DELIVERABLE REPORT
D2.4
"Participatory Design and Interaction Concept"

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

collaborative 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:	June 30, 2012 (month 6)
Actual submission date:	2 September 2012
Start date of project:	January 1, 2012
Duration:	36 months

Work package	**WP2 – USER REQUIREMENTS AND INTERACTION DESIGN**
Tasks	**T2.4 – Participatory Design and Interaction Concepts**
Lead contractor for this deliverable	**CUR**
Editor	**Jan Bobeth (CUR)**
Authors	**Stephanie Schreitter (CUR), Mirjana Artukovic (FLU), Eva Potrusil (FLU), Nicoletta Bersia (TI)**
Quality reviewer	**Manfred Tscheligi (CUR)**

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)	

1. CONTACT

Contact for feedback on this report to the project coordinator / editor / author :

bobeth@cure.at
Jan Bobeth
CURE – Centre for Usability Research and Engineering
Businesspark MARXIMUM
Modecenterstraße 17 / Objekt 2
1110 Vienna, Austria

COPYRIGHT & DISCLAIMER

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
03	AIT		RESEARCH AND EDUCATION LABORATORY IN INFORMATION TECHNOLOGIES	EL
04	UOC		FUNDACIO PER A LA UNIVERSITAT OBERTA DE CATALUNYA	ES
05	OU		THE OPEN UNIVERSITY	UK
06	COV		COVENTRY UNIVERSITY	UK
07	CTU		CESKE VYSOKE UCENI TECHNICKE V PRAZE	CZ
08	FHJ		FH JOANNEUM GESELLSCHAFT M.B.H.	AT
09	TI		TELECOM ITALIA S.p.A	IT
10	FLU		FLUIDTIME DATA SERVICES GMBH	AT
11	BUS		BUSUU ONLINE S.L	ES
12	FUN		FUNDACION DESARROLLO SOSTENIDO	ES
13	DAN		VEREIN DANAIDA	AT
14	MRC		THE MIGRANTS' RESOURCE CENTRE	UK

CONTENT

2. EXECUTIVE SUMMARY

This deliverable describes theoretical and practical knowledge on how to create easy-to-use user interfaces of the MASELTOV services that will be accepted by our target groups. The peculiarity of this question results mainly from the different cultural backgrounds of designers and target groups. Due to this fact it is very difficult to put oneself in the position of members of the target groups which impedes the design work considerably. So the final goal of this deliverable was to gather helpful design guidelines, to understand its background and to create basic interaction patterns for MASELTOV.

As a first step, we conducted a literature analysis presented in chapter 2 for establishing a theoretical background. Furthermore, we involved two groups of our MASELTOV target users in participatory design sessions for collecting practical experiences in designing for immigrants (see chapter 3). To complete our research we also collected design guidelines for cross cultural user interfaces (see chapter 4). At first more general ones but also specific ones for our Arabic and Turkish target group. Finally, we present interaction patterns for mobile touch devices that shall support designing consistent user interfaces for all MASELTOV services. We hope that this deliverable is helpful for the MASELTOV designers and that it supports the creation of useable and accepted mobile interfaces for our target groups.

3. USER INTERFACE DESIGN AND CULTURE

In this chapter, we investigate the relation of culture and user interface design. Especially expectations and previous knowledge are important factors for the usability of an interactive system and depend at least partly on the cultural background of a user. So first of all, we have a short look on what culture means in this context, research dimensions of cultural differences and look at the effects on the interface design. Subsequently, we describe the concepts of internationalisation and localisation as well as cultural usability. At the end of this chapter, we present common design challenges with a special focus on the MASELTOV target groups: Arab and Turkish users (see D2.3).

3.1 CULTURE IN THE CONTEXT OF USABILITY

3.1.1 DEFINITIONS OF CULTURE

We do not want to define culture ourselves but present some appropriate definitions of accepted experts. They should represent the diversity of culture as there is no hard concept or definition accepted by everyone.

Culture is the man-made part of the human environment.
(Herskovits, 1955)

In the critical discourse analysis culture is seen as a process of ongoing negotiation.
(Hewling 2005)

Culture is the patterns of thinking, feeling, and potential acting learned throughout the lifetime of a person.
(Hofstede 1994)

In analogy of how computers are programmed, Hofstede names these patterns “software of the mind” or mental programs (which vary as much as the social environment in which they were acquired).

3.1.2 DIMENSIONS OF CULTURAL DIFFERENCES

When reading about international or intercultural usability, research by Edward T. Hall and Geert Hofstede is most cited. Hofstede (1994, 2001, see Hall 2004) developed a set of cultural dimensions based on a survey of 116,000 IBM employees across 50 countries and 20 languages:

- **Masculinity versus femininity:** Masculine cultures emphasize achievement, assertiveness, and material success, whereas in feminine cultures there is a stronger focus on relationships, caring, and quality of life.
- **Strong versus weak uncertainty avoidance:** In cultures with strong uncertainty avoidance, people easily feel threatened by uncertain or unknown things, whereas in cultures with weak uncertainty avoidance, people are willing to take risks, try new things, and accept dissenting views.
- **High versus low power distance:** In cultures with high power distance differences in power and wealth among people is expected and accepted, whereas cultures with low power distance value equal rights and opportunities for everybody.
- **Individualism versus collectivism:** In individualist cultures people are expected to look after themselves and their immediate family, whereas in collectivist cultures people

are integrated into strong, cohesive groups and protect them in exchange for unquestioned loyalty.

- **Long-term versus short-term orientation:** In long-term orientated cultures general purposes are prioritized over individual interests. In short-term orientated cultures, there is a focus on quick results, tradition, personal standpoints, social obligations and people's need to protect their face.

Although the framework by Hofstede is useful for analysing specific forms of cross-cultural communication, a central critique of Hofstede's work is that it relies on interviews with IBM employees in the 1960s and 1970s and whether the results can be generalized to national cultures, see (Ess & Sudweeks 2005). The authors also emphasize the development of a "third" or hybrid entity resulting from different cultural flows due to processes of immigration and globalization, and therefore alternative frameworks appear to be required for studying individuals whose intercultural communication reflects: (a) a multitude of "cultures," and (b) "culture" as a series of practices and habits that are fluid, dynamic, and changing (especially as *generated* by intercultural communication online).

E.T. Hall's communicative distinction (1977) between low-context and high-context cultures is related to Hofstede's individualism-collectivism dimension (see Figure 1). In low-context cultures, communication is expected to be direct, explicit, and unambiguous and corresponds to the individualist society. In high-context cultures most information is either part of the context or is internalized in the persons involved. Very little is made explicit. High-context communication fits the collectivist culture.

