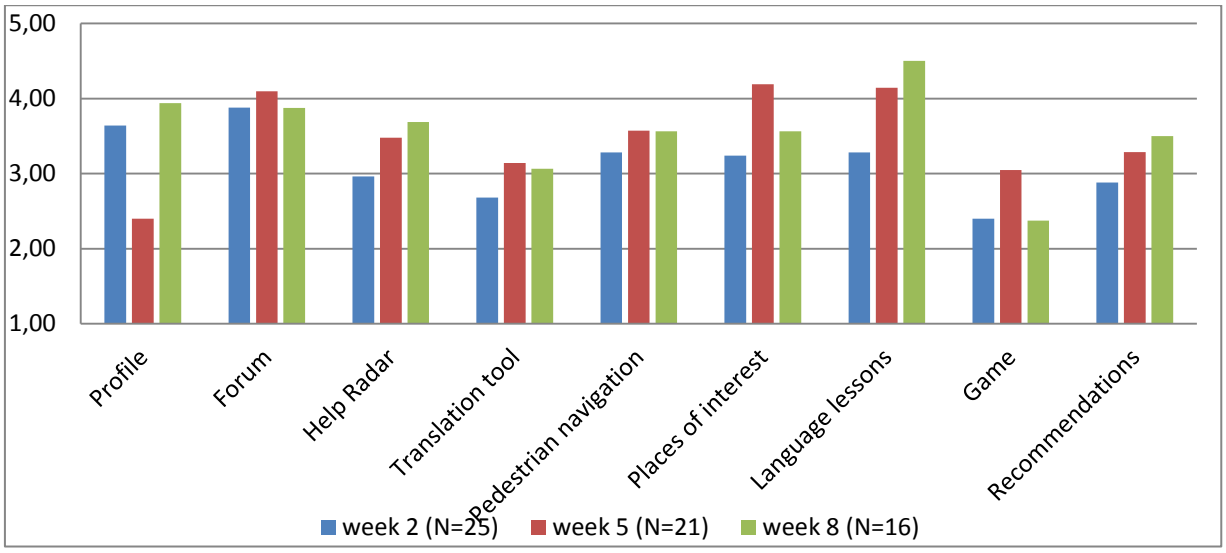

Figure 10. Overall satisfaction per service, full study sample.

Satisfaction was assessed via online mini-questionnaires (using the modified ESM approach). Looking at the overall sample, mean comparisons using Friedman Test showed significant differences between the measurement points (week 2, 5 and 8) for the *Profile* (p= 0.006), the *Places of interest* service (p=0.031) and the *Game* (p=0.034).

Most assessments from immigrants ranged from "neither satisfied nor not satisfied" to "rather satisfied". Overall satisfaction rose for the majority of the services over time, except the *Forum, Places of interest* and the *Game* (see Figure 10).

Overall reported satisfaction over time from 62 participants (summed over groups) varied across the tools:

Increase of satisfaction was reported by for the

- *Profile*, was not needed nor used anymore in the last period, however the last assessment was again more positive.
- *Help Radar*, after having learned how to use the tool (how to contact someone for assistance), the benefit of the service became more clear to participants.
- *Pedestrian navigation*, satisfaction score was above average and slightly increased over time.
- *Language lessons*, satisfaction clearly increased due to progress in the learning modules and achieved learnings.
- *Recommendations*, service provided information only after a certain duration, feedback remained around average satisfaction level, however the result conflicts a bit with qualitative feedback

For other services satisfaction varied over time but overall showed an increase over the whole study duration such as *Translation tool*, *Pedestrian navigation*, and *Places of interest*. Beside these variations only the reported satisfaction of the *Game* dropped over time, which might reflect experienced frustrations regarding the inability to proceed in the play.

2.3.6.2 TRUST AND PRIVACY

At the end of the sixth week, the participants of the Turkish and the Latin-American groups were sent a questionnaire on privacy issues and trust in the MASELTOV system. Due to the loss of the Arabic facilitator in week 5 this mini-questionnaire on trust issues and privacy concerns was not sent Arabic users.

Trust

Participants were requested to indicate the level of agreement with the statements seen in Table 11, through a five point Likert scale, where 1 stood for "strongly disagree" and 5 for "strongly agree". The results presented were averaged from the respondents in these two groups; and are displayed together with the standard deviation.

Table 11. Security and trust issues towards MApp services.

Statement	Turkish	Latin-American	*p* value
I feel secure when I use the MASELTOV system	3.41 ± 1.42 N(17)	4.25 ± 0.97 N(12)	0.132
I am concerned that the MASELTOV system is collecting too much personal information about me	2.31 ± 1.20 N(16)	2.83 ± 1.40 N(12)	0.314

Overall Latin American immigrants felt more secure when using the MApp services than Turkish immigrants and were slightly more concerned about the amount of personal information the MApp services collect from them, however assessments from both groups stayed below average value of 3. There were no significant differences between the groups.

Privacy

The respondents were asked if they would be concerned if a system like MASELTOV collects personal information in diverse regards (see Table 12). The results are presented in frequencies and percentages.

Table 12. Study participants´ concerns toward the collection of personal data.

	Turkish N(17)	Latin-American N(12)
Personal information (e.g., name, address, phone number, date of birth)	**13 (76.5%)**	6 (50%)
Financial information (e.g., monthly income, land tenure)	12 (70.6%)	**9 (75%)**
Location information (e.g., places I have visited, places I am frequenting often)	10 (58.8%)	3 (25%)
Health information (e.g., previous diseases, allergies, vaccinations)	10 (58.8%)	4 (33.3%)
Information on personal beliefs (e.g., religion or political positions)	9 (52.9%)	3 (25%)

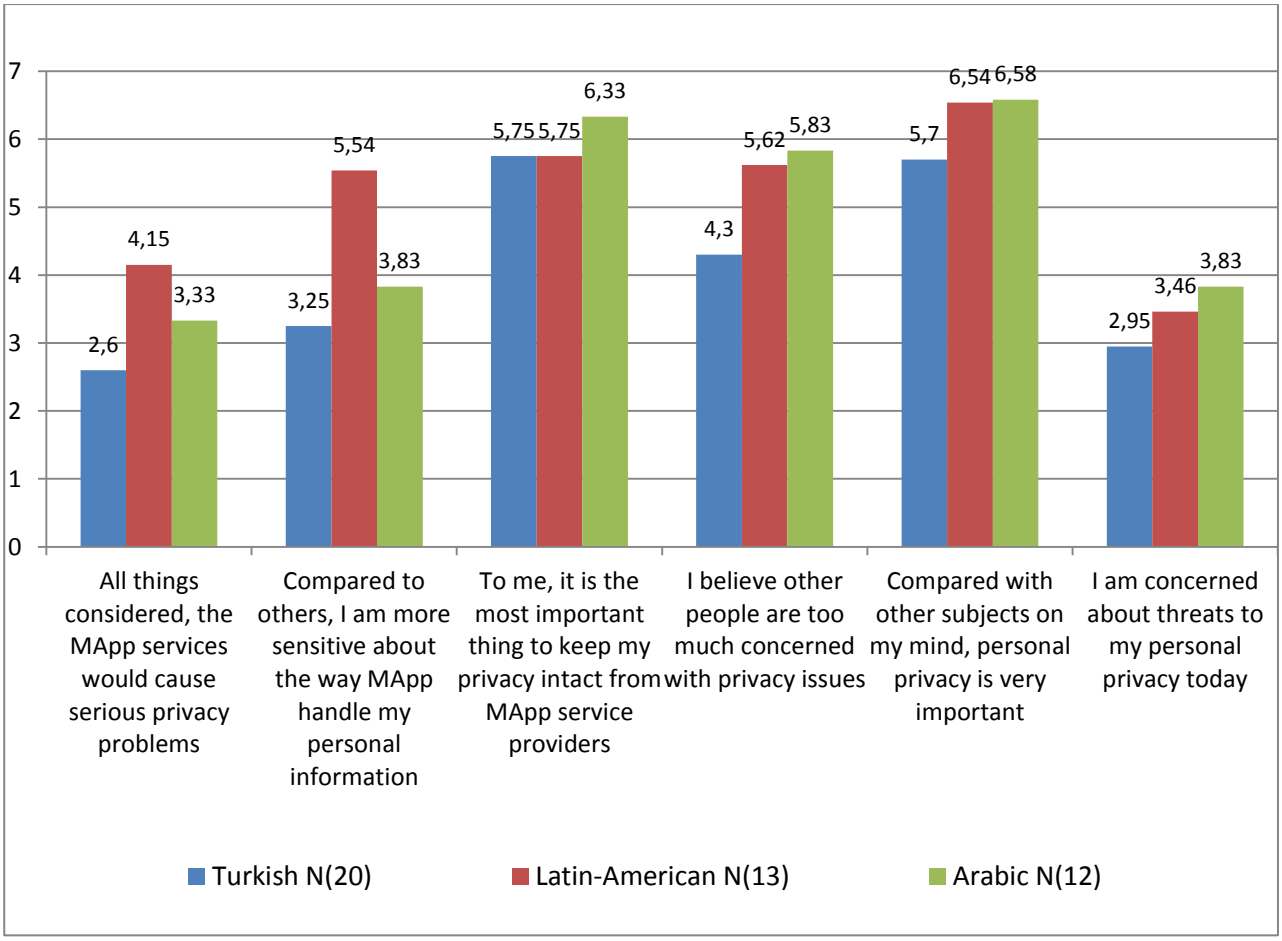

Figure 11. Subjective agreement on statements about individual privacy concerns.

During the closing workshop, the attendees filled out a privacy questionnaire with the statements presented in Figure 11. They rated each one of the statements through a seven point Likert scale, were 1 was for "strongly disagree" and 7 for "strongly agree". The answers were then averaged for each group and the standard deviation was calculated.

All together Arabic immigrants were the most concerned regarding their privacy and the handling of personal information by other parties.

2.3.6.3 USABILITY

Usability metric of user experience

Similar to previous trials (T9.3), an objective measurement tool for the usability the Usability Metric for User Experience (UMUX) was used. The UMUX is a four-item Likert scale used for the subjective assessment of an application's perceived usability [Finstad, 2010], comprising the four scales of perceived effectiveness, perceived satisfaction with the system, perceived overall usability and perceived efficiency. It was designed to provide results similar to those obtained with the 10-item System Usability Scale, and is organized around the ISO 9241-11 definition of usability.

Participants in our study filled the UMUX questionnaire via online mini-questionnaires in weeks 1, 4 and 7 (see Table 4). Participants rated on a 7-point Likert scale indicating 1 for "strongly disagree" to 7 for "strongly agree". The resulting scores have been averaged from the respondents who used the system more than two hours and are presented together with the standard deviation. The degrees of agreement of the second and the fourth statements were reversed in order to calculate the overall degree of agreement.

Table 13. Usability components and UMUX scale items (Finstad, 2010)

Usability component	UMUX item
Effectiveness	MApp services´ capabilities meet my requirements.
Satisfaction	Using MApp is a frustrating experience.
Overall efficiency	MApp is easy to use. I have to spend too much time correcting things with MApp.

High UMUX scores reflect high perception of effectiveness, satisfaction and overall efficiency by the participants (see Table 13). Results for all evaluated services are described in more detail in the following for each user group as well as for each UMUX scale separately. Figure 12 and 11 below illustrate the temporal evolution of the UMUX assessments for Turkish and Latin-American participants. As only very few Arabic participants (2 users) had filled the UMUX scale at measurement point 2 and 3, their scores are not further presented and interpreted due to limited explanatory power.

Turkish immigrants perceived MApp to be more effective over time, after getting more familiar with the usage of the difference components. During the field phase they did not perceive interaction with MApp as a frustrating experience. Subjective assessments on satisfaction and overall efficiency remained stable over time.

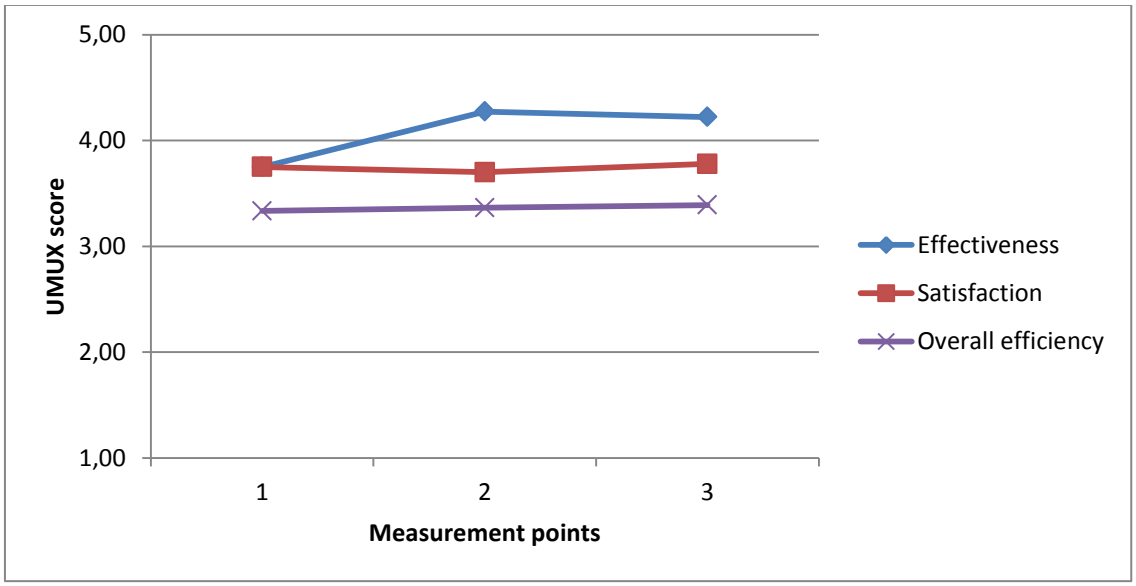

Figure 12. Quantitative usability assessment from Turkish participants in Graz (UMUX scale).

For Latin-American participants´ scores did nearly not vary over time. They consistently rated average effectiveness, satisfaction and overall efficiency regarding the interaction with the MApp system.

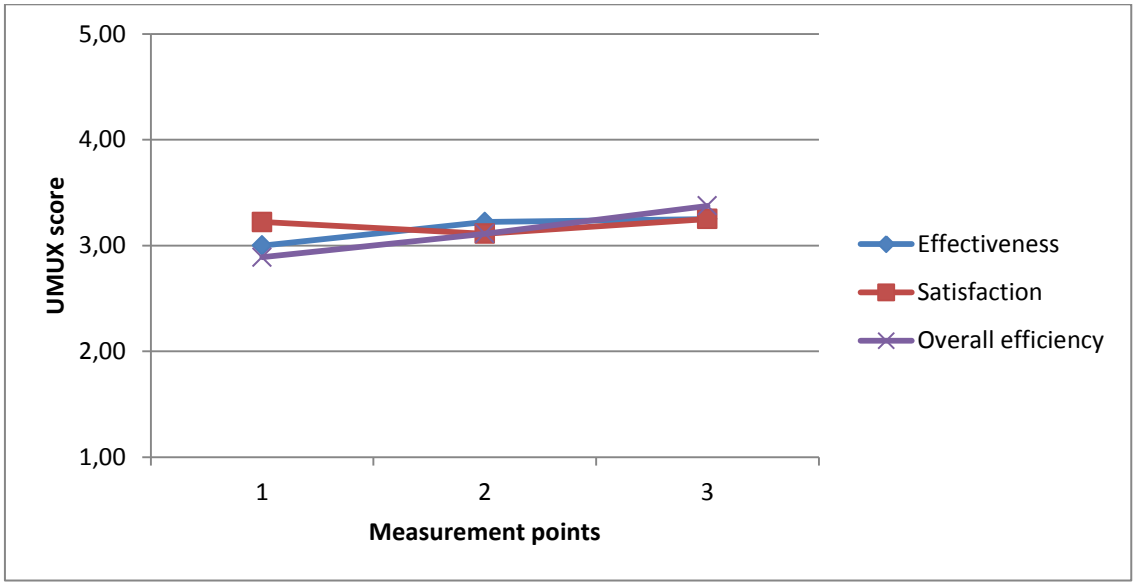

Figure 13. Quantitative usability assessment from Latin American participants in London (UMUX scale).

According to quantitative measures conducted over time in the first, the fourth and the last week of the field phase, subjectively perceived usability of the MApp services as a holistic integrated system was average for Latin-American participants and slightly beyond average in the opinion of the Turkish users.

2.3.6.4 LIKES, SHORTCOMINGS AND RECOMMENDATIONS

Qualitative feedback from participants gathered in the closing workshops is summarized in the following tables (see Figure 14). Expressed likes, experienced problems during long term usage and related shortcomings of the different components are presented and underlined by respective quotations from participants.