Figure 1: E.T. Halls low context, hight context dimension (withdrawn Rubinstein & Hersh 2011).

However, Hall (2004) emphasizes that although these dimensions reflect group behaviour, they cannot be used to predict individual behaviour. Nisbett (2003) argues that there is compelling evidence that cultural-historical differences in physical environment, upbringing, education, and social structure shape how people perceive objects and situations.

3.1.3 EFFECTS OF CULTURE ON INTERFACE DESIGN

Callahan (2005) emphasizes that cultural differences in interface design are manifested on the textual level (written language formats, vocabulary, and systems for keeping time and dates) and on the level of graphic design (preferences for colour, layout, culturally familiar icons). Colour and decorative design have little effect on the interaction. Nevertheless, user satisfaction shapes the user perception of the system's usefulness. Table 1 summarises the findings.

	Textual Elements	**Graphical Elements**
Critical for interaction – otherwise interaction cannot occur or is	• Language of the user interface is known to user • Ability to enter proper fonts • Ability to specify	

severely hampered	appropriate formats (numbers, date, …)	
Important for interactions – interaction cannot occur until user learns new information	• Discourse style is understandable to the user • Transparent relation between translated word and system function • Understandable formats (numbers, date, …)	• Culturally understandable graphical metaphors • Transparent relation between culture specific icon and system function
Important for system acceptance – interaction can occur otherwise, but user may reject the system	• Option to interaction in native language • Use of discourse style of native language	• Culturally appealing/ appropriate colors • Culturally acceptable graphical representations • Information display characteristic of user's own country • Culturally/morally accepted content

Table 1: The influence of culturally variable interface elements on user satisfaction (Callahan 2005).

3.2 INTERNATIONALISATION AND LOCALISATION

In a globally connected society every product or service especially in the area of ICT is exposed to a wide range of users whose cultural beliefs and practises can differ enormously. However, users care about design aspects. For example, a study of DePalma et al. (1998) reported that users spend twice the time at website when provided in maternal language (in comparison to the English version). For this reason the MASELTOV consortium should be aware of accordant processes that should support the development of systems for a culturally distinct target group: globalisation, internationalisation and localisation. These terms are defined by the Localisation Industry Standards Association (LISA) as follows (Aykin et al. 2006):

- **Globalisation** refers to the general process of world-wide economic, political, technological and social integration (on enterprise level). Those processes should facilitate localisation.
- **Internationalisation** is the process of ensuring, at a technical and design level, that a product can be easily localised. It helps define the core content and processes so that they can be modified for localisation.
- **Localisation** is the process of modifying products so that they are usable and acceptable for target cultures (follow-up process of internationalisation).

Accordant guidelines for internationalisation and cross cultural design are presented later on in section 5.1. Although such guidelines provide valuable support for user interface designers they have to take the actual usage context into account and therewith avoid focusing on stereotypes and clichés. Apart from guidelines for the obvious aspects of a user interface also metaphors, education, experiences, values, and work practices can differ widely and contribute to the cultural differences. Therefore, a user-centred design process like approached in MASELTOV is crucial for usability and acceptance for special target groups like immigrants.

3.3 CULTURAL USABILITY

MASELTOV wants to offer helpful solutions on mobile devices for immigrants in the European Union. Therefore, it is crucial that immigrants are able to use these services. Like stated above, culture also has an effect on how user interfaces are perceived and used. This is why classic usability knowledge might not work completely for the target groups of MASELTOV: Arab-speaking immigrants from North Africa and Turkish immigrants. In this section we introduce approaches to cope with this phenomenon: cultural usability.

Currently, there is no official definition of cultural usability but several different approaches. Sun (2002) distinguishes between two ways researcher interpret culture in the context of usability differently:

- **Culture as ethics:** Cultural usability is a study of cultural effects on product design. It arises from the technical approach and is interested in how to conduct cross-cultural usability research in an instrumental way. Culture is approached statistically, and researchers seek universal patterns for different cultures. Pushed by industry, more empirical research findings have been gathered about cross-cultural design elements and user profiles, and usability methods. Factors discussed include collectivism, individualism and nonverbal behavior.
- **Cross-cultural usability:** General cultural factors are studied with a critical perspective inspired by the humanistic approach. Culture is studied as the combination of individual's general characteristics.

Culture as ethics seems to be more popular and usually is referred to when people talk about cultural usability. Anyhow Sun criticizes that both approaches only provide half of the picture. So he proposes an approach to study cultural usability by combining these two approaches:

- Usability is studied in context of use and addresses general cultural factors (not only ethical factors).
- It is studied how a product is used as a tool in real contexts but also its signifying practices by analysing its mediating role. Structured methods are used that provide possibilities of conducting innovative and flexible usability research activities about cultural factors. Also issues of power, identity, and representations surfacing in the cultural contexts of product use have to be investigated.
- The units of analysis should cover the scope of usability research and reflect cultural dynamics.
- Dialog ethics in the design process are important to incorporate interests from different parties.

Sun combines Hall's circuit model (1997) with cultural variables (see Figure 2). The circuit of cultures examines five key processes in a development cycle of an artefact with a cultural focus: the presentation of the artefact, social identities associated with it, its production and consumption, and regulation mechanisms for its distribution and use. Issues of power, identity, and representation are explored. Sun emphasizes that cultural variables additionally offer a workable framework for researching cultural factors for specific groups of users and each node of the circuit embodies different cultural variables.

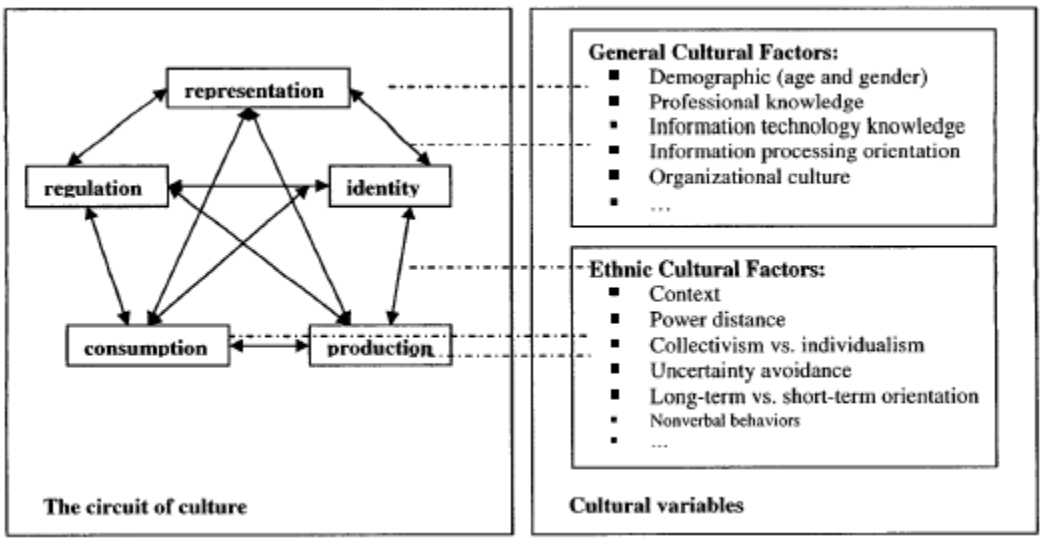


Figure 2: Two views of the Model of Culture (Sun 2002).