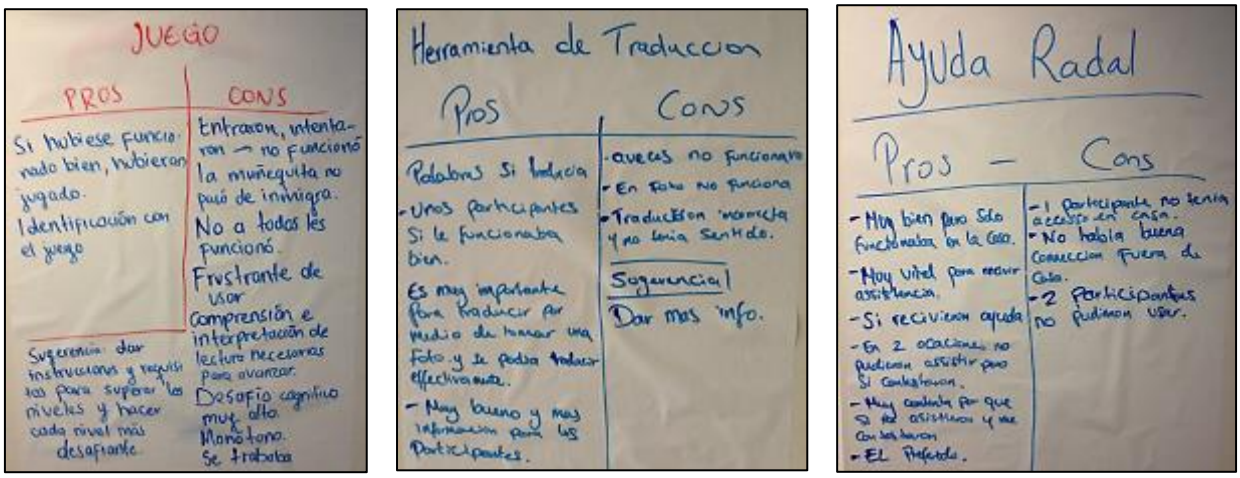

Figure 14. Latin American participants´ feedback on the services (*Game, Translation tool, Help Radar*) documented on flip charts during the closing workshop

PROFILE

The *Profile* was available in Turkish, Spanish and Arabic and was used by all groups. Overall the *Profile* was well accepted, the main purpose was clear. Most participants filled the preferences section once and never went back to change the settings. Arabic users were most skeptical about the purpose of some sections (Preferences, About you). Most Latin American had no concerns regarding their privacy, while some of them including the majority of Turkish users seemed to not having understood the meaning of the different categories. However, one participant (Arabic) disabled GPS Tracking in the settings section.

Profile	Likes	- "I did use it once and never needed it again" (Turkish) - simple to use (Turkish, Arabic)
	Problems, shortcomings	- purpose of the Preferences is not clear (e.g., entering current job, full name) (Arabic) - About you: entry options for the year of birth start with 1975, no possibility for older people to enter their age (Latin American) - Preferences: only a few nationalities can be entered, "Latin American" is not a nationality (Latin American)
	Recommendations	- provide the option to add a *Profile* picture - explain why and for what personal information is needed: e.g. add screenshot or link to *Recommendations*

FORUM

The Service was used by Latin Americans in London and Turkish users in Graz. No Arabic version was available, however the Arabic facilitator made use of the *Forum* for sending out

mini-questionnaires and motivating people to use the tools. Messages were sent in English as all of the Arabic participants were able to read and write English text.

Latin American participants found that the *Forum* is a powerful tool for people who are new in the country to be able to socialize through. Providing access to a given sub-community is seen as great benefit to connect with people and share experiences.

However they felt that at the end the *Forum* was not being used as much by participants and that we didn't really take advantage fully of this tool. Most probably this happened mainly because of the problems with the connection and people were communicating with the facilitator on her personal phone number instead via the MApp. Some kind of notifications to know when people have replied to your posts or have messages would be essential for the improvement of the *Forum*.

Forum	Likes	- "immediate ability to share an information and everybody who joins the *Forum* has a positive impact" (Latin American) - meet new people, learn about interesting events (Latin American) - "nice to have replies from volunteers, making jokes" (Arabic)
	Problems, shortcomings	- connection problems (all) - participants did not know each other before (Arabic) - Lack of personal information: pictures, name, profession, (Arabic) - Lack of motivation (Arabic) - Content density and structure: "I missed some talks, because it was hard to catch up in the *Forum*, who wrote what and where, it was difficult for me to follow all the conversations" (Turkish) - Trust and confidence issues to contribute to the predefined topics: "did not like talking about myself" (Arabic)
	Recommendations	- pattern: most recent messages on top - notifications: add audio-visual notification for incoming message - provide archive of read messages (e.g., per month) - add option to save or tag contacts

NAVIGATION

The Service was used by Latin American and Arabic participants in London. Some reported that they tried to look up addresses while on the road but the tool did not work, it kept showing the loading sign and did not give any address. Participants reported later on the trial that this tool got better but that it was still slow. Others were familiar with using Google Maps and stressed that some features are missing,

- "I like the service, however today I used it to get to Viktoria`s coach station and it led me to the train station instead. I think it might be better to let add more details to place´s names, give options to let the user choose the correct place" (Arabic).

Navigation	Likes	- useful (Latin American, Arabic)
	Problems, shortcomings	- connectivity problems ("location information unavailable"), especially in public places (Latin American, Arabic) - does not display bus roads (Latin American, Arabic)
	Recommendations	- entry format: add option to search for post codes - provide recent query and custom suggestions during search

HELP RADAR

The *Help Radar* service was available in Turkish, Spanish and Arabic and could be used by all groups. Table 15 shows the effected assistance requests from study participants via the *Help Radar* service within the trial duration. Turkish immigrants did not make much use of the *Help Radar* tool (highlighted in brown). Feedback related to user acceptance from the closing workshop was e.g.:

- "I would like to go by myself to the doctor in order to improve my German skills, that's why I did not use the service of *Help Radar*"
- "I have friends they attend to the doctor with me. I prefer that because I am more comfortable in making a dialogue with them instead of talking to a person whom I have never met"

Further reasons for unsuccessful assistance were that volunteers did not show up in the list of available volunteers. In some cases *Help Radar* could not connect to the network due to connectivity problems. In other cases the scheduled availabilities of volunteers did not cover the whole week. In case a participant looked for assistance at a time where no volunteer had checked his/her availability, the participant might have had the impression that the service did not work properly. As a consequence volunteers were asked to extend their availabilities in the volunteer profile of *Help Radar*.

Arabic participants shared quite similar experiences as the Turkish. However as they were already more adapted in London, had sufficient English skills and were already following their training courses, they probably did not have the need for assistance by an external volunteer. The realized use case with the *Help Radar* did not meet the needs of the involved Arabic users. However they appreciated the concept of the service saying e.g.,

- „I think the point of the *Help Radar* is not about asking questions or information, information you can get from the app in a lot of things but the main point of the *Help Radar* is to help you with something that you are stuck in or that you are having a problem with something, need someone with you, need someone to give you a solution for a problem not just information".

On the other hand Latin American participants really liked this tool, as they felt it was "very useful for people who need the help". They felt that this tool is something many people would like and purchase.

Table 15 further shows the given ratings of received assistances by participants. Ratings could reach 5 stars in case the assistance was perceived as very helpful by the participant. In case of the value "0" the participant had skipped the rating to a later moment.

The reasons for assistance requests by Latin American participants were manifold, to outline a few in the Table 14:

Latin American immigrants made use of the *Help Radar* for various reasons including translation of documents, real time translation on school or legal behalf. As reported from the facilitator Paula, participants often rang her on the phone to receive support without using the MApp service. They were used to directly contact her from previous exchange within the Latin American immigrant community.

Table 14. Help Radar assistances

MApp user	Reason of contact	Support given
32	Mother in hospital, participant asked for support	Guidance over phone about the necessary steps
26	Appointment for the change of school of participants´ children.	Meeting with school directorate. Children started school a week after.
28	Parents evening in child's school	Participated for translation (2hrs)
26	Appointment at the Job centre	Translation and support
29	motor bike was stolen	Follow up calls to sort out insurance
28	Housing office	Call the office and settling appointment
39	Help to translate a document from work (English-Spanish)	Translation
25	Do mini-questionnaires for the trial	Guidance over phone how to fill questionnaire

Table 15. Provided assistance via Help Radar (brown: Turkish; green: Arabic; red: Latin American).

MApp user name	Facilitator, volunteer name	Date and time of assistance request	Requested volunteer competency	Assistance rating
MApp12	sibelyigit	2014/10/30 18:14:58	Law	5
MApp11	sibelyigit	2014/11/10 16:26:30	commerce	2
MApp11	sibelyigit	2014/11/10 18:27:46	commerce	0
MApp07	sibelyigit	2014/11/30 12:43:40	health	0
MApp50	BaselZ	2014/12/20 17:34:32		5
MApp28	jaydee	2014/11/12 14:22:20	Law	4
MApp39	jaydee	2014/11/18 17:58:09		4
MApp34	jaydee	2014/11/19 18:17:24	health	5
MApp26	jaydee	2014/11/20 17:04:34	commerce	0
MApp33	jaydee	2014/11/20 19:22:25	Law	0
MApp60	Marina	2014/11/07 14:13:01	health	0
MApp60	Norbz	2014/11/07 14:11:11	Law	0
MApp39	Norbz	2014/11/24 12:20:48		0
MApp32	Paula	2014/11/03 13:31:11	Law	3
MApp27	Paula	2014/11/03 15:23:55	Law	3
MApp33	Paula	2014/11/03 15:23:58	Law	4
MApp34	Paula	2014/11/03 15:24:01	Law	5
MApp37	Paula	2014/11/03 16:53:44	commerce	0
MApp33	Paula	2014/11/05 10:19:36	Law	2
MApp33	Paula	2014/11/05 17:48:22	Law	0
MApp39	Paula	2014/11/07 11:37:05		5
MApp28	Paula	2014/11/13 13:01:21	Law	5
MApp28	Paula	2014/11/13 15:13:39	Law	5
MApp60	Paula	2014/11/14 18:49:57	Law	0
MApp28	Paula	2014/11/16 22:00:49	commerce	5
MApp32	Paula	2014/11/17 10:08:58	commerce	0
MApp34	Paula	2014/11/17 12:20:37	commerce	5
MApp71	Paula	2014/12/29 21:14:34	commerce	3
MApp39	Paula	2014/11/27 12:15:10		0

Help Radar	Likes	- "to get in contact with the volunteer, who made an appointment for the doctor" (Turkish) - "If I could not understand English I would have used the service to get help from somebody who speaks the host language" (Arabic) - "served me well" (Latin-American) - competences categories are useful and important (more section e.g. housing)

	Problems, shortcomings	- Trust and Confidence: "I was shy using it" (Turkish)
		- Usability: "I had problems to understand it" (Turkish)
		- Volunteer availability:
		  - "I tried to reach a volunteer – I saw the volunteer that she was available and I contacted her by writing a message, but there came no reaction" (Turkish)
		  - "I looked for assistance but the volunteer Allaa was marked available only 15 hours during the whole week" (Arabic)
		  - "it was not always showing the volunteers when I needed help. Then I rang the volunteer or wrote a text instead" (Latin American)
		- Trust: there was no personal contact with the volunteer before (Arabic, Turkish)
		- Privacy: "I can see where volunteers are, it did feel me exposed – who else can see me on the map?" (Arabic)

	Recommendations	- Usability:
		  - Provide instruction manual "how to use Help Radar"
		- Privacy:
		  - Places should not be shown on the map to all (privacy), only by messaging
		  - Provide the option to making oneself visible to the other
		  - Provide volunteer details to reduce the barrier of not knowing each other
		- Volunteer setup
		  - Make sure volunteers availability overall covers the week
		  - Allow volunteers to meet up personally with users in advance
		  - it needs a larger pool of volunteers than one or two.

TRANSLATION TOOL

Most participants could use the *Translation tool* successfully for the recognition and translation of a single word and short expressions. Although a more detailed instruction on how to use the tool successfully would have been beneficial for some users, others tried different angles, different lighting conditions for capturing text parts. Participants explored the usage of the tool by trying out many different formats and text contents (e.g., handwritten text, whole text pages of a document, web page contents). Some participants somehow missed to watch the video tutorial.

For Latin American and Turkish participants the designed use case met their requirements, there were attempts for the incidental and spontaneous usage of the tool on the move to explore the host language. London participants concluded the tool often did not work on the road. Some would have liked to use it while killing time on the busses to study new phrases and words.

Translation tool	Likes	- single words can be translated - worked also well with short articles - appealing design - can be used on the street, on the move
	Problems, shortcomings	- translation is not corrected, mixes up German and Turkish words (Turkish) - long sentences could not be translated properly - low efficiency: need to correct a lot afterwards, correcting bad captured content is annoying - "did not see any tutorial video, missed it" (Turkish)
	Recommendations	- improve text recognition quality - provide detailed and easy to understand manual "how to successfully use" - add option to spell the word for entry

LANGUAGE LESSONS

The *Language lessons* service was the most preferred service in all three groups. The tool was introduced later in the trial, available in Turkish for learning German, Spanish and Arabic for learning English. A lot of the Latin American participants reported that they had problems with installing and successfully activating this tool. It had to be installed locally on the device by every participant, which caused some delay. The Latin American facilitator Paula was asked for support and met up with some participants and instructed most of the participants on the *Forum* about how to update their MApp. Most participants realized the worth of this tool too late on the trial and were disappointed that they could not use it longer as it was really helping them learn more English. Beside the very few wrong translations, the *Language lessons* did not provoke any serious usability problems in long term usage.

Language lessons	Likes	- very useful (all groups) - "most important things when you first come into a country, love the idea" (Arabic) - "I like the levels – gradually goes up" (Arabic) - "It fulfils the gaps in my head like which preposition/vocabulary I have to use" (Turkish) - "I used it to prepare myself for the language exam" (Turkish) - "The tests in the service are great" (Turkish, Latin American) - "The topics like public transportation etc. are chosen great, they were really useful for my daily life" (Turkish) - "If you have made a mistake, the service asked you about it after a while again, so it was a good practice, where I learned a lot." (Turkish) - "Can I download it again?" (Latin American, Turkish)
	Problems, shortcomings	- if the phone settings are set to Arabic, the keyboard remains in Arabic for the service – needed to set it every time (Arabic) - translation quality (Arabic): - Diabetes translated as Asthma - Mumps as pneumonia/ lung infection - immunization not very clear needs more than one word - too basic (Arabic)
	Recommendations	- "It should update to new vocabulary, after you learned the existing one; it should be like every day new vocabulary" (Turkish) - "After you completed a topic with five stars, there should be added something new to the row" (Turkish) - Provide additional modules/ extensions (Latin American, Arabic)

GAME "SPLIT"

Latin American participants reported that they could not workout the game after trying it for hours and asking other young family members to try it. Only a few participants reported they understood how to play the *Game* and played to certain point until they got bored. Many participants especially the female immigrants from Graz as well as female Arabic immigrants in London pointed that they are usually not playing any games at all.

Most of the Turkish participants did not understand the purpose of the *Game*. Having rather low reading skills Turkish immigrants had difficulties understanding the dialogues and expressions.

Active Arabic participants tried to play through the *Game.* As most had sufficient reading skills in English they played the English version. Some did not agree with the overall concept that the

external world (and people) is changing as in reality the change and awareness toward adaptation has to be done by the immigrant him/herself. Characteristics, roles and peculiarities of the two fictitious cultures were distorted in terms of exaggeration and polarisation.

After a walkthrough document was provided by COV to participants via the facilitators, participants engaged again in the play. With the help of the walkthrough some users could proceed, but no participant played the *Game* to the end. Some participants recognised that earned coins are to be spent in the *Game*, by visiting the shopping centre. However no participant could buy something in the shop.

Game "Split"	Likes	- "worked well, run fluently" (Latin American)
	Problems, shortcomings	"I came to the hotel room, where I had to open a safe, but I was unfortunately not able to do so, I tried everything out, changed dimensions etc., but it sent me back to beginning" (Turkish) "I was not able to play, I did not understand it" (Turkish) "I went up and down in the train station and nothing happened, after a while I gave up trying." (Turkish) - "difficult and boring, rather frustrating and not motivating" (Arabic) - "changing dimensions were confusing, did not recognize that dimensions could be switch" (Arabic) - "no clear purpose of the game" (Latin American) - "roles are too exaggerated" (Arabic) - "not logically correct, not realistic (e.g. giving medicine)" - "you get to the shopping center and you cannot do anything" (Arabic) - "I am not a gamer" (Arabic)
	Recommendations	- provide introduction in the target language - keep objectives (Journal) up to date - provide more details on the purpose of dimension switching

PEDESTRIAN NAVIGATION

Latin American participants enjoyed using this tool when it worked but perceived that it was rather slow. Participants complained on the long processing time.

In the course of the tool development activities in WP4 an additional outdoor study was conducted in Task 4.2 which aimed to evaluate the Pedestrian navigation with Turkish immigrant users. The detailed description of applied procedure and gathered results can be found in the Appendix 7.5 Immigrant navigation study.

Arabic participants perceived the service as "very good". They appreciated that the AR view provided little details about where to go, and the tool accepted the post code as entry very well.

Pedestrian navigation	Likes	- "It was kind a fun using this service, it helped me to find my way easily" (Turkish) - "I used the map to orientate myself and look how far away the destination is and which direction I am going" (Turkish) - "very useful, provides clear directions" (Arabic)
	Problems, shortcomings	- "I did not need it much, because I travel by car or with my husband" (Turkish) - "does not provide "best way" options, does not provide the shortest way, rush hours like Google Maps" (Arabic) - "did not found the arrow view, I only used with the map" (Latin American)
	Recommendations	- Affordance: highlight the link (destination point) to open AR view more clearly - provide options for setting route quality preferences (e.g., distance, safety, crowding)

PLACES OF INTEREST

The *Places of interest* service was available in English only. No translated UI elements were available. Nevertheless most participants tried out the service to find important places of their entourage. Although in English only, the purpose of the service was clear to all groups and the usage was easy to adopt.

Arabic participants pointed that the *Placed of interest* would be well directed for new immigrants to get a good overview on nearby places which could become relevant in the future.

Latin American users reported that they were able to use this tool successfully and it helped them find the places they needed much quicker and also helped someone to not get lost (orientation).

- "The *Places of interest* helped, as for me I am here for about a year. There is a lot of places that I don't know about, so whenever I'm in a new area I just can check the places of interest and it can give me that there is a post office, there is a hospital, there is all the things on the area" (Latin American).
- "I tried many sites including Kew Gardens, Tate Modern, Tate Britain, London Zoo. However the problem with the tool is that you spend most of the time searching for the lollypop sign or else you have to know the approximate area, which defeats the object of the exercise" (Arabic).

The service was very much recommended to be further developed according to recommendations.

Places of interest	Likes	- "It shows everything I need like pharmacy, doctor, hospital and supermarkets – I liked it a lot. I could easily find places I was looking for" (Turkish) - "My neighbour had bad toothache, I easily looked up the next dentist" (Turkish) - "The aim of the service is to show us the places of interest next to us and it does it very good." (Latin American)
	Problems, shortcomings	Usability: -"after having entered a place, visual feedback is missing that indicates whether the query has been finalized (i.e., search results are available, no places found)." - "after having entered a place, the map view remains on actual position of the user and does not refocus on the location of the place of interest" - "could not find address information of the places" (Arabic)
	Recommendations	- Affordance: highlight the link (destination point) to open AR view more clearly - Orientation: zoom out map view to show query results in the surrounding - Visibility: only show a few categories at first view in favor of a less dense overview of the place - Interlinkage: to Navigation service

INFORMATION

The Information service was available in English and Spanish for participants in London. Information content was available for the topics health, employment and education (English and Computer skills classes). Latin American participants did not comment on the service neither with critics nor with suggestions for improvement.

Information	Likes	- useful information about employment (Latin American) - liked the active links (Latin American)
	Problems, shortcomings	
	Recommendations	

RECOMMENDATIONS

The *Recommendations* service was available at all sites, in English only. Due to the nature of the tool recommendations were not immediately created on the first day, but only as first user data was gathered during the first weeks. Hence the service could not be demonstrated in real time to participants during the introduction workshops. This probably caused the reduced awareness of

the existence and especially the potential benefit of this service. Most participants neglected the *Recommendations* completely.

Turkish participants who did not understand English writing did not benefit from the recommendations. Also Latin American immigrants had difficulties due to the language barrier and did merely look at the *Recommendations*. None of the users reported to having received notifications about new recommendations from MApp. However in workshops participants anticipated the usefulness of such service, in contrast to the majority of Arabic users who understand the English text parts reported they would know the places and would not have a need of such service.

Recommendations	Likes	-
	Problems, shortcomings	- "It was in English, so I only was able to interpret" (Turkish) - "not useful for me I know the places" (Arabic)
	Recommendations	- provide active links to the straight information - notification: provide message for new incoming recommendation in the Android notification bar - settings: provide option to activate and deactivate notifications

2.3.7 GOAL ACHIEVEMENT THROUGH MAPP SERVICES

In the study we wanted participants to reflect about some personal goals that could be achieved by using the MASELTOV services. In the first mini-questionnaire provided via online-link on the smartphone the participants were presented with a questionnaire about the goals they wanted to work towards by using the MASELTOV services; six options were presented as seen in the Table 16, participants were free to check zero to all suggested goals. The results are shown as frequency and percentage.

Table 16. Goals set at the beginning of the field phase.

Set goals	Turkish N(20)	Latin-American N(15)	Arabic N(12)
To receive practical information regarding job seeking, legal information, health services, …	**15 (75%)**	**12 (80%)**	**10 (83.3%)**
To share my experience with other people in my situation	10 (50%)	4 (26.7%)	**10 (83.3%)**
To meet people who can help me get access to local services	12 (60%)	8 (53.3%)	6 (50%)
To meet people with whom I can practice German/English	**14 (70%)**	**10 (66.7%)**	6 (50%)
To feel confident about visiting places I haven't been to before	9 (45%)	7 (46.7%)	8 (66.7%)
To learn about cultural differences/ about the local culture	10 (50%)	**10 (66.7%)**	8 (66.7%)

At the beginning of the trial most of the Turkish immigrants and people from Latin-American countries were interested in receiving practical information for their everyday life such as how to get information on legal advices or medical services in Graz (*Information service, Help Radar*). They further aimed at meet up with people to learn the host country language (*Forum, Translation tool, Language lessons*). Two thirds of Latin American participants were further interested in learning about cultural differences and getting familiar with the local culture (*Game*). At the end of the trial participants received a mini-questionnaire on the goals they accomplished through the MASELTOV services. The presented options were the same as the questionnaire of the first week.

Reliable data could be collected from 14 Latin-American participants. Turkish users checked all answering options which might not reflect their personal goal achievements but rather social desirable answering tendency or missing understanding of the task itself. Although only four Arabic users had really used the MApp services, 14 users replied to this questionnaire in the course of the final workshop. As these answers cannot be reliable in terms of the impact the use of the MApp tools had, this group was excluded from further interpretations.

After having used the MApp services for eight weeks in their everyday life, 6 of 14 Latin-American users answered they had received useful information regarding job seeking (*Information service*) and health related services (*Help Radar*). Six of them met people who helped them to get access to local services using the *Help Radar*. Additional achievements mentioned by this group were

- learnt English
- learnt the value of the other´s opinion

2.3.8 SOCIAL INTERACTION WITH MAPP

During the study the *Forum* offered participants, facilitators and volunteers a private and suitable media for communication and exchange.

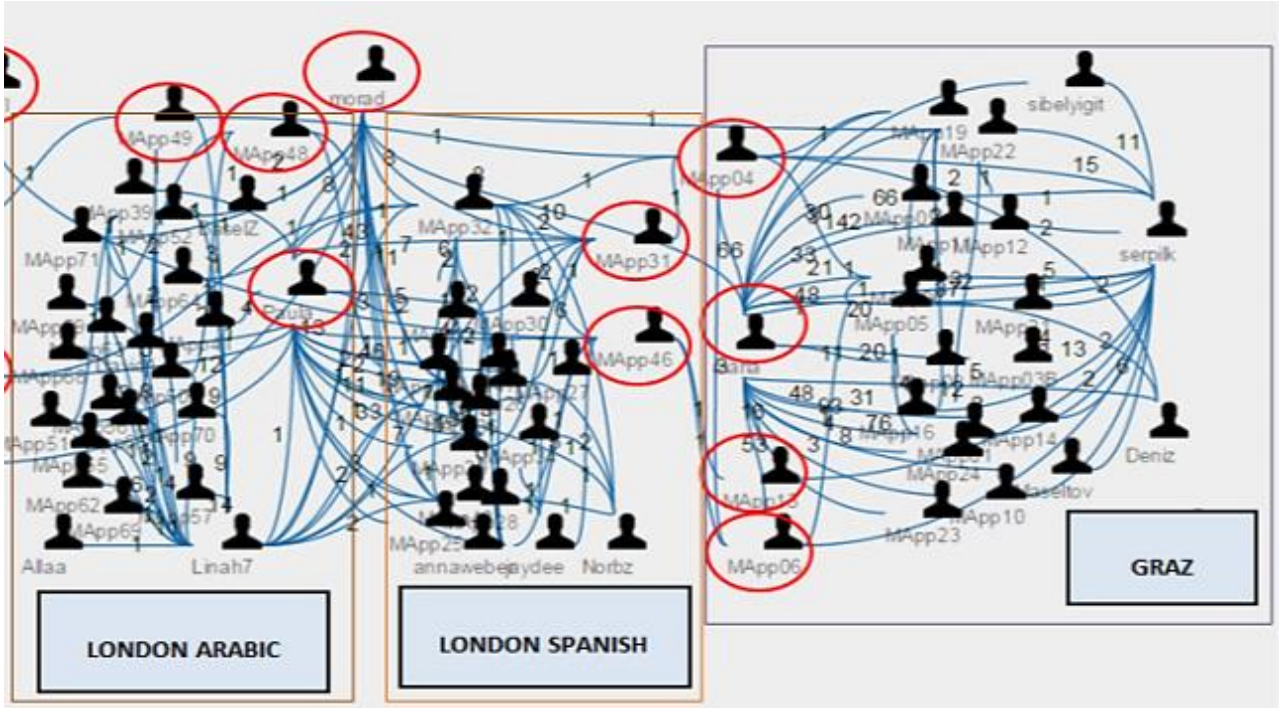

Figure 15. Social graph showing the interaction in the *Forum* during the field phase

In the social graph area provided by the Social Network Analysis tool (D8.1.2) the graphical representation of interactions between users is displayed. The edges are labelled with the number of reply posts exchanged between the two users. The three groups of trials can be recognized (see Figure 15). Users from trials appear with their predefined MApp number (MApp registration user name), beside facilitators and volunteers additional supporters of the study used the *Forum* for learning more about participant´s problems and experiences with the MApp tools (e.g. Morad).

- Arabic group: the graph clearly shows that the Arabic facilitator (Linah7) is at the centre of activity. Most direct links exist between Linah7 and the participants.
- Latin-American group: While the facilitator Paula (Paula) was driving discussions in the *Forum*, the graph shows that participants communicated with each other. Volunteers Norbz and Jaydee were less involved in the discussions of the group
- Turkish group: the facilitator Serpil (serpilk) initiated discussions, while the volunteers Sibel (sibelyigit) and Deniz (Deniz) replied to requests from participants. Less links between participants

Some individuals belong to more than one group because they have relationships with individuals from different groups. As the discussion topics from the Latin-American group were visible to Arabic users too Paula had relationships with both London users groups.

Exemplarily the *Forum* entries from Latin American participants were exported and transcribed by the Spanish speaking facilitator to get an understanding of the main discussion topics.

The *Forum* structure contained a selection of pre-defined topics participants were invited to comment on. Some discussions,

About your work: Most participants commented, all cleaners looking to better their English to better their lives in the UK:

- MApp34: “Hi!!! I work for a cleaning company and am currently contracted in a theater, I like it because I get to see the in and outs of how a theatre functions. My supervisor is Colombian and a very good person. My work consists of cleaning backstage and offices within the theatre.”
- MApp26: “It is interesting working in a theatre even if it's cleaning, I really like that world. I am a Makeup Artist, I paint in festivals and parties. When in Colombia I painted the medellin ballet team and I was in a competition in Amsterdam over here I do the same as you cleaning and sometime I paint in parties.”
- MApp28: “I work in cleaning but the truth is I don’t like it that much. No because it´s cleaning but because of my boss. But im trying to learn this language so I can try get work in what I actually like.”
- MApp32: “Hello my people! My work is similar to a lot of us that come here looking for a better life the difference is I work with old people and I have another job that I like less because I have to wake up at 3am. I am studying English so I can get a better job and have a better quality in life. This is a bit about my life!”

Life in the UK: Participants feel that life in the UK has a lot to offer with great possibilities for all weather you want to educate yourself or just work but they find that people lose their warmth. In this section participants also recommended books to each other.

- MApp28: “The life in UK is good economically but people loose their feelings and human heat.”

- MApp46: "I agree with the comment above, over here it´s possible to work and make money, but it´s to spend more money on materialistic things and loose our humanity and value of life. The people are very cold."
- MApp31: "it is complicated adapting because of the language, the lifestyle and the cold. Not everyone can cope those that have work with the time it gets better and you get used to it."

Topics related to the use of the MApp services:
Participants reported that they were having problems with the connection while on the road but could access the MApp better when at home connected to the Wi-Fi. Participants reported that the application closed frequently and they could not access most of the tools especially the *Help Radar*. Volunteers also reported they were having problems with connection and to report we were not receiving help request.
Participants mentioned they could tell the system was getting better because as the trial was finishing they were being able to connect better and realized that the problem was more on the phone then the MApp. Participants also said they felt this toolset should have come with a manual for them to work out the tools as not all participants were smart phone savvy.

The following topics were discussed:

Language lessons: many participants reported that they had problems with getting this tool to be installed. Paula was asked for help and could instruct most of the participants on the *Forum* how to update their MApp. Most participants realized the worth of this tool too late on the trial and were disappointed that they could not use it longer as it was really helping them learn more English. However they discussed the language learning tool as being very good for them and being able to learn through it but that they would have liked it to have more advance learning. They liked the fact that the tool had illustrations.

Help Radar: one participant needed help and had to go through the *Forum* because she could not access volunteers through the *Help Radar*. Volunteers and participants replied and the participant received assistance through the phone.

- MApp28: "Hello Paula I am Maria, I also needed assistance and I could not get it, on the street the connection is terrible and I was only able to use the Mapp over the weekend from home."
- MApp32: "Hi I am Stella, I have my mum in the hospital and I need someone, please help me. My mother is a little delicate and I need some translation, thanks"

Translation Tool: Participants reported that they were having problems with having access to the tool on the road and that the translations were poor. Some participants had emergencies with children and other family members at hospital and school and they couldn't use tool and couldn't get help through the radar neither because of connectivity while out. Most participants reported they could only use it at home with wi-fi.

- MApp34: "The translator doesn't work well the translations are very poor."
- MApp26: "What I can say is that the program does not work on the road. I would have liked to use it while killing time on the busses to study new phrases and words"

Navigation: Participants reported that they tried to look up addresses while on the road but the tool didn't work, it kept showing the loading sign and didn't give any address. A participant

reported that most of the applications would work for her at home while connected to the wi-fi but not on the road. Participants reported later on the trial that this tool got better but that it was still slow.

Game: Participants reported that they could not workout the *Game* after trying it for hours and asking other young family members to try it. Only a few participants reported they understood the *Game* and played to certain point because they got bored.

- MApp30: "Many times the application closes, in the *Game* tool I cannot move forward, has anyone been able to move from the station?"
- MApp32: Hi Guys, I have been trying to play the *Game* for days and the truth is I haven't been able to understand it and not even my daughters that are good with this things can work it out.

Places of Interest: Participants reported that they were able to use this tool successfully and it helped them find the places they needed much quicker and also helped someone to not get lost.

Pedestrian Navigation: Participants enjoyed using this tool when it worked but found it was slow.

Help Radar: Participants really liked this tool they felt it was very useful for people who need the help. They felt that this tool is something many people would like and purchase.
Forum: Participants found this a good tool for people that are new in the country to be able to socialize through. They felt that at the end the *Forum* was not being used as much by participants and that we didn't really take advantage fully of this tool. I think this happened mainly because of the problems with the connection and people were communicating with me on my personal phone number instead of the MApp. Participants also said that this tool should have some kind of notifications to know when people have relied to your posts or have messages.
Links: Participants were sent the links for the questioners and were asked to fill them in. Participants replied and some asked for help.

New topics were created by the facilitator and participants:

- **Festival this weekend:** Participants responded positively and asked for more information.
- **Invitation to a Temazcal and What is a Temazcal:** Subject created by Paula to try and get the participants together to get to know each other better and to check any problems with the MApp. Participants replied interested but could not meet.
- **How do you celebrate Christmas?** A participant wanted to get people involved in the chat and started this subject and some of the participants shared their family traditions. Most of the participants are of Christian faith.
- **Favorite places:** Another topic created by the facilitator to get participants talking on the *Forum*. Some participated and shared their favorite restaurants.
- **Carnaval Del Pueblo 2015:** Paula announced a carnival meeting. Some people replied but no one could make it, but are interested in participating in Carnival 2015.

2.3.9 DISCUSSION AND CONCLUSION

The User Experience Evaluation study covered the interaction with the MApp services by the MASELTOV target groups under natural, uncontrolled conditions, for the duration of approx. 8

weeks. While no explicit task-based observation was performed, user-generated feedback was gathered to answer the main research questions regarding the overall usage behavior and experience with the services at the beginning (introduction workshop), during and after (closing workshop) the field phase.

RQ1: Are there differences in the usage activity of immigrants with different origins in different European countries when using MASELTOV services over time?

Forum was the most used service in the final field trials. It served as a means for communication between the participants and the facilitators. Mainly facilitators used the *Forum* to post the links for the weekly mini-questionnaires, to send out special information about the study and services (e.g. *Language lessons* are available, walkthrough for the *Game*), as well as to motivate participants to engage in interesting discussions within the groups. Additional discussions occurred between the participants.

From qualitative feedback we conclude that the *Language lessons* best met the needs of the Latin American and Turkish participants. Arabic users differed in their demography from the remaining participant profiles. They were more highly educated (Bachelor), had lived over 5 years in the host country and had sufficient English skills to follow academic studies In London. Arabic participants used the MApp tools (including the *Language lessons*) significantly less intensely than the other two groups. This might be due to reasons not primarily related to the functional repertoire or the performance MApp services, but rather to the low commitment of the Arabic facilitator, and of motivation of participants (they had little need of the language lessons compared to other groups): as no participant knew each other nor the leading facilitator, motivation and willingness to using the tools and providing valuable feedback for the study was rather low.

Turkish participants preferred the *Language lessons*, *Places of interest* and *Pedestrian navigation*. Beside *Language lessons* and the *Forum*, for Latin American users the *Help Radar* was the most promising service. Finally Arabic participants reported to perceive greatest potential in the *Language lessons*, *Places of interest* and the *Translation tool*.

RQ2.1: How satisfied are immigrants when using the provided services over time?