3.4 CASE STUDIES REFLECTING DESIGN CHALLENGES

In this section we present three case studies describing other projects that identified concrete challenges of providing user interfaces to the MASELTOV target groups.

3.4.1 DESIGNING AN ARABIC USER EXPERIENCE

Hemayssi et al. (2005) described how they developed a custom web application for data gathering and logistics management applications for an on-going educational reform in an Arabic Gulf State. The user interface needed to be usable for both Arabic and English users. They discovered the following challenges and approaches:

- Both stakeholders and end-users were unfamiliar with having rough edges exposed und expected a finished deliverable at each stage of development. Usability testing with paper prototypes was a format shocking the participants.
- Hesitancy to ask for help occurred, especially on the end-user side. Therefore, the interface needed to be very intuitive, leading the users easily from step to step.
- There was one single opportunity to gain feedback on the user interfaces. Individual testing was immediately rejected because the client team was locked into a rigid, hierarchical collectivism and it was necessary to discuss usability issues in groups. This lead to an unfocused session with a few louder and more senior people setting the tone reflecting Hofstede's dimension of a high power distance (Hofstede 1994).
- Regarding the translation from English to Arabic, some words did not translate literally but had to be described in a longer and more conceptual way.
- The information architecture was designed in a linear process: all necessary steps were visible. Input fields were greyed out until the preceding steps had been completed.
- Strong visual cues were preferred. The colour choices were refined to higher-contrast/more saturated colours and clear typographic hierarchies.
- Icons were deployed with consistency to draw attention to actions and transcend the reliance on language. Also it has to be ensured that the icons work culturally. Pictures are orientation-based and buttons are flipped in form as well as language. Less ornamentation and less texture were preferred.
- Drag and drop interactions were employed to increase the speed of the interaction.

3.4.2 CULTURAL USABILITY EVALUATION OF SMART PHONES

Aryana & Liem (2011) conducted a study in Turkey and Iran to identify specific cultural traits, and to understand the influence of culture when users interact with smart phones for the first time. Apart from general usability problems also country-specific aspects could be detected. Based on the results of one focus group per country, two topics were selected for a usability study. In Iran, users wrote SMS and sorted and looked for songs through music player applications. In Turkey, users dealt with the contact list and sorted songs by the music player application as well.

The results showed that users in Turkey have usability problems with the contact list application and they would prefer to have different levels of intimacy and privacy in their contacts. Although Turkish users were able to sort and find songs, they preferred sorting the songs based on mood, which was not possible.

In Iran, people use SMS as a social network tool not just for communication, but also for sharing interests and having fun. Three usability problems common among more than 50% of the users had clear connections with using SMS. Also, all users had problems in finding and adding songs to the playlist in their first interaction with the music application.

To explain the results Aryana & Liem (2011) took three approaches into account:

- **Social networking approach**: The SMS and contact list applications deal with social networking activities, therefore the usability problems may relate to the different networking patterns in these societies.
- **Contextual approach**: Previous user experience affects the way users interact with a new product. As most popular social network services are banned in Iran, the users were not familiar with the idea of such applications and thus had usability problems.
- **Cultural models approach**: The Iranian and Turkish user had difficulties in navigation through a structured and hierarchical interface. As Iran and Turkey are high context cultures according to Hall's cultural model (Hall 1977), while Western cultures are rather low context, brief and direct user interactions might not suffice for this particular target groups.

3.4.3 EXPERIENCES FROM A MOBILE LANGUAGE LEARNING PLATFORM

The MASELTOV partner Busuu offers its language learning services not only in European languages but also in Arab. This means that the user interface needed to be adapted and support Arab, too. Busuu gathered a lot of feedback not only from users but also from other professional contacts, such as translators or voice artists (who refused to record certain contents for some courses). The bottom line is that Busuu decided to make only minor adaptions from the European version and no drastic ones for the Arabic user interface. In this section we present some of their experiences:

3.4.3.1 CONTENT

1. All learning chapters that were related to dating, in a bar, Christian religious events (i.e. Valentine's, Christmas, Easter etc.) were blocked to users with Arabic countries IP addresses. Basically they were not part of their language offerings.

2. The images that included pictures with nudity were replaced for more conservative ones.

3. The language itself that was used in certain dialogues, like going out for drinks etc. was reduced.

4. Also any reference to kissing, relations, implicit suggestions, etc. was reduced to a minimum.

5. The food, especially ham, pork would only be mentioned as meat.

3.4.3.2 USER INTERFACE

The whole content was moved from right to left. However, it is quite a tedious job to adapt the user interface. A simple example is the order of the tool bar which shows Home, Courses, and Settings etc. The standard order for Europeans seems not to be intuitive for the Arabic version (see Figure 3). It needs to be mirrored and tested with real users.

Figure 3: Standard header of Busuu in English and first draft of the Arab version.

4. PARTICIPATORY DESIGN SESSIONS

To fully understand the cultural differences in user interface needs it is important to not only stick to guidelines but also to include people from each target group into the design process because most of the existing design guidelines try to raise awareness for the issue but do not offer ready-made solutions (Callahan 2005). To deepen our knowledge on the influence of cultural background on user interface design apart from the literature review presented in chapter 2 we involved potential end-users of MASELTOV in the design process. The goal of this user involvement was to identify potential differences in design and solution approaches and to discuss them with end users. Furthermore, we wanted to get an impression about user centred multicultural design ideas and gather new design ideas and functionalities. For this reason we conducted two participatory design sessions with Turkish and Arabic immigrants. One participatory design session was held in London, UK (June 26th 2012) and the other one in Graz, Austria (July 10th 2012).

4.1 SETUP OF THE PARTICIPATORY DESIGN SESSIONS

4.1.1 PARTICIPANTS

We invited participants from Turkey and Arab-speaking immigrants from North Africa that were sufficiently able to speak the accordant language from the host country (German in Austria and English in UK). In Graz four Arabic speaking women and four Turkish speaking women took part in the session. In London five female and 3 male participants joined the session. All of them came from Arabic speaking countries to the UK. All participants were between 17 and 53 years old, each living in their respective host country for at least 5 years.