As the *Forum* was extensively used, the increasing amount of posts and messages led to a reduction of the overall usability of the service regarding clarity and arrangement of the content on the small display. Subjective satisfaction regarding the *Places of interest* service might have been influenced by the occurrence of connectivity problems participants had using the tool on the move.

Satisfaction ratings for the *Game* remained around and below average for the duration of the field trials, due to the problems the participants reported to proceed in the *Game*.

All participant groups fully appreciated the value of the *Language lessons*, and satisfaction with this service increased over time and reached the highest score among the MApp services.

While at the beginning the rating for *Recommendations* was below average, satisfaction with this component rose with time as with processing of more and more logging data (e.g. MApp usage, location tracking) the MASELTOV system produced entries in the *Recommendations* which could be received by participants.

RQ2.2: Do immigrants have privacy concerns towards the use of the MApp services? If yes what are they?

In our study context information privacy can be understood as the "claim of individuals to determine for themselves, where, how and to what extend personal information is communicated to others" (Malhotra et al., 2004).

Participants were asked to provide feedback on their general attitudes and privacy concerns toward the collection of personal information by MASELTOV system. While most Turkish immigrants were more concerned to provide personal and demographic information (see Table 12), more Latin American immigrants expressed their concerns about providing financial details.

According to previous research the construct of information privacy further refers to three dimensions:

- *Collection*, the degree to which a person is concerned about the amount of individual-specific data possessed by others
- *Awareness*, the understanding about established conditions and actual practices
- *Control*, the given control over personal information

Feedback on general attitude toward privacy-related statements showed that overall the (higher educated) Arabic users were mostly concerned about threads against personal data security and privacy. Concerning their attitude toward the MApp services, Latin American users reported most concerns, however scores remained in the middle of the scale. However high scores for all groups were attained in relation with the *collection* of personal data by MASELTOV, reflected by the item "To me, it is the most important thing to keep my privacy intact from the MApp service providers". Arabic showed highest *awareness* on possible threads as the lower educated Turkish and Latin American participants. Education level is only one co-variable that influences extend of privacy concerns.

Overall summary

Overall most participants said they felt the MApp was a fantastic idea to help immigrants at first arrivals. Most of the MApp services were positively evaluated by the different groups. Arabic participants turned out to be the most critical group, Latin American engaged most in the communication tools (*Help Radar, Forum*) and Turkish participants referred to the usefulness of the navigation and place finding tools (*Navigation, Places of interest*). However the main problem has been the unstable connection to make the services run properly, participants were put off from using the MApp more frequently because of the connectivity. Participants were asked if they would pay for this MApp and they replied they would if all the teething problems were resolved.

3. LANGUAGE LEARNING WITH MAPP

3.1 BACKGROUND AND RESEARCH QUESTIONS

The aim of this trial was to explore how the MApp supports users to improve their English language learning and to develop their understanding of the UK's cultural context. The focus was on gathering qualitative data about the participants' perceptions of their learning experience, and their perceptions of changes in learning practices. The services and modules which the trial focused on are shown in Table 17 below. Due to logistical and technical reasons three of the MApp tools were not included in the Milton Keynes trial (MK trial). The difficulties involved in recruiting local bilingual paid 'volunteers' for the *Help Radar* services, together with the technical problems experienced by those in this role during the London trial suggested that this service would not be feasible during a trial of such short duration. The *Navigation* and *Information* services were designed and built around the transportation systems of the city of London in the UK, and for this trial, added at a later stage to the planned field trials, the time and resources available meant that extra technical developments needed for their inclusion were not possible

A full description of the background and methodology can be found in an earlier MASELTOV deliverable, D9.3.1.

Table 17. Services and modules evaluated in the MK user trial

Services and Modules	Milton Keynes, UK (Latin American participants)
Profile	**x**
Translation tool	**x**
Help Radar	
Forum	**x**
Navigation service	
Pedestrian navigation	**x**
Places of interest	**x**
Information service	
Language lessons	**x**
Game	**x**
Recommendations	**x**

The two main research questions were:

RQ1: How do the participants use the tools and services provided within the MApp to improve their language and communication skills and cultural understanding?

RQ2: Does the MApp enable participants to shift their learning practices toward more self-directed learning?

3.1.1 CONTEXTUAL BACKGROUND

Milton Keynes is a new town in the centre of the UK that has developed since the 1970s with the aim of achieving city status. It has a non-hierarchical design that contrasts with other traditional new UK towns and is modelled on the work of an American urban theorist (http://en.wikipedia.org/wiki/Milton_Keynes#Birth_of_a_.22New_City.22; accessed 15.4.2015).

Milton Keynes is one of the more successful (per capita) economies in the UK, with a gross value added per capita index that was 47% higher than the national average (2005 data). It attracts a growing multi-cultural population with many recent immigrants and has a population of over 250,000.

3.2 METHOD AND PARTICIPANTS

3.2.1 METHOD

Pre-trial preparations

The final field trial methodology used in London and Graz was used as a basis for the MK trial (see Section 2.2). Smartphones were purchased and pre-loaded with a SIM card, 6 GB of data and £10, and configured for participants' use during the trial. A technical walkthrough in Central Milton Keynes was undertaken to establish which services (from the list of those planned to be used in the Milton Keynes trial shown in Table 17) were (1) running in a technical sense when connected using 3G (2) were logging via 3G, and (3) to give an idea of the functionality of the tools when faced with authentic tasks so as to (a) understand what potential problems are and consider work-arounds; and (b) create participant briefing materials and to prepare volunteers for known issues.

Induction workshop

An induction workshop, delivered in Spanish, was held so that participants could familiarise themselves with the Android smartphone and the MApp functionality, and to begin to build a community of learners. The following resources were provided, all of which were translated into Spanish:

1. A hand-out on how to use the MApp. This was used as a training tool during the induction workshop (see Appendix I).
2. A handout aimed at encouraging participants to try out the MApp tools and share their experiences in the MApp *Forum*. This handout was entitled 'My quests' (Appendix II: version in English. Participants received Spanish version).
3. A consent form explaining how data collected would be used.
4. A Motorola 'Moto G' phone for each participant, pre-loaded with: a Gmail account; the MApp and a MApp user account associated with the Gmail address; a SIM card with 6 GB of data and £10 credit for calls and SMS use.

The 3 week trial period

During the trial period a Spanish-speaking facilitator and a member of the Open University team were available to support the participants when necessary. There were thus two facilitators for the trial: (1) a bilingual Latin American facilitator who was known to many of the participants from this community before the trial, since she was instrumental in recruiting them, and (2) a

Spanish speaking OU facilitator helped co-ordinate and solve any technical problems. Both facilitators entered into the *Forum* to prompt, scaffold, join in or further develop discussions underway and answer questions. In lessons learned from the London trial, the bilingual facilitator was strongly encouraged to ensure all discussions and communication about the technical services were carried out in the *Forum*, so this data could be captured.

Qualitative and quantitative data were collected using a variety of methods. These methods can be assigned to two categories which are intended to generate data for different purposes:

1. Methods which allow data to be collected at the place and time that the MApp is used, i.e. *synchronously at the MApp's location*
   These methods enable data to be acquired which can track actual usage of the MApp.
2. Methods which allow data to be collected at times and places at which the MApp is not in use i.e. *asynchronously and not necessarily located with MApp use*
   These methods enable participants to reflect on their experiences of using the MAppp, before, during and after their use of the MApp during the trial.

The data collection methods used in the two categories were:

1 Data collected synchronously from the MApp's location

- Event data from the MApp, e.g. lesson access and duration in seconds
- *Forum* posts
- Geo contextual data, i.e. place and time the Mapp was used

2 Data collected asynchronously and not necessarily located with MApp use

- Pre-trial questionnaire (paper-based and completed at the induction workshop)
- Post-trial participant interviews (face-to-face)
- Post-trial facilitator interview (face-to-face)

Experience sampling

- Weekly online surveys using the Experience Sampling Method (ESM) were sent to participants via the smartphones

We also used a short questionnaire to capture participants' views at the end of each week. The modified ESM method collects data in a manner that contains elements of both Category 1 and Category 2, i.e. it collects self-reports of MApp usage and reflections on use. Participants may respond in different ways depending on their own preferences: some may respond using their smartphone just after using a MApp service, while others may respond on another device sometime after having last used the MApp. The questionnaire could be completed online or via the smartphone at the end of each week.

End of trial workshop

Three Spanish speaking Open University research staff were recruited to conduct semi-structured interviews in Spanish with the 12 participants who completed the trial, i.e. who responded to at least 2 out of 3 weekly surveys, engaged in *Forum* discussion and attended the final workshop. All of the interviews were recorded.

Geo-contextual and other usage data obtained during the trial were removed from the smartphones. These 12 participants were presented with a Certificate of Participation in the project and given the smartphone, plus a £25 shopping voucher as a token of appreciation.

After the trial

The following data were translated from Spanish into English prior to analysis:

- *Forum* posts
- Weekly surveys
- Semi-structured interviews (2 complete interviews and specific excerpts identified by the OU MASELTOV team)

3.2.2 PARTICIPANTS' DEMOGRAPHIC DATA

17 Spanish speaking participants with a low level of English, who have immigrated to the EU and are now living in Milton Keynes, took part in the trial.

Milton Keynes traditionally attracts immigrants with post graduate qualifications, and initially the local ESOL colleges, restaurants, salsa groups and other Latin American social forums yielded very few participants with the appropriate language or education levels. Two participants were eventually recruited via Open University staff networks and the remainder via the Venezuelan facilitator's own personal contacts.

3.2.2.1 AGE, SEX, NATIONALITY, LENGTH OF TIME IN THE UK, EDUCATION LEVEL & REPORTED LANGUAGE LEVEL

Of 17 participants, 12 females and 5 males, 2 were under 21, 2 aged 22-24, 8 aged 40-49 and 1 between 50- 59. 15 were from Spanish speaking South American countries and 2 were Spanish (see **Fehler! Verweisquelle konnte nicht gefunden werden.**).

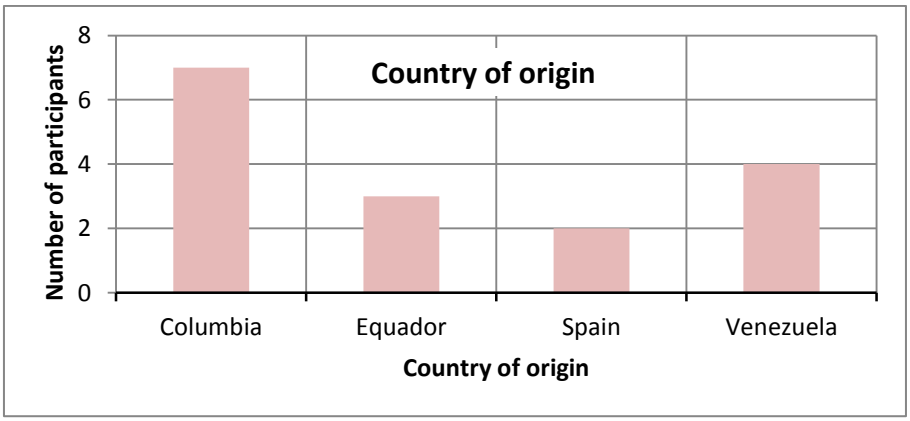

Figure 16. Chart showing the countries the participants originate from.

Eight participants had been in the UK for a year or less (one for less than a month); 2 for 2 years or less, 2 for 3 or 4 years, and the remaining 4 for longer. The average is just over 3 years (SD 4.1). Their reported education level shows 2 participants leaving compulsory schooling aged 16, and 15 who completed some studies after this. 9 of these indicated their studies were at 'university' with 6 at 'college' or bachalaureat/high school leaving certificate. 10 people indicated their language level was at level A1, 4 at B1, and 2 at B2.

Table 18. level of education of the MK trial participants

MK trial: participants' education level	Modified assessment after clarification
Primary school only	
Education up to age 16	2
Post 16	6
University level	9

3.2.2.2 EXPLANATION OF ISSUES RE LEVEL OF EDUCATION & LANGUAGE

The facilitator recruited participants via phone, social media (e.g.facebook and what's app). She elicited the 'highest' level of education from participants and provided in a spreadsheet showing that most potential participants were not educated beyond aged 16, with some having taken vocational courses (e.g. hairdressing; food hygiene). The demographic data reported above are from a paper based questionnaire completed by participants in the very busy environment of the initial workshop.

The potential participants invited to the workshop had all indicated to the facilitator that their formal education stopped by age 16, and information relating to all parts of our participant profile were recorded in the facilitator's spreadsheet. All the invitees fit (to our knowledge) the criteria relating to non-EU Spanish speakers where possible:, age, level of language, and education. However, in order to reach our desired number of participants, a local language school found us 3 Spanish participants who did not comply with the nationality or education level. As we were focussing on language, culture and communication the language level was seen as the most important criteria in the MK trial.

Hence, participants had been vetted as far as possible PRIOR to the initial workshop to ensure that the majority fitted the profile characteristics in our information sheet for potential participants (given to the facilitator, the local language school and provided by the OU researcher by email where possible).

Unfortunately in the question about 'level' of education (see below) people ticked more than one box. It is possible that participants completely misunderstood this question so unfortunately the data here is not robust. The Open University MASELTOV researcher emailed participants to disambiguate responses but received only 3 helpful responses which clearly explained their educational level. Many attempts to try and clarify other responses by phone or email were unsuccessful, in either language.

Similarly level versus qualification received or course followed appears to have caused some confusion. Participants who were studying or had studied ESOL in relation to a benefit related job seekers course for instance, might then mark the box for Higher or Further Education ("Educación superior" using e.g. university).

Questions that elicited ambiguous responses

¿Cuál es su nivel educativo? (p.ej., primaria, secundaria, formación profesional)

What is your level of education? (e.g. primary, secondary, vocational education)

Educación elemental o primaria (hasta la edad de 11 años) ☐

Primary or elementary education (until 11)

Enseñanza secundaria obligatoria (hasta la edad de 16 años) ☐

Compulsory secondary education (til 16)

Bachillerato o equivalente (hasta la edad de 18 años) ☐

bachalaureat or equivalent (til 18)

Educación superior, por ejemplo, Universidad ☐

Higher/Further education, e.g. university

Si su nivel educativo no encaja en ninguna de las categorías anteriores, por favor, describalo a continuación. If your level of education does not fit into the previous categories, please describe it here below

Regarding language level, the CEFR is unknown to many language *teachers* as well as learners, and not used in Latin America. There is no test for CEFR; it is a tool with descriptors of examples of typical language use by language users at different levels. So a learner can be A1 in writing and B2 in listening. Possibly this unknown scale on question 15 confused some participants, because nobody was at a level B1 or B2 in speaking or listening at the workshop, and all communication was needed in Spanish. Possibly participants unfamiliar with the CEFR put B1 or B2 taking it to indicate the 5 categories in the previous question (14.) so 'neither good nor bad), or 'not very good" (see the exact wording as follows).

14. ¿Cómo considera que es su competencia de la lengua inglesa?

What do you consider your language level to be? please select only 1 option

Por favor, seleccione únicamente una opción

☐ *Muy buena*	*Very good*
☐ *Bastante buena*	*Quite good*
☐ *Ni buena ni mala*	*Neither good nor bad*
☐ *No muy buena*	*Not very good*
☐ *Nada buena*	*Not good at all*

15. Por favor, indique el nivel de su competencia de la lengua inglesa según en Marco Europeo de Referencia (MER) (si lo sabe)

Indicate your level of competence on the CEFR (if you know it)

A1 ☐ *A2* ☐ *B1* ☐ *B2* ☐ *C1* ☐

3.2.2.3 IMPLICATIONS FOR THE INTENDED MASELTOV USER GROUP

Given that some of the demographic data for our Milton Keynes participant sample does not (or may not) match the target group, how far are our results applicable to this group? We've addressed two aspects: educational level and language level.

- *Education level.* As has been noted elsewhere it was not possible to include illiterate immigrants – and indeed it would have been very difficult for them to engage with the social aspects such as using the *Forum* and the text in the *Language lessons* app for example. As noted the education level seems to be higher than we wanted, but we cannot be sure about how it was interpreted by the participants, so this demographic data is not robust. Taking the most cautious line, and assuming that these participants were educated to a higher level than the expected target group, it is possible that immigrants with less education might find the content harder to deal with. We can only speculate. However, regarding the *Language lessons*, participants were very positive, and no-one struggled with the material: they compared it positively with other courses/resources they had used. So we would be optimistic about its use with a group with fewer formal educational qualifications, but it is not possible to give a definite answer about this.
- *Language level.* It seems that participants may not have understood what the CEFR was and we have noted the difficulty of giving one overall 'level' grade for language. However, there is no indication that their language level was too high for them to benefit: indeed on the contrary when they were encouraged to write in the target language (in the *Forum*) most were very reluctant to try to do this, finding it too hard. We therefore suggest that the level of the *Language lessons* was appropriate for the participants and would be appropriate for the target group.

3.3 FINDINGS

Interview data

Of the 17 participants that participated in the trial (see Table 21 event data below) 12 were invited to take part in an interview in their first language, based on their availability to attend the final workshop. During the interviews participants commented on how they used MApp services, focussing on the language learning app and *Forum* in particular. A couple commented on how long they spent at a time on the app, whilst many talked about what they used it for and how (e.g. to practice in advance or when needed). In the account below, the numbers in parenthesis following each numbered point indicate the ID of the participant(s) making this comment. The interview data suggests that the MApp supports users' language learning by:

1) Being available when needed (87);

2) Enabling them to look up vocabulary and phrases of personal interest (84, 87);

3) Enabling them to practise different language skills – in particular reading, listening and speaking: an example given was practice in pronouncing and hearing/understanding pronunciation, in the participants' own time (86, 94);

4) Supporting particular situations: for example going to the doctor's (87), settling into the UK (88), making bank transactions (89), catching a bus – where one participant found they could change a couple of words in a phrase and use it for their own journey (90);

> 5) Helping them to learn colloquial and appropriate English (e.g. using the word 'temperature' instead of 'fever' (87), and learning contracted forms of phrases e.g. "I've" instead of "I have" (85).