4.1.2 PROCEDURE

After the workshop leaders have been introduced, the sequence of action was introduced to the participants to give them a rough overview of what they had to expect. Next, administrative aspects like the informed consent and general questions have been managed.

In order to loosen the atmosphere and to stimulate creativity we started both sessions with an introductory game called *trading cards* (Gray et al. 2010) replacing the usual introduction round. We provided sheets of paper and several colourful markers and each participant (including the moderators) took 5-10 minutes to create his/her personal trading card. The task was to create a personal trading card including name, a more or less realistic self-portrait, a nickname and special hobbies (for examples see Figure 4). After the finalisation of the trading cards one of the workshop leaders collected and distributed the cards randomly, so that each participant received the card of another participant. Then every participant presented the person of his/her trading card to the audience. The audience as well as the presenter were allowed to ask questions to the person whose trading card was presented. This way a comfortable atmosphere was created and every participant lowered the barriers to speak and made it easier to give input to the session.

After this “icebreaker” game the aims of MASELTOV were explained. The focus was on two designated MASELTOV services: the geo-social radar and the multi-cultural event calendar. To make it easier to understand for the participants the according scenarios presented in D2.3.1were drawn and presented on an A3 Paper in front of the participants and two participants shared a small version of it as well. Additionally, we provided describing text of the scenario in the language of their host countries (i.e. German or English) in front of all participants. The text was read out by one participant.

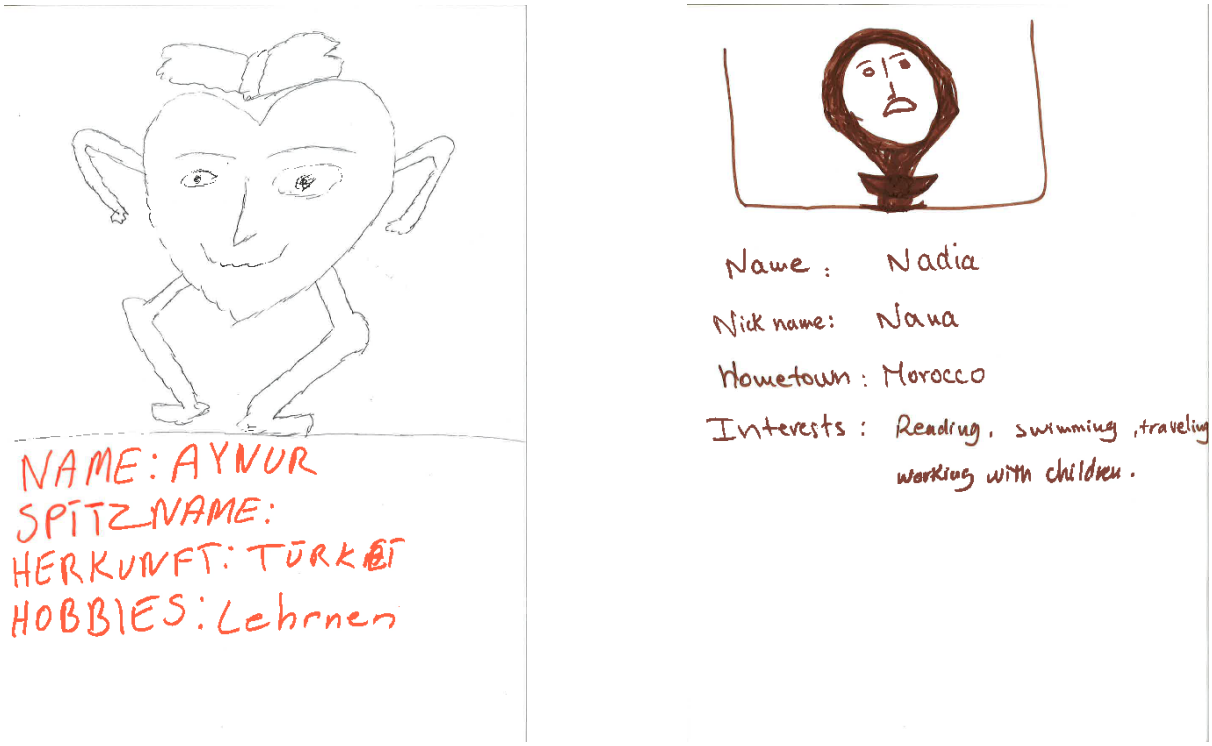


Figure 4: Trading cards of participants of the design sessions.

To estimate the experience the participants had with smartphones and other touch technologies some questions about if and how they are used have been asked. Then, short sequences of a YouTube video about interaction possibilities of an iPhone 4GS were presented to show the already existing variety of interaction techniques. In parallel, an iPad was passed around to let the participants try out some of the touch techniques. The purpose of this training part was to give all participants an idea of possible interaction techniques.

In a short break groups of two were formed to discuss and work on design ideas of either the geo-social radar or the multi-cultural event calendar smartphone applications. After 30 minutes the participants were asked to present their design ideas in front of the group. The other participants had the possibility to ask questions and give feedback, before every group had the possibility to redesign their ideas. Then, again the idea was presented and discussed. In the end of the session, every participant got a financial compensation of €30.

4.2 RESULTS

After the presentation of the project aims of MASELTOV and the two scenarios short discussions about the feasibility of the services came up. In the following we give a short summary of the discussed points.

4.2.1 FEEDBACK TO THE SCENARIOS

The *multi-cultural event calendar* was perceived helpful because big cities might lead to loneliness. However, the London participants argued that it might be useless, because people get to know people from their home country very easily when they arrive in a new hometown.

The *geo-social volunteer radar* was criticized, because one would rather call a friend for help than a completely unknown person. Other participants then argued that there might not be a friend speaking the required language, since migrants might have just arrived in the new city.

They also questioned why we would not just use video-calls to communicate with the volunteer helper.

4.2.2 FEEDBACK TO MASELTOV IN GENERAL

When the question came up about how MASELTOV could be promoted to newly arrived immigrants, the airport was considered an appropriate place. After arriving at the airport, there should be information desks for immigrants, announcing the MASELTOV application. There should be personal assistance in the first place to help immigrants to organise themselves in the new country.

The app should also provide the possibility to navigate the newly arrived immigrants to their home address continuously. If they do not have a place to sleep there should be help with finding a place to stay within the MASELTOV services as well.

The use of symbols and icons that are intuitive for all cultures (e.g. a cross for medical help). Text-to-speech and speech-to-text interaction as well as plain text entries should also be supported within the MASELTOV apps. Therefore, it will be important, especially for the Arab speaking persons, that all of their many dialects are recognised by the translation engine.

The discussion also turned out that privacy issues are playing a big role in the life of immigrants. They require having absolute control about who they are in contact with through the platform and who can see where they are located and what they are doing right now. They indicated that this is because they do not know who they can trust in the new country and they are afraid to be expelled somehow.

4.2.3 PRESENTATION OF THE DESIGNS

The participants were asked to present their design ideas to the others. Since the design ideas were varying in terms of detail and comprehension, all design ideas are summarized per scenario (see Figure 5).

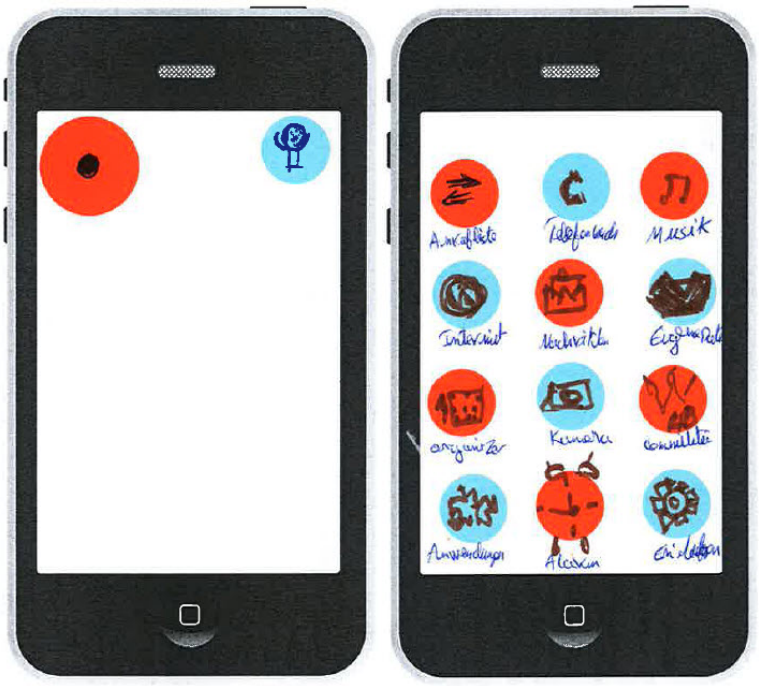


Figure 5: Two exemplary designs of the participants.

Multi-cultural event calendar

At first everybody sets up a profile and selects the preferred language. The app is able to translate from and into every other language. Therefore, all content is available in the preferred language. The interaction with the app needs to be as easy as possible. It would be helpful to have a guided instruction to how to use the app when using it the first time. The app should provide information about places where people meet (e.g. playground, cultural centers), about events where different cultures are presented and people from different countries connect to each other.

Geo-social volunteer radar

Button for languages can be found on the home screen. The app also contains a translation machine that helps in the first instance. Additionally, an emergency button that connects with the local hospital should also be integrated. In general, a map with volunteer helpers nearby is displayed. By tapping on a potential volunteer, information about the language the person speaks as well as their sex is displayed. Quick access is given to invite the available volunteer to come over and help. It was also mentioned that it is necessary to give the volunteer the possibility to set his status to "not available". The user needs to get a confirmation in any case. Otherwise s/he would wait for help not knowing if someone is coming. Additionally, a list of physicians displaying which language is spoken there should be made available.

Comments on MASELTOV apps in general:

- Interactive tutorials about how to use the apps (navigation, geo-social radar, …)
- Quick access to all functionalities is required (one app for every problem)
- Clear icons; symbols everyone understands (i.e. young, old, illiterates)
- Different languages and dialects should be available (there are several hundred Arab dialects)
- Volunteers could train immigrants how to use MASELTOV
- Touch and voice-based interaction to support illiterates.
- Text-based interaction to support deaf people.

To sum up, an easy understandable and usable service is very much appreciated, not only by immigrants. However, it is important to include voice- and text based interaction, as well as intercultural understandable symbols and icons would be helpful. For Arab speaking persons it is regarded crucial to have a speech recognition engine that is able to interpret dialects as well. Guidance and assistance in using the MASELTOV technology is very much required. Privacy issues need to be taken into account to enhance the trust in the technology to raise their acceptance.

4.3 LESSONS LEARNT

In both sessions we experienced the "icebreaker" game as working quite well. Participants got to know each other and the first barrier to talk to the other people in the group fell already. This is important in terms of feedback from the actual end user. The atmosphere was friendlier and more open afterwards.

The sessions provided us with rather little impact on the design ideas, but the interaction with the users in face-to-face situations is very crucial due to the rather unknown impact of cultural background. This provided us with more implicit knowledge about the target groups and will therefore help to design the user interfaces correspondingly.

No matter how often the moderators told the participants that they should not worry about financial costs of MASELTOV for the purpose of this session, they always came back to this issue.

Participants should be given more space for creativity in terms of “no restrictions, everything is possible” and make clearer that the design process is not about designing a new operating system, but designing their perfect interface for a future application.

5. DESIGN GUIDELINES

Like stated in the previous chapters cross culture interface design is an important issue when designing and developing for an audience of diverse nationalities. There are some cultural characteristics of an interface which are clearly visible like language, currency, date and time format, and there are other aspects which are not as obvious like mental models, metaphors and speech conventions. Some differences that should be considered explicitly are different religious, historical, linguistic and aesthetic conceptions for different cultures.

To follow the approach of internationalization and localization (see section 3.2) in this section we first outline basic guidelines to design for an international audience and in a next step we have a closer look on special issues of cross-cultural design for the target groups of Turkish and Arab immigrants.

5.1 CROSS CULTURAL DESIGN GUIDELINES

Internationalisation guidelines for displaying information have been categorized by Aykin and Milewski (2005) according to the mnemonic GLOCL which stands for: Graphics, Language, Data Object Formatting, Colour and Layout.

Graphics includes not only pictures but also icons, illustrations and maps. Although graphics are usually meant to be universal, in reality there are only few graphics that have cross-cultural generality. Even when a graphic is widely understood the same way it is often not the preferred way of visually representing things by all cultures. There are no general guidelines for graphics in the form “express this aspect with this graphic” because the amount of different cultures is too high. Instead, guidelines often pose more general approaches to avoid problems e.g. show a range of examples together in one graphic when there exist a lot of specific versions like banknotes. (Horton 2005).

Language is pervasive in user interfaces and comes along with a number of issues e.g. country and language are not related in a one-to-one relationship as there a multilingual countries. Furthermore, translations needed to be proved carefully as there are differences in writing (ENG vs. US) as well as semantic differences. Another issue is the rendering as text direction, font characters and character distances differ, too.

Object formatting relates to differences in standards of data like presenting time, date, temperature, telephone numbers, sizes and so on. Although there are many standards that have been established by the ISO both governments and people rather prefer their own versions.