The MApp provided support in **using** English – where other courses have not helped (89) and as an accompaniment and complement to formal ways of learning (100). Participants appreciated being able to test themselves and practise as many times as they liked and wherever they liked.

Although participants used the *Language lessons* to prepare for specific settings and to rehearse specific vocabulary such as medical or banking terms and found it to be very helpful, they did not describe any instances of using the *Language lessons* IN a particular context (such as at the doctor's or at the bank for example), so it is not clear how much the app was used for preparation/rehearsal and reflection, as opposed to being used 'in the moment' to solve a particular language issue.

The Translation tool was used by some participants when they were out and about, although the majority did not find it worked as they had hoped. Nearly all participants thought the language learning app was better than previous courses or books they had used, with just one participant (81) preferring face-to-face classes: "English classes … are more useful than the telephone, a bit more social," but, as the app contained practical information (such as about doctors) not found elsewhere, she still found the app very helpful.

The facilitator said the participants "gave really positive feedback about the lessons, the language learning…One was saying she had to go to the doctor's and it was so useful knowing how to say things and what things meant". She also said one participant, who had been in the UK 15 years, had tried going to a few classes

> "… but when you have kids around and are going to work, the last thing you want to do at the end of the day is to sit in a classroom…not everybody likes reading and writing, so having the course on her mobile, she could flick to what she wanted; if she was bored, she could easily change to a lesson about something else...she was learning at her own pace and told me 'this is really useful' ".

The interview data also show how the *Forum* was also used to support language learning and cultural learning. The shared experiences of this small community were valued and the participants expressed the following ways in which they used the *Forum*:

- To gain reassurance that others have the same gaps and make the same mistakes (84); it was a trusted space of like-minded people (92)
- To meet people, make friends (81); find people from the participants' own community (84); build relationships and community (85, 86); talk to fellow users – discussion (92); to comment; follow discussions (84)
- To ask about learning English (90)
- To learn about English food and gastronomy (84; 86, 87, 89), culture (84, 87 ,88 ,81) (*The English are punctual!*), social security (88)
- To express opinions, share information, practise writing, communicate (90)

According to interview data, participants stated that their *Forum* posts were in Spanish (81, 84, 87); English (85); both (88, 94); and occasionally in English (89, 90); however the vast majority of the postings were in fact in Spanish (see *Forum* data section below). The facilitator also discussed the interactions that took place in the *Forum*:

> "They liked the interaction, being able to talk to others and getting a response trail….even if I wasn't on the phone when they posted a question, someone else would respond".

Where and when was the MApp used? One person didn't want to take the phone out and about too much – commenting that it was 'delicate' (88). Many talked about using it mainly at home, especially for the *Forum*, because of internet issues (e.g. 84, 85, 87, 88, 90, 91) and of using it at night, whilst one participant talked about using it in different places and at different times (94). The extent to which others used the MApp whilst navigating Milton Keynes in the course of their daily lives was not clear from the interviews. One mentioned that she had more time whilst at home (90).

The *Translation tool* concept was really liked but it was not used much as it did not work as participants had hoped; participants wished to use it for longer segments of texts such as to understand letters from their children's school (81, 84, 87,100) but it was fine for shorter fragments (e.g. water bottle label) and one participant used it at college to understand notices (90). Another (92) stopped experimenting with it when people were looking at her in the shop or street.

In summary, the interviews showed that the participants really liked being able to practise; seeing their errors and being able to try again, gaining confidence, and the practicality of the lessons. Participants were overall very positive about the language lessons, as exemplified by MApp88:

> *"Really useful … for people recently arrived here…it gives the basics for starting a new life here."*

Forum **data**

In addition to the participant interviews, the *Forum* posts exemplify the ways in which language learning was both supported and motivated (or not) by the use of the MApp. Practice is clearly important in developing skills in speaking a target language and the forum supports communicating with others in social interactions. It is interesting to note that the interviews appear to reveal perhaps slightly more use of English in the *Forum* than actually occurred, as overall there was minimal use, even in those threads specifically related to language practice in English. There are only four posts (of a total 1,182) asking for specific help understanding or correcting language, and despite valuing unsolicited peer and facilitator correction ("thanks for the correction Mila, I have a lot to learn, Mapp85 corrections help all of us" (94)), the 'corrections' thread was very rarely used. One possible reason for this is shown in the following *Forum* post communication quest, where participants are challenged to share useful words and expressions learned through using the MApp suite of tools and services:

> "Guys I'm going to share the vocabulary that I learnt today: Upholp= Defender, sift out = seleccionar (personal de trabajo), mesa up = estropear, Likewise= igualmente :)" (92)

The participants' phones had been set to use Spanish as the default language in order to aid overall understanding of a new smartphone, which resulted in the auto correction of English words to Spanish ones. Without very careful doubling back to correct and edit input keyed in, there can be some problems with the resulting texts, as the example above demonstrates. The word 'uphold' comes out as 'upholp' (a common mistake in dyslexia that might be aided by English auto-correction) and 'mesa up' is clearly a mis-auto correction of the word 'mess' (mesa=table in Spanish). The first part of the text ("Guys I'm going to share the vocabulary that I

learnt today") was written in Spanish, which shows the reluctance or problems in using English, or a continuing of this communication quest thread started in Spanish by the OU facilitator.

The problem of auto-correction is identified by the following exchange later on within the thread, this time composed in English (the response is by the bilingual Latin American facilitator):

> *92*: your welcome, and sorry is mess up, but this mobile has spanish diccionary
>
> *MilaR*: agree? it's difficult to type in english as it has spanish as default dictionary

This issue is reflected more precisely in an earlier thread by MApp80: "In this telephone I write in English and some of the words come out in Spanish."

Together with a discussion around the perceived usefulness of the content or topics in the *Language lessons* service as revealed in the interviews reported in the previous section, the harmonisation of topics across the collection of MApp tools was also represented here. MApp88 suggests that the serious *Game* might be improved "if the dimensions were according to the topics practised in the language learning app, because as it is at the moment it's a bit boring". Interestingly, two of the most populated threads, both instigated autonomously by participants (on the subject of British food and English weather) were not represented in the *Language lessons*. The vast majority of contributions made on these familiar everyday subjects were in Spanish, despite repeated facilitator attempts to move towards the use of English, from which we might surmise that there was a (perceived) lack of L2 (English) available to participants, or the participants found the constant auto-correction into L1 (Spanish) meant it was easier to communicate in Spanish.

The *Forum* posts reveal more about the participants' expressed increase in linguistic awareness, including particular emphasis based around pronunciation and lexis as was also revealed in the interviews. MApp93 describes the features valued here when listening to tannoy announcements: "the vocabulary part is brilliant since you have words separated from the classic messages from the big supermarkets..." This participant appreciates how chunks of everyday language are isolated for focus on how the spoken forms appear in writing, which is mystifying to a user whose L1 is phonetic, i.e. combinations of letters have one possible sound, rather than the multiple possibilities in English.

A further important addition to the interview data lies in the identification of concrete language learning strategies, which when shared in a community of practice can be a powerful motivating factor for new learning:

- Reviewing answers: Early on MApp80 comments "It would be good if when they give you the results of the exercises they would tell you where you've failed" and a fellow participant gives technical help: "MApp80 yes they do tell you where you have failed. If, on finishing the exercise it says, for example, 6/10 you can press the < and you see your answers".
- Pronunciation practice: MApp93 says "for me the best part is the pronunciation because in this way you can tune your ears and get used to the English accent", and similarly MApp88 says "I have enjoyed a lot the modules for listening to and repeating the pronunciation, I'm walking around with headphones in".

The language learning strategies shared in the *Forum* emphasise listening and repeating, in a similar way to the interviews expressing a preference for copying. The following exchange exemplifies this tendency, and refers to the motivation to score 100% in the test at the end of a section of the language learning app:

MApp82: I'm going to repeat and repeat until it comes out at 100%

MApp89: Yes me too, it is really nice and necessary

This strategy for repetition (both listening and repeating, as well as going over and doing exercises a number of times) are familiar to participants from the courses and language learning they have done throughout their lives (and possibly more prevalent in their home cultures), but are not especially effective. The emphasis on listening and repeating might be characterised as a somewhat passive strategy rather than actively engaged ones which the MApp aimed to motivate. Sharing ineffective strategies without any critical reflection by participants on their effectiveness is evident in this instance of unquestioning acceptance of the group wisdom "but as you say it is good to repeat many times so that what you learnt sticks" (90).

Only one participant (100) makes reference to the *Language lessons* "Challenges", which are designed to stimulate the use of language studied via the app with other English users around Milton Keynes: "They challenges of the language learning app have helped me a lot!!" A future development to the *Forum* might include the ability to upload photographs and recordings made when engaging with such challenges, which could have a dual purpose: providing evidence of and progress in learning, as well as encouraging other *Forum* users to set their own challenges to post and share. This could bring the wider community in which participants operate into the same *Forum*.

ESM mini-questionnaire data

All participants were sent an invitation to complete a short questionnaire at the end of each week of the trial. The number of responses for each week is shown in Table 19. One of the questions asked the participants to report which of the MApp services they had used in the past week. Figure 17 shows a summary view of the results over the 3 week trial period.

The overwhelming majority of comments relate to the participants' perception of an increase in their language learning, with a particular emphasis on increased vocabulary as a result of using the MApp. A very limited number of responses refer to improved pronunciation or speaking skills. All the words supplied are positive, with no negative responses from those who answered this survey.

Table 19. Number of responses to the weekly ESM questionnaire, % of the total number of participants (17)

Number of responses	13	16	13
%	76%	94%	76%

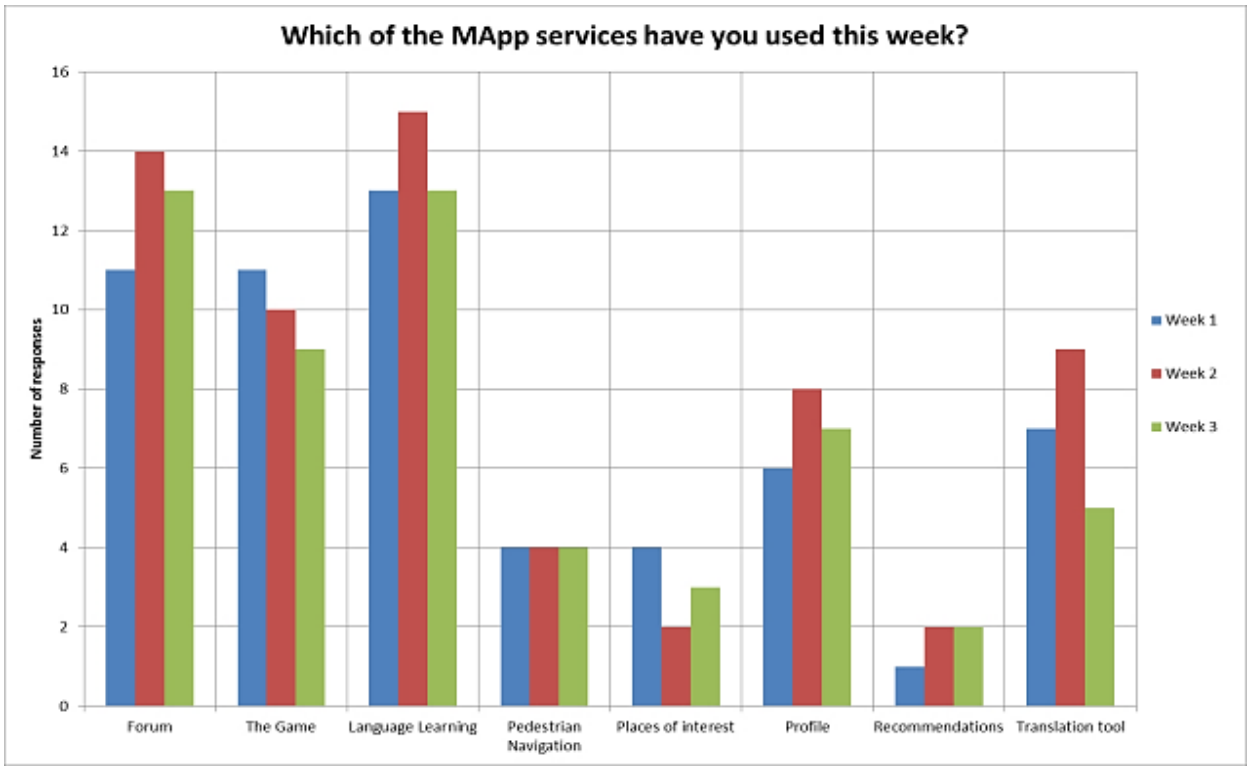

Figure 17. Number of participants who reported use of particular MApp services in the weekly questionnaire.

Table 20. Table showing reported use as a percentage of possible maximum use.

ID	% of use
MApp80	46
MApp81	29
MApp82	71
MApp83	29
MApp84	38
MApp85	54
MApp86	21
MApp87	75
MApp88	29
MApp89	38
MApp90	58
MApp92	58
MApp93	25
MApp94	42
MApp98	50
MApp99	33
MApp100	42

Event data

Table 21. Access duration of the *Language lessons, Forum* and *Game* (Jan 20th – Feb 2nd 2015). The Ids of participants who completed the trial and were interviewed are shown in bold.

	Language lessons			*Forum*			*Game*		
Id	**Hours**	**Mins.**	**Average time per day hh:mm:ss**	**Hours**	**Mins.**	**Average time per day hh:mm:ss**	**Hours**	**Mins.**	**Average time per day hh:mm:ss**
MApp80	9	51	00:45:28	13	51	01:03:55	10	6	00:46:37
MApp81	13	39	01:03:00	10	22	00:47:51	13	0	01:00:00
MApp82	9	28	00:43:42	11	30	00:53:05	3	14	00:14:55
MApp83	10	4	00:46:28	18	22	01:24:46	0	21	00:01:37
MApp84	10	10	00:46:55	4	31	00:20:51	11	12	00:51:42
MApp85	2	15	00:10:23	14	30	01:06:55	6	43	00:31:00
MApp86	16	12	01:14:46	5	30	00:25:23	16	9	01:14:32
MApp87	10	3	00:46:23	8	53	00:41:00	0	36	00:02:46
MApp88	10	37	00:49:00	1	11	00:05:28	2	53	00:13:18
MApp89	22	55	01:45:46	16	33	01:16:23	13	38	01:02:55
MApp90	10	43	00:49:28	18	23	01:24:51	3	18	00:15:14
MApp92	12	27	00:57:28	4	5	00:18:51	10	11	00:47:00
MApp93	23	43	01:49:28	13	49	01:03:46	9	22	00:43:14
MApp94	15	37	01:12:05	10	23	00:47:55	17	8	01:19:05
MApp98	8	8	00:37:32	8	29	00:39:09	18	58	01:27:32
MApp99	12	50	00:59:14	4	20	00:20:00	15	45	01:12:42
MApp100	29	32	02:15:32	8	29	00:39:09	15	44	01:12:37

Please note that the time spans shown in Table 21 represent the duration that the particular MApp service was in focus on the participant's phone, it may not relate to the duration of actual engagement by a participant with the service.

LEARNING PRACTICES

The ways in which the MApp was seen by participants as being new and different encompassed the following:

- Using small amounts of spare time (84)
- Driven by personal interests (84)
- Different from the classroom (85)
- Can go over it repeatedly (85, 88)
- Can use for my personal needs (e.g. the bank) (85)
- Can see my errors (85)
- Practical, different: can use when needed (87) e.g. in doctor's (81, 92), wherever you are (92)
- *Forum*: sharing new words, information, expressing oneself, opinions, writing practice (88), very interesting when get answers to questions (90)
- Can work at own pace to practise and repeat (88)
- Supports my talking and understanding; more practical (89)

- There is a community of learners to draw on (94)

Below a number of extracts exemplify what was appreciated, and what was seen as new, different – or perhaps complementary. There was at least one instance of a more traditional approach, though too, where one participant repeated how she copied everything into a book.