Colours have very specific meanings which can differ widely between cultures.

Layout issues are rather a secondary problem resulting of cultural differences in the other dimensions. Changes in graphics, language, and formatting of can have large effects on the layout of a product. These issues have to be taken into account in the design phase. In general, a flexible layout is the base to avoid expensive redesigns when adapting a product for another target culture.

The following sections present some notable guidelines for internationalisation mainly based on the work of Aykin et al. (2006).

5.1.1 LAYOUT AND INFORMATION ARCHITECTURE

Liquid layouts are recommended for an international design concept because the place needed for text can vary extensively due to different font-width and size. It is also important to take

the change of text amount due to translation into account. Text expansion can be higher than 200% (Vitols 2011). So instead of fixed-position layouts dynamic layout managers should be used to ensure flexibility and expansion space, since layout elements vary, including text direction, placement, and alignment on the screen (Microsoft 2002).

Regarding navigation design it is important to think of the different reading directions. A horizontal top navigation is considered the most save navigation design when designing for internationalization for the web (Arno 2010). An example can be seen in Figure 6.

Figure 6: Example for a horizontal menu bar at the top in English and Arab (http://government.ae).

5.1.2 LANGUAGE AND TRANSLATION

Language is the most obvious part of an interface that needs to be adapted for each foreign-language target audience. Although translation of text is considered an easy task it should be made with great care to avoid confusion due to inaccuracy through direct translation or wrong use of words (Callahan 2005). Abbreviations and Acronyms should be added to a translation glossary and there they should be spelled out or explained in order to not lose information through translation (Vitols 2011). Hyphenation should also be analysed for each target language because in some languages word wrapping can change the meaning or the word (Callahan 2005).

Concerning content it is important to avoid culture specific metaphors, potentially mistakable humor and jokes as well as colloquial language (Vitols 2011). It is recommended to provide consistent naming conventions for interaction elements, to reuse standard terms of the native UI of the device and to pick up terms that the users would bring in relation with the accordant tasks.

The following Table 2 presents some notable guidelines on language collected by Aykin et al. (2006).

	Guidelines	**Examples**	**References**
Language			
Character sets	Several character sets deal with the processing and rendering of languages. The most commonly used are ASCII, ISO-8859 Series, Unicode, UTF-8.	UTF-8 is an addendum to Unicode where characters are represented with 8 bits; provides compatibility with the ASCII set.	Aykin & Milewski 2005
Fonts	Choose fonts to accommodate target languages, provide enough	Most non-Latin languages	Aykin & Milewski

	space for changes in line heights, to ensure the clear separation between lines, and to accommodate underlining.	require proportional spacing.	2005
Text direction	Accommodate bidirectional (left-to-right and right-to-left), and top-to-bottom text in design.	Arabic and Hebrew are bidirectional languages, where Arabic and Hebrew characters are read from right to left, non-Arabic/Hebrew and numbers are read from left to right.	Aykin & Milewski 2005
Paper size	Select margins to accommodate different paper and envelope sizes. Ensure that printers can accommodate different paper and envelope sizes. ISO 216 provides the international paper sizes.	Not only do U.S. paper and envelope sizes differ from those in Europe, business card sizes also differ.	Kuhn 2003
Transla-tion	Identify the content in the code to be translated. Provide instructions for the translators, and translation glossaries. Use translation memory to eliminate replicates of the same text translation.	If not marked properly, the code itself or file names may get translated, causing a large problem with perfectly working software.	Microsoft 2002, Hoft 1995
Abbre-viations and acronyms	Provide full text for abbreviations and acronyms. Instruct translators on what and what not to translate (e.g. some organization names).	Although the United Nations is a well-known organization, many countries still use the translated version of its name.	Aykin & Milewski 2005
Spelling	Same language can have different spelling rules in different countries.	*Internationalisation* in UK English is spelled *internationalization* in U.S. English.	Aykin & Milewski 2005
Text expansion	Layout should be designed to accommodate text expansion in labels and the body text. Can use larger font types for the source language and smaller fonts for the target language (given the high legibility), can	Text on short labels can expand up to 400% when translated from English to other languages. Paragraphs over 70 characters can expand on	Hoft 1995

	increase the margins, or can provide dynamic layouts to accommodate text expansions.	average 40% when translated.	
	Placing labels above the fields, using automatically expanding text objects, use of graphics, and changing the space between lines and paragraphs could help to accommodate text expansions.		
Sorting	Sorting rules should be able to handle accents, character combinations, case differences, non-Latin scripts, and Far-Eastern languages.	In German, the character ß is sorted as "ss".	Microsoft 2002
	ISO/IEC 14651:2000 provides default collation orders.		
Writing practices	Using short sentences, active prose, formal vocabulary, and present tense, per organizers such as graphics/icons or lists.	Instead of "You may turn on the computer", use "You can turn on the computer".	GNOME 2012, Hoft 1995
	Avoid joint sentences, indefinite pronouns, personal pronouns, semicolons, use of the word *may*.		
Termino-logy	Avoid culture specific metaphors, acronyms, abbreviations, jokes, humor, and idioms, gender-specific references, colloquial languages.	*Bathroom* in U.S. English means *toilet* in UK English.	Aykin & Milewski 2005
	Use standard terminology within the target language, while considering terminology differences between countries.		
	Ensure that the translated version retains the technical accuracy.		
	Use dynamic layout managers instead of fixed-position layout.		

Table 2: Internationalisation guidelines on language collected by Aykin et al. (2006).

5.1.3 DATA OBJECT FORMATTING

Regarding date and time it is important to let the user know how and where to insert the right data hence the use of graphical calendars could be the more user friendly method (Ishida 2007).

It is important to consider that name definitions can also vary in cultures. It might be the user-friendliest approach to give the user a single form field for the whole name. Of course this depends on how the names would be processed later (Ishida 2007).

The following table presents some notable guidelines on data object formatting collected by Aykin et al. (2006).