Particular areas of focus included the following:

Everyday practical language

> *like in the doctor's .. because I've only been here four months, and I've .. been to the doctor's, only maybe once, and I was terrified...so at least you have all this vocabulary that they use...the application seems really good for this, because if you do a google search, which is traditional, it shows you words, but not what they use here...it's language from the street (the MApp?) and that's the part I like..(I: prompt) (87)*
>
> *It has a guide I can look at if I need to go to the bank about my account, I look for it, find it, read it, go to the bank and do it! (85)*
>
> *for example in my bank I didn't know what to say if I want to deposit this amount...but I saw that there were really simple sentences that help you really fast, it's been really good, this course...Yes, it met my expectations really well...(90)*
>
> *On the course I was fine but when it was time to practise to talk, to listen; I didn't.. I was left behind. On (MApp) I listened and discovered lots of words that are more commonly used (89)*

Using and changing 'templates'

> *for example there's a transport (lesson) that says how to catch a bus, how to change bus, how long will it take... possibly I got to my destinations with the same phrases simply by changing the (name of the) destination and the time, so this is what I really liked, questions like "...how long will it take from my house to central Milton Keynes...what bus do I take?" so then it's really easy, things like 'take' and 'change'...really simple words I know but I didn't know how to express myself with them…so this really helped as I got phrases where I could simply change words like the destination... (90)*

Pronunciation

> *You can listen and here repeat it, repeat it, repeat it, .. they (*accents?*) are different, so I'm thinking "look, am I saying it wrong?" and I can say it again several times, complete it with my headphones, repeat it with the system, oh...it's weird, they are saying it like this!..(88)*

Personalisation

> *I looked at things linked to the classroom, for my girls, classroom objects. Sometimes I looked at things linked to the doctor, which interested me. (84)*

Motivation

> *Yes, a very easy way to learn, at home I have books, books, books, but...I read and don't understand...I don't know if it's the application, but I read and I want to read more, read more and learn it.. it's not the same… (85)*
>
> *Yes, it's changed, … it's really different from a classroom, it's something really different, … I can see it, I can go over it again, I can read it again I can try a lot of times to learn it..... (85)*

Constant access

> *Whether you want to or not, if you have an English learning programme in your mobile, you tend to use it when you have a chance. Even if you don't use it all day, you use it when you have a minute and something will stick, whether it's just a word, or a phrase. (84)*
>
> *Yes… it's like this, you use it but you don't know at exactly which moments you could need it, so then to have it on your mobile… (87)*

Place and time

> *When I had free time, when I was at college, when I had a break, when I left work, when I was at home. (94)*
>
> *When I go out, for example to shopping centres and other places I didn't want to take the phone out, it's very delicate this little phone, and of course I have to, I want to learn, obviously, but above all I wanted to take advantage of it at home where my kids to practise with are or at night when it's all calm and I can go into the Forum for opinions with the other participants and join in, get answers right away (88)*

Facilitator interview

The facilitator also discussed what she learnt from her role in the trial. This feedback is useful for recruiting and training volunteers for the Help Radar:

> *I was a bit afraid in the beginning that I wouldn't be able to answer the questions they might ask...I met a few of the participants outside of the workshop and we discussed a few of the things that they didn't understand, and in a way we all learnt, the learning was both ways. I never felt really alone. Any time I needed support [the OU facilitator] was always there. It was a really good experience. I actually felt useful. It gave me more confidence to deal with people, to explain things…it was good for my own professional development. It taught me that you can be friendly and also extremely professional at the same time.*

In terms of steering learners towards more self-directed learning, the facilitator again referred to the *Forum*:

> *Every time I went into the Forum there was always someone in there, it was really busy, really active. They were supporting one another, but it was probably also because they knew me. I felt as though there was a sense of community… in fact now the trial has finished we have opened a 'What's App MASELTOV ladies' group, so we can continue communication".*

The facilitator also said that at the end of the trial:

> *"The participants asked me if the language learning lessons would stay there because they said the pronunciation was really good, and it touched on* ***basic things that people need every day****, like doctors, groceries, etc."*

***Forum* data**

The themes identified in the interview data in the section above with regard to RQ2 are echoed and evident throughout the *Forum*, and there are many examples of social learning that provide evidence of the importance motivation plays in moving towards more self-directed learning.

The communication quest thread posts share positive (and negative) experiences with native users of English which highlight and identify communication strategies used by participants. These are not confined to language use, but largely focus on other functional strategies such as apologising in advance for their poor language skills (thus disarming their interlocutors), smiling broadly, using hand signals, acknowledging the way fear blocks them, gaining confidence by practicing, writing things down to prepare beforehand (85,87,88, 90, 99,84). This quest thread demonstrates how humour, storytelling and sharing of their experiences promote social learning, prompting a more dialogic and fruitful discussion exemplified by this exchange:

> *When I speak I always say " I am sorry I don't speak English very well " first and they always smile at me and say.."don't worry" .. and this gives me a lot of confidence. (90)*
>
> *I think the most important thing is to not be afraid of speaking like this and even if you are saying it wrong practice is what gives you confidence (99)*
>
> *Yes the important thing is not to be afraid :((sometimes I am and this doesn't help me progress because I'm blocked (81)*
>
> *That's so, fear blocks you and you forget everything. (90)*
>
> *I understand a little when they are talking to me what happens is when I want to answer I lack vocabulary and it is important to lose the fear we are here to learn and it is all a question of time. We do have merit. (84)*

This last contribution hints at the frustration felt by adult learners of English, and shows a determination to succeed. The range and breadth of the exchange is glimpsed in this example, but what stands out is the way that participants spur each other on, and there are many instances of reassurance, solidarity and a sense of growing community.

Motivation and demotivation is a factor in the exchanges about life in the UK throughout the *Forum*, and there are some links to some examples of goal setting. Coins are mentioned only 3 times, participants sharing how many they earned, and one participant describing an extra benefit of repeating is that more coins are earned. There is no discussion related to what participants did with their coins, so as a motivational factor this element of the MApp might benefit from further investigation. This thread about the serious *Game* provoked much debate in the *Forum* around the difficulties they were experiencing and strategies were shared and discussed with a great sense of humour which plays an important affective role throughout.

> *I haven't succeeded in getting out of the airport (88)*
>
> *MApp88 talk to the receptionist and afterwards with security, give them the medicine if they ask for it and carry on up where it says exit. (85)*
>
> *Who has got past 6? (86)*
>
> *Facilitator: How have you managed with the Game here? You already know that there is a prize ON MY BEHALF FOR THE ONE WHO GETS TO THE END :):):) (85)*
>
> *Ha ha ha this prize will remain for sure because it is difficult to get to the end. (94)*

The facilitator role throughout the threads could be described as one of 'mother hen', with the exception of this one, where she morphs from expert to novice, seeking help from participants, and putting up a prize to be awarded in the final workshop.

There are rare glimpses of weak goal setting in the *Forum*, characterised by these examples:

> *"I'm going for the 2nd part, transport and it's really good that these are the situations that you have to deal with day by day" (80)*

"Ok, I'll try! thanks Mila" (100)

"I'm going to finish 3" (85)

"I am carrying on repeating so that it sticks to me and at the same time because I also earn coins!" (90)

Threads with quests specifically asking participants to set some language and communication goals for themselves or each other, or share their achievement of goals were left blank. The most successfully taken up goal set by the facilitators was to share translations from The *Translation Tool*, or words learnt during the quests, purely in terms of numbers of posts. The resulting posts could not be described as particularly beneficial, unfortunately, as the appearance of words without the visual context (e.g. the notices) or (lack of) correction of the translations led to examples such as:

Nappy sacKs dour neutralist (98)

Excellent bijrR For iiiofe info and to to our projects aroiind the bx please wisir ePsxwthnic cod (89)

Calle un sick (94)

BOaX? aoO Sg6S 3340 EOC gnSeES naEa SNgXB COD Kd66X WECd EIno 83A?Qgo m 9 SA 0 880 DBW coaME3 au ua Z 8 33E Oeo 8 Ea38 Ogegz QE 3SEX30 3 a BtEBGe ONBG S M M A Q?kW OpQga E 293x410 gEC6 zOEgaal (100)

The interviews threw up many negative comments about this tool, echoed in the *Forum* in comments such as "yes, it only captures a few words from the photo and in my case it doesn't capture the phrases that really are in the photo, therefore it doesn't translate well" (85). The participants were urged to use the opportunity to correct the text detected by the *Translation tool* at the induction workshop, and by the facilitators in the *Forum*, which could function as a way of 'noticing' language and thereby becoming more self-determining, but this step was not followed.

3.3.1 DISCUSSION AND CONCLUSIONS

RQ1 How do the participants use the tools and services provided within the MApp to improve their language and communication skills and cultural understanding?

Of the 17 participants that participated in the trial, some engaged with the MApp tools and services more than others, but the usage figures (see Table 21 event data above for *Language lessons*, the *Forum* and the *Game*) for three of the MApp tools and services give good evidence of the success of these 3 components. In terms of the minimum and maximum amount of time spent by all 17 participants engaging with these tools in the first two weeks alone, use of the *Game* ranges from 21 minutes to almost 19 hours, while study with the *Language lessons* app encompasses a span of 2 hours 15 minutes to just over an impressive 29 and a half hours. During the same two week period the *Forum* data show the lowest engagement period of just over an hour, to an impressive maximum of over 18 hours clocked up by 2 participants and 1,112 posts made after 3 weeks. As the participants had 8 different tools/services to use and there were some issues with some of them, overall, we see this as a very positive outcome. When interpreting these durations please bear in mind the comment when made under Table 21 i.e. that the time spans shown represent the duration that the particular MApp service was in focus on the participant's phone, it may not relate to the duration of actual engagement by a participant with the service. However, given the lengthy durations recorded, and the fact that the participants' phones' screensaver time-out was set to 10 minutes, this still represents evidence of substantial engagement with the services overall. One participant summarised the MApp suite in a *Forum*

post in the last week of the trial like this; "for me the collection of tools has helped with learning, some more than others but each one has its own place" (85).

Participants needed a detailed introduction to the MApp, and it was challenging to do this and provide practice time in the time available in the induction workshop. The two facilitators were essential for running the workshop and supporting the participants during the next three weeks, in particular in helping them in the *Forum*, and encouraging them to contribute.

Figure 17 and **Fehler! Verweisquelle konnte nicht gefunden werden.** show which services were used and the usage made. Figure 17 shows that most participants used most of the services available, but with few using the *Recommendations* (which were problematic as they were provided in English), the *Places of interest* and the *Pedestrian navigation* which did not work well in Central MK as the centre does not have the traditional pavement at the side of the road structure and thus participants were guided into the road. In addition, it is possible that connectivity issues led to some confusion in using the tool, evident in participants' posts in the *Forum* such as this "I see the application as useful, but I see it as a bit annoying that you carry your mobile in one direction and if you move a bit it tells you something [else]" (80).

Of the three services used most, the *Forum*, *Game* and *Language lessons*, participants discussed the *Forum* and *Language lessons* mostly in their interviews and said little about the *Game*, although it generated a great deal of discussion in the *Forum*, and posts about navigating and progressing through the *Game* were among the most populated threads. Overall, then, the participants tried out all the services and appeared to continue using the ones that worked and were relevant to them, as evidenced in Figure 17 and Table 21 above. The usage data shows high use (Table 20) and that participants' actual use of the *Language lessons* corresponds to their perceived use which they discussed in the interviews and the *Forum*.

The interview and *Forum* data show that participants

1. Used spare time (small or larger chunks) and appreciated being able to use the MApp anywhere as the phone was always with them;
2. Used the *Language lessons* to support their own particular situations, such as medical appointments, bank transactions or transport needs;
3. Used the *Language lessons* to extend their vocabulary and practise their language skills;
4. Used the *Forum* for social learning; to create a community with the support of the facilitators, to exchange information and ideas and to provide emotional support, in particular with their language and cultural learning, and to support language learning and discuss their learning strategies

Participants appreciated the control over their learning, which could be carried out anywhere and anytime, was personally relevant and practical and often needs-driven, therefore readily applied to contexts where needed. However, we should also note that some participants mostly used the MApp at home and mentioned connection issues. Also, it is not clear whether learning took place in-context. For example, it is likely that participants rehearsed the language they needed for medical appointments beforehand rather than use the service in the waiting room – and perhaps this is not surprising, given that a waiting room may not always be the ideal place to learn the appropriate phrases needed. Participants did not use English much in the *Forum*s, but as noted in the section '*Forum* Data', there were problems with auto-correction to English which made using the target language challenging for these participants.

RQ2: Does the MApp enable participants to shift their learning practices toward more self-directed learning?

Participants did feel that they were learning in different and new ways. They appreciated the flexibility (anywhere, anytime, own pace), the practicality and quality of the *Language lessons* and the community of learners to draw on. The experience of using the MApp *Language Lessons* was very different to previous experience of classroom, book based and internet based learning. Some of this 'newness' however was not related to in-situ, mobile learning, but rather to good design and flexibility. However there were many examples of participants praising a number of features that indicate some moves towards self-directed learning in that they decided when and where they used the lessons, what they learnt (e.g. classroom vocabulary where relevant) and were able to use parts of the lessons as templates which they could personalize to support their transport use as well as some in-context learning with the *Translation tool* for reading college signs. Participants found the self-evaluation tests in the *Language Lessons* to be motivating and also found the *Forum* exchanges both motivating and encouraging – for example they appreciated others' encouragement and seeing that their problems were shared. Coins as a motivational device (as discussed in more detail earlier) are not mentioned much however.

One aspect that did not work so well for these participants was the *Translation tool*, possibly due to the fact that participants persisted in trying to translate text from sources other than the signs and notices for which it was designed, with unrealistic expectations with regard to the length and type of text that would be recognised. Comments and examples of shared translations in the *Forum* and the interviews suggest that participants simply did not take the extra time and attention needed to correct details of the text recognised from the photographs, as discussed earlier. This post characterises attitudes towards the instantaneous, on the spot affordances of the MApp prized by participants; "this application would be good if it captured the whole text, it would be really useful because it ***would resolve any problems in the moment" (90).*** A novel subversion of this tool was applauded in the *Forum*. It was discovered that taking a photograph of anything, clearing the resulting text and inputting English text would result in a mother tongue translation. This rapid way of translating short texts or words led to a discussion in the *Forum* which compares this MApp tool with other translation tools known to participants.

Getting participants to set goals for themselves was another aspect that did not work as well as expected, possibly due to the participants' previous learning experiences and cultural background, where formal learning could be characterised as contingent on rote learning, memorisation by repetition and the 'spoon feeding' of exam and test based learning goals and objectives. These participants did not appear to find it easy to answer questions posed via the *Forum* that required reflection on language or cultural learning, and ignored, or failed to contribute to challenges to set a goal for themselves or each other. Attempts by the OU facilitator within the *Forum* to uncover details of specific examples of learning were unsuccessful, with the following (L1) exchange typifying the difficulties participants seemed to experience:

> *OU4 please share with us examples of times when you have used what you've learned with the MApp*
>
> *82: I don't understand*
>
> *OU4: can you give actual examples of what you have learned?;)*
>
> *82: a lot of vocabulary that is useful for every day*

Any future development of the MApp tools and services might be well informed by the suggestions participants make in the *Forum*, such as "it would be great to have a voice translator" (81) and "it would be better if the translator was similar to google with sound" (88), which echo other contributions referring to the desirability of speech elements in the MApp.

4. GENERAL DISCUSSION

The present work describes the reported and observed experiences of EU-immigrants from different non-European countries who had migrated to London (UK) or Graz (AT). The study involved immigrants from Latin American (Colombia, Ecuador, Dom. Republic) and Arabic countries (Sudan, Iraq, Syria, Palestine, Algeria, Egypt and Morocco) as well as from Turkey. People have multiple reasons to move from their original home in a new country (see D2.2.2) while in any case at their arrival in the host country ICTs play a key role for them in mobilizing useful resources, such as accessing relevant information as well as instant communication in particular through mobile phones and smartphones. In this regard, MASELTOV aimed to provide EU-immigrants a selection of information retrieval and communication services on the smartphone for better empowerment and inclusion in the host country culture. Within the final field trials, the developed services were evaluated with immigrant target groups in four field studies (two in London/UK, one in Graz/AT, one in Milton Keynes/ UK).

4.1 TOWARD SOCIAL INCLUSION AND EMPOWERMENT

As defined in the description of work, the MASELTOV project aimed at improving the quality of life of immigrants and EU residents by supporting, in general, (i) processes of integration as a two-way process of mutual accommodation by immigrants and residents, and, in particular, (ii) preparing immigrants to participate fully in society through local community building, language learning and appropriate access relevant information, using persuasive learning and social computing. Evaluation results show that MASELTOV can truly increase the social participation and competence through facilitated and richer social interactions.

Indicators for actual quality of life in this context can be understood as

- The extent and quality of **social interaction** both between peers (other immigrants) as well as with locals and people from the host cultures; with strong relation to
- the development of the **communication** and familiarization using the host language;
- the acquisition of **new forms of learnings** and motivation raising;
- new **way finding** and the exploitation of the physical surroundings and experience of new cultural realities by moving around.

In the following, we summarize how the MApp services (including its community tools and services) supported the participants towards enhanced social interaction and inclusion. The results on the impact and relevance of MASETLOV for the actual evaluated participants are reflected against implicit potentials for those parts of the MASELTOV target groups who could not be reached in the conducted user study, as clarified in Section 2.3.1.

4.1.1 IMMIGRANTS FROM TURKEY

The study in Graz involved mainly female immigrants from Turkey. An explanation for this gender imbalance in the Turkish sample has been given earlier in Section 2.3.1. They used to live in Austria on average for 4.54 years, while the length of stay of one older woman was significantly longer with 12 years. At the beginning of the trial about one third of the participants, mainly the ones aged between 21 and 30 years, reported to be familiar with the use of mobile apps (navigation, language learning) while more participants (50%) were used to play games or chat in social networks such as Facebook.

In respect with the MASELTOV target group definition and toward reaching the projects´ objectives, available data from the final field trials does not allow interpretations for Turkish low educated male immigrants in Austria. Results and interpretations are valid for the assessment of the MASELTOV system for younger and middle aged immigrant women from Turkey living in Austria for max. 5 years. On this note, in the following main implications on the impact of the MASELTOV services for Turkish female immigrants are stated.

- **Services supporting social interaction:** social inclusion might benefit from social applications such as the *Forum* which provide easy to use and secure interaction possibilities with peers. Social exchange and information retrieval via thematic content organization into specific topics (health, food pricing, school) have great empowerment potential for the individual. On the other side Turkish immigrants did not much use the *Help Radar*, as younger as well as older women stated they would prefer to approach their relatives and friends in case of emergency and not contact (unknown) volunteers from an NGO. Most of the participating women came to Austria in the context of family reunion, their husbands having been living in Austria for several years. Hence, apparently good connectedness of the participants within the Turkish community let assume that the *Help Radar* service in its current state might not be of high relevance for these well connected users. This is especially true for the older Turkish women, who rely on the support of their family (husband, children), whereas less connected groups (without familiar networks in the host country) might profit from opportunities for immediate assistance via *Help Radar*. Considering methodological moderators, the Turkish facilitator did not live in the same city than the immigrant participants. In addition, the involved volunteers were not part of the Turkish immigrant community in Graz. Facilitation work was effectuated remotely via messaging, mailing and calling. The facilitator and the volunteers had not known each other before the MASELTOV studies and did not share the lifestyle of the immigrants. Overall, these circumstances could also have led to a minor commitment both from the side of the volunteers as well as from the side of the immigrants who stated that they would prefer asking for help within their community or family.
- **Language learning**: Among the Turkish immigrants all participants including the younger (21 – 30) as well as the older ones (41 – 50) appreciated the *Language lessons* service, especially its instantaneous character for location independent learning. Although the older participants had indicated less experience with smartphone usage before, the service provoked no usability issues, indicating a sufficient learnability for less technology affine users. Although the idea of the *Translation tool* was perceived very positively by the Turkish immigrants, its potentials could barely be exploited due to the technical limitations in OCR. However if functionally more mature and as part of a holistic toolbox the *Translation tool* has great potential for supporting incidental learning and information retrieval tasks of Turkish immigrants.
- **Playful cultural learning**: the interaction with the *Game* might support immigrants of being less anxious about social interaction (i.e. becoming aware of how differences might occur and that behavior that might appear offensive or dismissive is not necessarily intended as such. However these interactions and social phenomena are diverse across different geographical and socio-demographical contexts. Hence a serious game for playful learning should tackle the real world problems of the specific immigrant group, i.e. should provide extensions for different cultural and social settings. Log file analyses showed that the *Game* was explored on the test devices of the Turkish participants. However, most participants stressed that the *Game* in its current form was

too difficult to understand for them, so that no playful learning effect could be achieved by its use, as reported. It happened that the *Game* was given to the more gaming affine children, who could interact with the character and the surroundings successfully but failed to recognize the purpose and the storyline of the *Game*. Based on usability results, as an implication it can be stated that adopting a serious gaming approach can become beneficial for the cultural learning by Turkish immigrant target group if i) transmitting a clear purpose and traceable goal to the user, ii) providing simple and short text content as well as iii) inviting adult users to engage in the gameplay collaboratively (e.g. with their kids, with each other)

- **Wayfinding and mobility**: before taking part as participant to use MApp services, about one third of the Turkish participants had previously used navigation tools on the smartphone for individual wayfinding. Although the *Navigation service* with routing instructions was not available for testing in Graz, combining a mobile navigation tool with specific information content such as the *Places of interest* can support immigrants in their daily activity management and mobility. By becoming aware of places such as supermarkets, post offices, authorities, shops or pharmacies their mobility behavior favor flexibility. Extending the individual activity spaces by learning to know new places can be supported by respective personalized *Recommendations*. Such service combinations might motivate also the older immigrants to explore the surrounding and independently seek for useful information (e.g. independent from the husband´s capacities). As the presented work did not trace participant´s trajectories in detail (GPS logging and analysis), future research needs to identify impact of the provided services on the individual physical activity radius of the immigrant participants.

4.1.2 IMMIGRANTS FROM LATIN AMERICAN COUNTRIES

In London demographic characteristics in the Latin American group were quite homogenous. No participant had achieved an education level beyond secondary school graduate or had been living for more than three years in the United Kingdom. Despite a slight imbalance in the gender distribution (8 female, 5 male) among the participants who attended the Introduction Workshops and provided demographic data, the criteria of the MASELTOV target group definition were met.

In order to focus more research findings on incidental and language learning the fourth participant group in Milton Keynes was involved. Demographic characteristics and justification of deviations from the intended user profile of the final participant sample can be found 3.2.2. The following implications partly apply for the MASELTOV target groups i.e. immigrants from Latin American countries in the United Kingdom.

- **Services supporting social interaction.** Analysis of the logging data, questionnaires and verbal feedback clearly revealed a high acceptance of the *Help Radar* service among the Latin American users in London. The impact of this service was strongly tied to the choice and setup of the involved volunteers though. Volunteers in the Latin American group had been recruited by the facilitator who herself was a social worker in the Latin American immigrant community there. The facilitator and volunteers, all living in London, had known each other before the study took place. Volunteers were well committed to the study and motivated to help other immigrants in case of need. *Help Radar* was frequently used and in cases of technical and performance problems with the MApp service, participants used other communication channels such as the *Forum*, personal text messaging as well as direct calling. These results show the high relevance of an instantaneous assistance service combined with private and secure communication

channels (i.e. *Forum*, text messaging service) for immigrants from Latin American countries who have been living in the host country for one to two years.

- **Language learning.** As learned from requirements analysis (WP2) the acquisition of host language skills is a central need of immigrants favoring increase of quality of life. Accordingly the study outcomes show that MApp usage resulted in new learning behavior or disposition and motivation to learn. Participants used the *Language lessons* coupled with discussions on language aspects in the *Forum* to exercise in the host language, adopting new forms of learning (e.g. using spare time). Self-directed learning i.e. having the control over learning can be seen as an extremely empowering aspect of MApp, different to any class room experience by using multiples tools (*Forum, Language lessons, Translation tool, Game*), supported by self-evaluation tests in the Language Lessons as additional motivators. Moreover, the *Forum* was used for social learning; to create a community with the support of the facilitators (Latin American users in London and Milton Keynes), to exchange information and ideas and to provide emotional support, and to support language learning and discuss their learning strategies. Similar to other groups the *Translation tool* would be useful as fast and easy help for instantaneous translation on the spot.
- **Playful cultural learning.** Users in London and in MK played the *Game* and mostly found it boring. For the improvement of the Serious Game approach for cultural learning a dissociation of the target group between gaming affine and non affine and interested immigrants needs to be considered in the framing. The play literary of the players can essentially influence the gameplay experience. Hence in the given context information content should be less abstract but be put in direct reference to real world scenarios as intended by the prototype developed in the project. Further for immigrants with low education the amount of text should be kept low, the content and information should be well presented, valid, easily approachable and fact-based.
- **Wayfinding and mobility.** Services for orientation and wayfinding were evaluated in London by Latin American users only (not users in Milton Keynes). Especially in large cities reliable tool are needed that allow successful and easy wayfinding in unfamiliar surroundings. Facing the multitude of mobile navigation aids that have emerged in the past years, immigrants require solutions providing comprehensive instructions ideally combined with additional easy to retrieve information about the physical surroundings such as provided by the *Places of interest*. These services should be synced, supported by route planning component for public transportation.

4.1.3 IMMIGRANTS FROM ARABIC SPEAKING COUNTRIES

The majority of the participants in the Arabic group did not reach the recruitment criteria. Explanations for this mismatch in terms of education level and length of stay in the United Kingdom were given earlier in Section 2.3.1. Many participants had good English skills as most had lived in the UK for more than five years. Thus, Arabic participants were much more autonomous in their daily life than the intended MASELTOV target groups, i.e., they followed studies, visited courses, had stable housing and income conditions. Such conditions imply stronger social inclusion into the different local communities (e.g. neighborhood, school).

According to the refined definition specified in D2.3.2 Use Cases and Service Scenarios in the final field trials the exact target group of Arabic immigrants was not met, due to the reasons described earlier. Although the results from this group let not reveal direct implications toward the achievement of the MASELTOV objectives for the intended target users, elaborated

feedback on usability and user experience (i.e. satisfaction over time, privacy) might be used to enhance the services for the exact target group.

Taken together findings regarding two of three target groups have been analyzed in the final field trials. For the further exploitation, modular organization of the MApp components might be contemplated, i.e. offering a reduced amount of services to a given immigrant group depending on

- Usage preferences identified in the conducted trials in MASELTOV
- Resources and capabilities of the involved NGO or public authorities

4.2 CHALLENGES IN CROSS-CULTURAL EVALUATION

In the study context, cultural aspects of the involved immigrant groups can be defined as differences regarding learned and socially acquired traditions and lifestyles of the members of a society including their structured and consistent ways of thinking, feeling, and acting. Furthermore, the diversity in the sample is distinguished by not only country and culture of origin (national and regional culture), but also by the host country. It is characterized by external characteristics (i.e., organismic variables such as sex, age, education level, nationality) combined with internal factors (i.e., personality, individual history), which are supposed to be interrelated and have confound effects on each other (e.g., in most cultures sex is related to the manner of education a person receives). This means that variables cannot be isolated in a study design, but observed and interpreted carefully along the concept to investigate.

Cross-cultural evaluation often consists of a comparison of a certain construct on the basis of a given scale. The construct is never directly observable, but it has to be opened up through the observation of the related phenomena (e.g., usage frequency, answers, solved tasks, etc.). However, there is a claim for equivalency on different operational levels (van de Vijver & Lueng, 2011). Conceptual equivalency is given when the nature of the targeted construct (i.e., usage behaviour, user experience) can be compared in all cultures. Material equivalence is met when the investigated construct can be identified through similar physical of perceptual phenomenon (e.g., usage duration, satisfaction). Although usage frequency meets these criteria of objectivity, user experience might have differently weighed drivers across the involved cultures and hence needs different instruments and approaches to be researched. This is also true for the operational equivalence which is reached when the phenomenon observed in the different cultures can be applied on the same construct in question. Factors that lead to an enhanced user experience might be manifold and not similar across cultures (e.g., for one culture co-experience of technology might be more valuable than for others who demand for maximum usability). In this regard, cross-cultural user experience research has still to identify the distribution and relevance of the main user experience factors for the targeted (immigrant) cultures. Moreover, in our study context more specific conditions of the EU-immigrants would have to be considered, who have experienced characteristic attitudes and rules of not only one but at least two cultures (enculturation, acculturation). More research is required to elaborate on constructs and adapt metrics that can be used in comparative studies involving immigrants.

Although from an operationalization point of view, some methodological issues were not solved due to the target group characteristics specified earlier by the project, in the following we present main methodological insights from the final field trials with EU-immigrants as part of a user-centred design process. Main methodological challenges had to be tackled or were to be considered within the interpretation of results, most importantly including the suitability of given research methods and techniques, the language of data collection, coordination work and quality

of the translation processes, as well as the matching of samples. In the following a detailed reflection is given on these challenges in the way how they influenced the procedures and outcomes of the final field trials.

4.2.1 SUITABILITY OF GIVEN RESEARCH METHODS AND TECHNIQUES

This challenge was tackled by extensive elaboration of the conceptual aims of the evaluation task, resulting in the development of unified guidelines and procedures. Previous trials have shown (see D9.3) that paper-pencil questionnaires might not be the method of choice when working with low literacy, low educated immigrants who are not familiar with any concept of written interrogation and questioning. Hence, in contrast to the first field trials, the focus of T9.4 analysis was set on the quantitative data drawn from usage activity logging, which was collected during the field phase and enhanced by statements provided by participants, which were collected in form of simple and short questionnaires. In addition, qualitative inputs from workshops were analyzed, promising substantial contribution and elaboration to the findings from logging data.

As some users committed more to the study and the project than others, data from a selection of users was used for analysis. Looking at the initially intended user base to involve in T9.4, Table 22 shows the proportion to the finally available data sets from participating users. While data from 66.6% of the Turkish sample and about 72% from Latin-American data base was analyzed, gathered information from only 18% of the Arabic participants could be utilized for the analyses, as remaining users did not use the MApp services.

Table 22. Overview of participant´s logging data that were included in log file analyses.

	Planned	Recruited	Log analysis
Turkish (Graz)	24	21	14
Latin American (London + Milton Keynes)	24	19 + 17	9 + 17
Arabic (London)	24	22	4
Total amount of end users	72	73	42

As an implication when seeking to involve immigrant groups within user studies, researchers should make sure that end users are somehow related to the involved personnel in order to foster their commitment and interest to participate and to provide their valuable feedback. More efforts should be done to make immigrants understand the purpose of such studies, and that by participating they become the chance to influence the development and achievement process. However regarding the more collectivistic cultures, a more community-centered approach could be envisioned, by triggering key users, relevant (real life) interests and establishing mini-communities over time. Overall, larger sample sizes could be foreseen to cover data loss due to participant drop outs. Beside the problematic of various participant commitments some methods worked better with some groups, i.e.:

Online mini-questionnaires: It turned out that especially Turkish participants tended to fill the same mini-questionnaire several times. They might have been skeptical and wanted to make sure their entries are collected by the survey tool. Researchers decided to only include latest entries in the analysis of results. As a variation of standardized and non-standardized questionnaires was used, answering formats differed (e.g. inversed), which caused confusion. Especially when users were not familiar with a certain answer scale, filling the questionnaires was reported to be not that easy.

Autonomous service usage: In the introduction workshop all participants were instructed to use the MApp services during the upcoming field phase. They signed a form by which they agreed to make use of the MApp services and give honest and repetitive feedback on their experience. Additionally, participants were pledged with an additional reward (EUR60, GBP 45 in addition to the smartphone) to be handed out at the end of the trial. In the end, 9 Arabic participants had not used the services at all, and 6 did not come to the closing workshop to finalize the study. A possible explanation is that most Arabic users did not have a personal relationship to the NGO, the research team and involved facilitator before. Others, especially some Turkish immigrant women, had given the test devices to their children for playing mobile *Game*s instead of exploring MApp. Although they had agreed to it, their commitment to the study turned out to be low. Although the Turkish women were used to come to Danaida for language learning courses before, some might have taken the study efforts not too serious, by giving the test devices to their children. At the closing workshop one Turkish woman, who turned out to have not used the MApp services, was clearly surprised and disappointed because she did not receive the additional financial remuneration. The conditions of participation might not have been clear to all participants, which will have to be assured in future studies.

Workshops: The trial included one workshop for first meet up and introduction and one at the end of the field phase. However in the closing workshop some Arabic users pointed that they would have preferred to meet up with each other more often during the trial in order to foster social interaction. They did not know each other before and did not feel safe and comfortable to interact with strange people in the *Forum*. More meetings together with the facilitator (who left the trial earlier due the private reasons) would have been beneficial for these participants.

As for the Turkish group, different observations regarding the participation, attention, and attendance were made compared to other groups. Turkish women tended to not arrive on time to the workshop, which caused significant delays. Some women left the workshops at the NGO Danaida after some time to pick up their children from day care. Others brought their small children to the workshops, who obviously required some attention. Instead of reflecting on the MApp services, participants held conversations about their health issues, daily activities, their actual levels in the language courses and so on, while the facilitator aimed to keep participants´ attention on track. Workshops with Turkish immigrants would have benefited from a more community-centered discussion approach on the one hand combined with distinctive in-depth interviews of every woman on the other hand.

As an implication from the London and Graz trial, participants in the MK trial received a more detailed introduction to MApp. The facilitators provided more practice time in the induction workshop. The two facilitators were essential for running the workshop and supporting the participants during the next three weeks, in particular in helping them in the *Forum*, and encouraging them to contribute.

4.2.2 LANGUAGE OF DATA COLLECTION

Study materials such as mini-questionnaires were designed to provide majorly quantitative data for which no language barriers during analyses could occur for the main investigators.

In workshops and the online discussions in the *Forum* participants provided user feedback in their mother tongue. After the trial end all relevant data were translated into English by the native speakers who participated in the study (as volunteers in the *Help Radar*) or professional translators (in case of the Milton Keynes interview translations). Entries in the *Forum* were translated and summarized by facilitators in order to know about the discussed topics during the trial.

Some apps are more frequently used when users are on the move; others are used more often when users are at home. In the present study users encountered connectivity problems with the services, they were not able to identify the source of these problems by themselves. Error messages did not contain concrete information about the source of a problem. The immediate support and problem solving advice from the technical team was not possible directly, due to the language barrier and the missing level of detail about the problem from participants. If a user reported a problem, the communication chain reached from the facilitator at NGO, partly over the leading researcher at ATE to the developing partner and back. This procedure provoked delays in the solvation of technical problems. For future attempts a more direct communication structure supported by detailed error messages would be beneficial in order to accurately picture technical problems and initiate the necessary steps for their solvation.

4.2.3 COORDINATION AND QUALITY OF THE TRANSLATION PROCESSES

In cross cultural studies translation work needs to be done with care, as bad quality of the text-based content should not compromise experiences with the tools and materials.

Materials. After study materials and additional content (e.g. discussion topics in the *Forum*) were created, partly external translators were employed and partly facilitators were asked to translate the texts into the target languages i.e. Turkish, Spanish and Arabic. All translated materials were reviewed by the facilitators (who monitored the overall methodological procedure and participants´ activity during the main trial). They made themselves familiar with all materials and the procedure in order to support the study (see Table 3).