	Guidelines	**Examples**	**References**
Data object formatting			
Date	Although there is an international date notation (ISO 8601), countries still prefer their own accustomed way of representing dates. Ensure that the application software and layout accommodate different date representations.	In Saudi Arabia, the date is shown as 1425/04714, in the United States as 04/14/2004, and in France as 14/04/2004.	Aykin & Milewski 2005
	The date-formatting differences include the order of day, month, and year, and the delimiters separate these.		
Time	The international standard notation for time is hh:mm:ss (ISO 8601). However, there are differences between countries on how to represent the hours: AM/PM or 24-hour notation.	In the United States, the time is represented as 2:34:60 PM, and in most of Europe it is represented as 14:34:60.	Kuhn 2001
Calendar/ holidays	Although most of the world uses the Gregorian calendar, the exceptions could have an impact on the localization. Other calendars include the Arabic, Jewish, Iranian, and Japanese Imperial calendars.	In the Arabic calendar, the date changes with the sunset, making calculations and conversions complicated.	Aykin & Milewski 2005
	It is also important to know the holidays of the target culture, especially if you are conducting studies there and are interacting with the local offices.	Islamic countries do not celebrate Christmas, so sending Happy Holidays cards during Christmas may not be appropriate.	
	On schedules, the start of the week may change from country to country.	Start of the week is Monday in most European countries, and it is Sunday in the United States.	
Numeric formatting	The elements of numeric formatting include thousands and decimal separators, number of digits between separators, and	123,456,789.00 in the United States is shown as 12,34,56,789.00 in Hindi.	Aykin & Milewski 2005
		Negative numbers may be	

	negativity placement.	indicated by using a minus (-) sign before or after a number, or by enclosing the number in parentheses or brackets.	
Names and addresses	The name and address formatting can change the layout of forms drastically.		Aykin & Milewski 2005
	The name format can include title, gender, first/given, middle, last/family/surname (even two last names).		
	The address format can include (not necessarily in the same order) street number, building number, street name, city or town, state/ province/ region, country, zip/postal code.		
	Zip/postal codes can have alphanumeric characters and more than five-digit codes; the fields should be flexible to accommodate these differences.		
Telephone numbers	Format for telephone numbers varies from country to country: including the total number of digits, separators, grouping of numbers, long distance access codes, and extensions.	Separators used in phone numbering can include hyphens(-), period(.), parentheses[(.)], and spaces. Long-distance access codes could be 001, 011, or 00. Many countries do not have area codes, but city codes.	Aykin & Milewski 2005
	Provide flexible labelling and the capability to handle at least 15 digits for entering phone numbers.		
	Allow free format entry, with no separate fields as “area codes”.		
	Follow ITU-T recommendation E-164.		
Currency	Symbols representing currency differ from country to country. Use ISO 4127 three-letter abbreviations of world currencies. Well-known symbols such as the dollar ($) could	Monetary symbol placement: $123,45 in the United States, and 123,45 TL in Turkey.	Microsoft 2002
		Some countries use parentheses to indicate	

	replace the ISO symbols. The format for placing the monetary symbol differs also ($123.45, €123,45).	negative value [United States: ($1,234.56), France: €-1,234.56]	
Measure-ments	Measurements include distance and weight units (Imperial or metric systems), typographic units (point sizes), temperature (Fahrenheit, Celsius), clothing sizes (European, U.S.). Use dynamic layout managers instead of fixed-position layout.	1 point (Didot) equals 0.3759mm, 1 point (Postscript) equals 0.3527mm. Women's size 6 in the U.S. is equivalent to size 36 in Europe.	Kuhn 1999

Table 3: Internationalisation guidelines on data object formatting collected by Aykin et al. (2006).

5.1.4 VISUAL DESIGN

When designing for an international audience it has to be considered that symbolism differs in cultures. For example the check symbol means „correct" in many countries but in others, as Japan or Norway, Sweden and Finland it can be used as an error mark. (Ishida 2007). Furthermore, it is important to avoid taboos and potentially offensive icons (Vitols 2011).

Images of gestures should be avoided because they are very likely to be interpreted differently in different cultures (Horton 2005). Generally, it is better to consider modest clothing of visible people (no bare arms, legs, or feet) and to use universally recognized objects. Don't forget to provide translated versions of all images that contain written information (Ishida 2007) or try to leave text out of graphics, or layer the text so it can be translated without altering the underlying graphics (Horton 2005). In Arabic and Hebrew, the images are also read from right to left, which can cause confusion when telling a story in subsequent frames.

The textual elements accompanying icons should also be tested isolated and together with the graphical elements. Together they should support the intended meaning.

The font-families should be chosen carefully to provide a coherent positive user experience in all target languages (Vitols 2011).

It is important to know that colors have different meanings in different cultures. The following Table 4 points out some of these differences.

Color	Cultural interpretation
Red	China: Good luck, celebration, summoning India: Purity Egypt: Death South Africa: Color of mourning Russia: Bolsheviks and Communism Eastern: Worn by brides Western: Excitement, danger, love, passion, stop, Christmas (with green)

Orange	Ireland: Religious (Protestants) Western: Halloween (with black), creativity, autumn
Yellow	China: Nourishing Egypt: Color of mourning Japan: Courage India: Merchants Western: Hope, hazards, coward
Green	China: Green hats indicate a man's wife is cheating on him, exorcism India: Islam Islamic cultures: Religious color Ireland: Symbol of the entire country Western: Spring, new birth, go, Saint Patrick's Day, Christmas (with red) Eastern: family, harmony, peace, life World: “safe, go” like in traffic lights all around the world.
Blue	Iran: Color of heaven and spirituality Western: Depression, sadness, conservative, corporate, "something blue" bridal tradition
Purple	Thailand: Color of mourning (widows) Western: Royalty
Black	China: Color for young boys Western: Funerals, death, Halloween (with orange), bad guys, rebellion
White	Japan: White carnation symbolizes death Eastern: Funerals Western: Brides, angels, good guys, hospitals, doctors, peace (white dove)

Table 4: The meaning of colors in various cultures (Kyrnin online).

Color preferences between cultures still exist but not primary due to their meanings but due to aesthetic preferences. Although the meanings of colors are becoming less apparent across cultures, avoid prime colors for design purpose. As a rule of thumb, use muted, pastel colors for Asian countries and bright, bold colors for Central America (Morton 2003, Spartan, 1999).

Paul Andrew mentions in his article „Tips and Thoughts on Cross Cultural Global Web Design” that blue is often considered the safest and most positive „global“ color (Andrew 2010). The Federal Government Web Guidelines of the UAE recommend using a white background for Arabic websites (UAE 2009).

5.1.5 METAPHORS

Real-life metaphors are a strong way to build an intuitive and simple interface. One example for an effective metaphor used extensively in today's user interfaces are buttons. They look very much like buttons in the real world and the user interaction is very similar as well. Another positive example would be the on-off switch on Apple's iPhone user interface (see Figure 7).

Figure 7: Apple's iPhone on-off switch for options.

Metaphors should generally match real world experiences otherwise the user interfaces can lead to frustration and even to the rejection of the interface. A too strong familiarity should also be avoided. This could lead the user to take the metaphor too literally which easily leads to misconception and again to frustration. It is important to provide consistency in the use of metaphors through the interface (Rizvanoglu 2010).