User interfaces. The translation of the multiple user interfaces (UIs) was partly conducted by the developing partners and partly by ATE who hired native speakers of Turkish and Arabic. Study materials such as instructions and questionnaires were translated by those native speakers, as well as by Spanish-speaking researchers at UOC. As different partners did cover the translation of the various services (i.e., by involving professional translators, involved native speaker students, translation tools such as Google translate) the nature and the quality of translations might differ, which overall risks to impact the user experience and usability in terms of consistency in wording and semantic meanings. Moreover, variations in translation accuracy and correctness might occur when non-professional translators are involved.

Accordingly, for all UI design and evaluation activities realized in multiple languages in the course of MASELTOV it would have been beneficial to involve one single party of professional translators. In future project preparations sufficient resources should be allocated to avoid inconsistencies in translation processes. If this is not possible the translated parts should at least be double-checked by a different person than the translator.

4.2.4 MATCHING OF SAMPLES

According to previous work on cross-national or cross-cultural research, there is a need for matched samples in cross-cultural studies to be able to extract valid data, i.e. collecting the data from matched national samples of individuals. In this context “Matched” stands for “similar in all measurable respects except their nationality” (Hofstede, 2013).

Characteristics of the study samples in the three countries were initially planned to apply to the refined target group definition in MASELTOV (see Section 2.2). Thus, user characteristics as defined in the project did not ground on exact similarity (in cross-cultural psychology considered as organismic variables). For example, the MASELTOV user group definition allowed to involving people of both sexes, as well as people originating from different countries. Hence, an exact matching of samples could not be attained per definition within MASELTOV user studies.

A more problematic mismatching in the used samples regarded the education level and host language skills, especially of the Arabic participants. Due to the exit of one of the NGOs (Fundeso), the consortium lost the access to low educated immigrants from Arabic countries with minor host language skills. In order to not completely neglect this immigrant group, the consortium had decided to involve Arabic immigrants in the final field trials anyway. Compared to the first field trials (see D9.3), Arabic users were recruited from MRC in London with the shortcoming that these people were better educated than the respective immigrant group in Spain would have been. In respect to the different demographic characteristics of the participants, results of the various groups in current field trials were compared with specific care by considering the probable influences of the demographic differences on the outcome and the further interpretation.

5. CONCLUSION

In the MASELTOV project, the user-centered design and evaluation process under the coordination of ATE aimed at profoundly involving the defined immigrant target groups into a process of service and user interface development. This user-centered approach involved three different immigrant groups and supported the system development toward enhanced accessibility, usability and user experience for different services. The consideration of cultural and educational background as well as age of the end user groups was important for the usability design (WP2) and evaluation studies (WP9). In doing so the MApp service environment was developed in constant exchange with end users and experts (NGOs, sociological and HCI researchers). Decisions on the UI designs and functionalities were edited and reviewed in the consortium from the early conceptual phase until the appearance of the fully integrated prototype.

Within Task 9.4, MASELTOV realized a strong involvement of end users as the final main assessment activities of the test and evaluation phase of the project. Services' strengths and limitations were identified in respect with the preferences and experiences of the involved representatives of the three groups. Recommendations for the further improvement of the services towards higher technology readiness level from a usability and (learning) experience point of view were presented in this deliverable.
Finally, experienced problems and challenges and possible implications from the application of the user-centered evaluation techniques in Task 9.4 were discussed.

Furthermore, nearly all participants in London, Graz and Milton Keynes felt that MApp helped them to develop or apply their target language. They appreciated being able to use the MApp anywhere as the phone was always with them. Participants used the Language lessons to support their own particular situations (such as in the Milton Keynes trial for medical appointments, bank transactions or transport needs) and to extend their vocabulary and practise their language skills.

Mobility supporting and context-awareness components of MApp supported social inclusion or learning. No explicit feedback on newly created relationships with locals was reported to local citizens (e.g. neighbours). However MApp services supported orientation and way finding of participants. The *Places of interest* provided a good and easy to handle overview on relevant spots in the direct surrounding. Partly more advanced navigation support than the *Navigation service* were requested by participants in terms of functional range and maturity, especially by those who already were familiar with existing tools such as Google Maps. In the future,

navigation support might be combined with additional relevant information services (interlinkage with the *Places of interest, Information service*).

Overall, referring to the main objectives of the MASELTOV project and the reflection on the achievements above, we conclude that the developed MApp services might serve well to different immigrant populations toward a better quality of life in terms of learning, and facilitated social integration of the involved immigrants. Especially the latest trial conducted in Milton Keynes was a huge success, MApp services´ acceptance and adoption were particularly high, with incredible enthusiasm along the users.

Evaluating mobile services in different languages in multiple countries demands careful planning and coordination. According to the service language availability, selected and adapted materials were elaborated and user interface strings were translated. From a methodological point of view the study offered multiple experiences and lessons learned for NGOs, researchers and technical partners regarding resource planning, coordination and communication of trouble shooting and much more, which will be disseminated and forwarded to the related scientific communities.

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7. APPENDIX

7.1 PRE-QUESTIONNAIRE

Please fill out this questionnaire. If you have any questions do not hesitate to ask the person who handed out this questionnaire to you.

How old are you?	_____ years
What is your gender?	○ Female ○ Male
What is your country of origin?	_____
How long have you been living in this country?	_____ years
Please indicate your language skills	very good □ □ □ □ □ very poor
What is your educational background? (e.g. elementary school, high school, apprenticeship, university)? If your education does not fit into one of the above categories, please try to describe your educational background?	_____

Do you own a smartphone?	○ Yes ○ No
Do you use a smartphone?	○ Yes ○ No
How often do you use a smartphone?	☐ At least once per hour ☐ At least once a day ☐ At least once a week ☐ Less often ☐ Never
How long have you been using a smartphone?	_____ months
Do you use mobile Internet?	○ Yes ○ No
How often do you use mobile Internet?	☐ At least once per hour ☐ At least once a day ☐ At least once a week ☐ Less often ☐ Never
Do you own a cell phone?	○ Yes ○ No
Do you use a cell phone?	○ Yes ○ No

Have you been using apps on the smartphone before?	○ Yes ○ No
Have you already downloaded apps on your smartphone?	○ Yes ○ No
What kind of mobile apps have you been using on the	☐ Navigation, route planning (e.g. Google maps,

smartphone before?	…) ☐ Social networks (e.g. Facebook, Twitter, …) ☐ Language learning, translation ☐ *Games* ☐ Photo taking and sharing ☐ Libraries, information services

In your personal opinion, how easy to use the presented services were for you? Please choose an answer for each of the presented services.

	very easy to use	rather easy to use	neither/ nor	rather not easy to use	not easy to use at all	don´t know
Profile	○	○	○	○	○	○
Forum (UK, AT only)	○	○	○	○	○	○
Translate	○	○	○	○	○	○
Navigation	○	○	○	○	○	○
Help Radar	○	○	○	○	○	○
Language lessons (UK only)	○	○	○	○	○	○
Interesting places (UK, AT only)	○	○	○	○	○	○
Game (UK only)	○	○	○	○	○	○

In your personal opinion, how useful do you think the presented services will be in the coming week? Please choose an answer for each of the presented services.

	very useful	rather useful	neither/ nor	rather not useful	not useful at all	don´t know
Profile	○	○	○	○	○	○
Forum (UK, AT only)	○	○	○	○	○	○
Translate	○	○	○	○	○	○
Navigation	○	○	○	○	○	○
Help Radar	○	○	○	○	○	○
Language lessons (UK only)	○	○	○	○	○	○
Interesting places (UK, AT only)	○	○	○	○	○	○
Game (UK only)	○	○	○	○	○	○

Thank you!

7.2 UMUX QUESTIONNAIRE

How much do you agree with the following statements?	strongly disagree 1	2	3	4	5	6	strongly agree 7
The system´s capacities meet my requirements.	○	○	○	○	○	○	○
Using the system is a frustrating experience.	○	○	○	○	○	○	○
The system is easy to use.	○	○	○	○	○	○	○
I have spent too much time correcting things with the system	○	○	○	○	○	○	○

7.3 MILTON KEYNES TRIAL: HANDOUT ON HOW TO USE THE MAPP


Esta connectada?
Encender y apagar el GPS aquí


Gmail


la pantalla de inicio de las herramientas de MApp


mis preferencias
y rellenar mis intereses!
Como completar mi perfil


la app de aprendizaje de lengua
como elegir una lección


la herramienta de traducción
toque aquí por sacar una nueva foto


como corregir el texto traducido (inglés)
como encontrar la traducción al español del texto en inglés?


como compartir la traducción en el


Como usar la herramient


Como publicar un
mensaje al Foro?


Como abrir el juego y
especificar el idioma?
Split


MApp se
recomienda
cosas de hacer
segun a su
preferencias!


Gracias y feliz viaje con el MApp de MASELTOV!

7.4 MILTON KEYNES TRIAL: MY QUEST HANDOUT

7.5 IMMIGRANT NAVIGATION STUDY

A wealth of mobile navigation services has recently emerged, proposing user interfaces of various degrees of usability. The concrete act of using the service, to pay attention to immediate environments and the navigation objectives has been of minor interest so far. However, researching the impact of culture on wayfinding styles requires detailed information about the user's focus of attention, its preference for information types in its environment, such as, from user interfaces and displays, from user trials. This work starts to close this gap by investigating the attention processes and user feedback of an outdoor field study in which native users (from Austria) and migrant users (from Turkey) applied mobile pedestrian navigation. From the results we were able to conclude that migrants made more navigation errors and more stops, and preferred to use intuitive augmented reality mode to more cognitively challenging usage of map based navigation as preferred by native users.

	Total (N=20)	**Immigr. (N=10)**	**Locals (N=10)**
Age	30.05 (6.26)	32 (6.12)	28.1 (6.06)
Length of stay in AT	-	8.55 (5.43)	-
Education level (ISCED):			
0-1	7	7	0
2	7	3	4
3A-3C	6	0	6
Familiarity in using:			
navigation	6	2	4
tools	1	1	0
AR tools	4	0	4
maps			

Table 23. **Demographics of test persons (Turkish and Austrian native females).**

7.5.1 STUDY DESIGN

Navigation application

The mobile navigation application [1] was modified for the requirements of this study. The application was running on a Samsung Galaxy S2. Two different presentation modes were used to indicate the route: a two-dimensional map-based view (MAP) and an augmented reality-supported view (AR) (Figure 3). The AR mode showed a moving arrow overlaying the camera view on the smartphone display.

Apparatus

To acquire video and eye-tracking data cooperation partner JR used SMI Eye Tracking Glasses (ETG), with 30 Hz sampling rate of gaze and a 1280 x 960 pixel resolution scene camera (Figure 1). A screencast video of the previously described navigation app was recorded, and synchronized with the eye tracking data, for visualization purpose. For the post-processing of gathered gaze data we used the smartphone eye tracking (SMET) system [14]. The SMET system enables fully automated analysis of attention in user studies and showed highly accurate POR mappings on smartphone displays. Figure 18 shows the automated smartphone localization on a given eye-tracking scene video frame. Synchronization and image analysis provide then a correlated data stream with smartphone events, geometric transformation and saliency mapping enable then further attention analysis. [3] show that this approach is feasible for large scale studies.

Participants. The recruitment of the Turkish users was done by a local NGO according to pre-defined criteria (sex, education level, age, length of stay in Austria, smartphone experience). We seek to involve users with lower secondary education only (ISCED level 2).In total 20 women participated in the study. The mean age was 30.05 years (ranging from 19 to 41 years, Table 1). Among the Turkish participants the average duration of stay in Graz was 8.55±5.43 years. Among the final sample 6 local participants with education level 3A to 3C were involved. Finally we invited participants with experience with smartphones to at least one year to make sure that they knew how to use the test device.

a)  (b) 

Figure 18. Apparatus (eye tracking glasses) used in the study, backpack with recording, and interaction with mobile service during navigation.

Routes. The study took place in the Austrian city of Graz at the area of the General Hospital, within an area with nearly no car traffic, wide streets and enough open space to freely move. We pre-defined a route within this area that participants should follow. The route contained 12 decision points (DPs, locations with multiple ways to proceed such as crossovers and turnoffs) where participants had to choose the correct way.

	Immig.	Locals	$\chi 2(1)$	p
Total soft errors	1.3(1.3)	0.7(1.2)	1.795	.180
Total hard errors	1.5(0.9)	0.8(0.6)	3.230	.072
Total stops	6.1(6.0)	1.7(1.9)	4.569	.033*

Table 24**. Results on performance indicators (stops over the test route) for immigrants and locals, mean (SD), x2 statistic and p-value are shown.**

Performance Measures. We counted stops and incorrect direction choices at decision points and distinguished between soft errors (error in heading in a wrong direction but correcting herself without receiving a sign from the facilitator), hard errors (error in heading and motion while walking in a wrong direction until the facilitator provided a non-verbal hand sign in the correct direction), and stops (motion suppression on the route). Behavior observation results were summed over the three sub routes to get one overall score for each measure, i.e., for soft errors, hard errors and stops. As the study took place in a public area where unforeseen traffic conditions, obstacles may occur, time-to-destination was not used as a performance parameter. Apart from qualitative feedback about their experiences with the application participants filled the System Usability Scale (SUS) [14]. For measuring acceptance we asked the participants to rate their behavioral intention to use the tool in the future on a seven point Likert scale.

For the exploratory analysis of gaze behavior, eye movement recording data was post-processed to identify the average amount and duration of point of regards (POR) on predefined areas of interest (AOI). For the analysis of the gaze patterns we used content-dependent AOI assignment

(Figure 19) including the two interface elements on the smartphone (MAP, AR) and the physical surrounding (SUR).

Procedure. 20 participants completed a short questionnaire about personal usage habits of technical devices and previous experience with navigation and location-based services. Next, SMI glasses were set up and calibrated. The route was pre-selected on the smartphone and the walking direction was shown. The instruction was to follow the indicated route on the interface until a destination was reached.

Afterwards, participants filled the standardized SUS questionnaire and answered to more qualitative questions about their experience with the prototype.

7.5.2 RESULTS

Immigrants made significantly more stops ($\chi^2(1)=4.569$, $p<.05$; Kruskis-Wallis-Test) over the test route as can be seen in the mean differences of total stops in Table 24. From behavior observation it is confirmed that, in case of uncertainty which way to choose, immigrants tended to interrupt their walk more often to orientate while locals rather reduced their walking speed without stopping.

Figure 19 shows the mean scores for the SUS questionnaire. Kruskal-Wallis-Test revealed that immigrants rated learnability of the application significantly lower ($\chi^2(1)=8.040$, $p<.05$) but its usability significantly higher ($\chi^2(1)=9.024$, $p<.05$) than locals did.

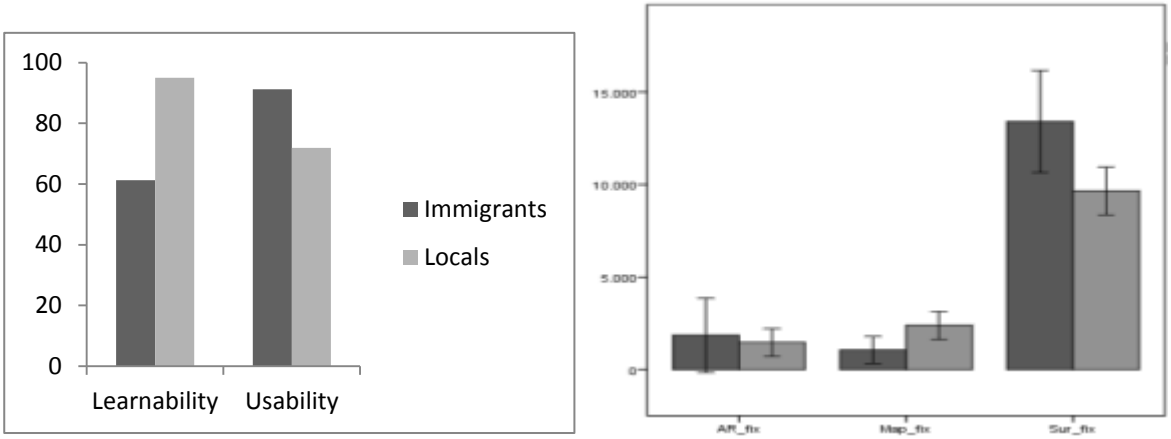

Figure 19. Left: mean ratings for perceived usability, and learnability; right: PORs (points-of-regard) on ROIs AR (left), MAP (ctr) and surrounding (right).

Fehler! Verweisquelle konnte nicht gefunden werden. shows the average count of PORs on he selected AOIs i.e. augmented reality mode (AR), the map mode (MAP) and the spatial surrounding (SUR). Analysis revealed that immigrants looked more often on the AR view than on the MAP, while for the Austrian controls more points of regards were found on the MAP over the AR view. Results showed a significant effect of cultural background on the amount of PORs regarding the MAP view and SUR.

Using transition matrices between AOIs [10] retraces gaze patterns during navigation: the occurrence of various variants of gaze transitions between three different AOIs (AR, MAP, SUR), after post processing with the SMET tool [3], reveal POR results (10 immigrants, 10 locals) that were included in the exploratory analysis of the eye movements (Figure 19).

7.5.3 CONCLUSION

A study comparing navigation performance and interface preferences proved the impact of culture on perceived usage, learnability, recalled usage of route, and attention processes in mobile navigation.

Findings drawn from qualitative feedback as well as eye tracking data reveal interface preferences of the Turkish immigrant users of the AR-based over the map-based prototype in contrast to native Austrian behavior.

7.5.4 REFERENCES

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