5.2 SPECIFIC INSIGHTS FOR ARAB AND TURKISH USERS

5.2.1 LAYOUT AND INFORMATION ARCHITECTURE

When designing for an Arabic audience it is a straightforward approach to mirror-image the design patterns from left-to-right language sites (Nielsen 2011). Also the Federal Government Web Guidelines of the UAE demonstrate this approach (UAE 2009). Figure 8 and Figure 9 show exemplarily how this might look. Nielsen also mentions that regarding behavior and interaction design the general usability principles stay the same (Nielsen 2011).

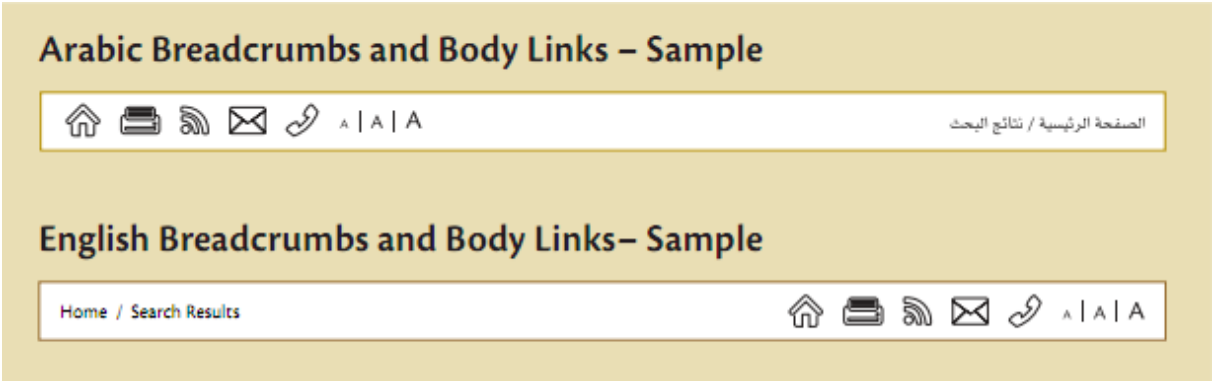


Figure 8: Exemplary Footer and Breadcrumb of a website to demonstrate the mirrored interfaces for English and Arabic version of a website (UAE 2010).

Figure 9: Example Screenshot of Arab Android App (https://play.google.com/store/apps/details?id=com.arbandroid.ArabAndroid&feature=search_result).

5.2.2 LANGUAGE AND TRANSLATION

When working on an Arabic localization of content it is important to know that abbreviations and acronyms do not exist in Arabic and that numbers are read left-to-right.

A text expansion of 20 to 25 percent needs to be considered when translating from English to Arabic (Arabic Translation Challenges 2010). The Turkish text expansion can be expected to be around 28 to 33 percent compared to corresponding English source content (Turkish Translation Challenges 2011).

5.2.3 VISUAL DESIGN

The arabesque art and the various kinds of calligraphy have a major influence on Arabic web design (Mushaweh 2010). This can be seen in the screenshot of an Arabic website in Figure 10.

Figure 10: Screenshot of an Arabic website from 21st August 2012 (http://alrasekhoon.com/).

According to Mushaweh (2010) the font-family of Tahoma is the number-one used font – it is available in Latin and Arabic.

It has been found that most websites have the pictures of males. Few of them also have the pictures of both males and females together, but females are covered in traditional veils (Khanum 2012).

International broadcasting companies like the BBC do not only adapt the content of their news portal to the chosen language, they also adapt the design of the site and change the reading direction for the Arab version of their web platform (see Figure 11 and Figure 12).

Figure 11: Screenshot of BBC Arabic from 21st August 2012 (http://www.bbc.co.uk/arabic/)

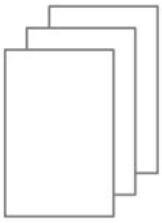
Figure 12: Screenshot of BBC Turkey from 21st August 2012 (http://www.bbc.co.uk/turkce/).

6. INTERACTION PATTERNS FOR MASELTOV

The insights of the described research in the previous chapters as well as previous experience in interaction design in general led to the development of interaction patterns for MASELTOV which are presented in the following sections.

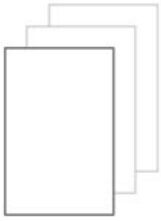
A pattern guide is an important tool for the interaction design process and is strongly related to visual design and software development. In this section, we present basic interaction patterns for Android that will serve as a basis for the MASELTOV prototype. The patterns are described through a very basic visual representation and the behavior of components on user interaction is demonstrated. In a later design phase, the visual design is implemented by defining color and form of GUI elements which form the basis for the components. A coherent user experience can be achieved by reusing these interaction patterns where reasonable.

6.1 TAXONOMY OF ELEMENTS



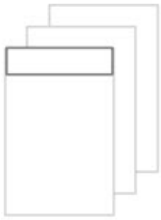
1 Modules

In a complex application structure modules are formed to support the user to get certain information. One module can consist of many views.



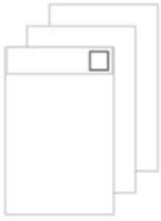
2 View

A view is one part of a module. One view can contain many components.



3 Components

A component is a single or a group of GUI Elements. User Interaction is based on components and their attributes. Components are the visual representation part in an interaction pattern and therefore the basis for a consistent design solution for a coherent user experience components need to be reused where user interaction motivations are similar.

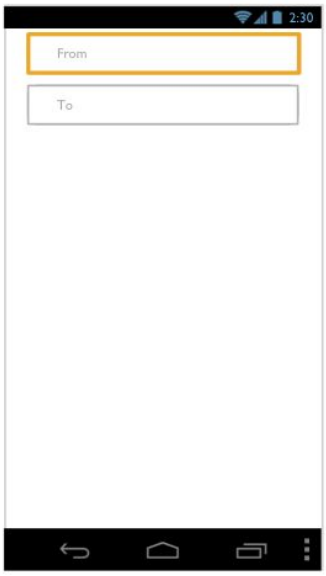


4 GUI Elements

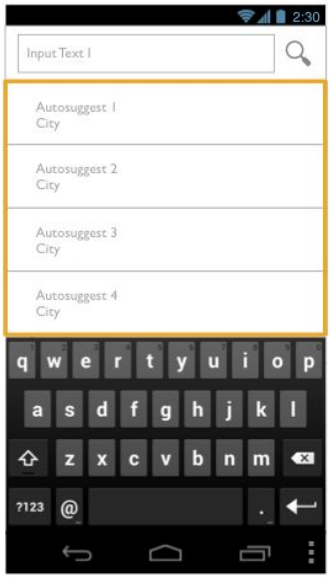
GUI Element are the smallest elements and the basis for components. Where possible and reasonable GUI elements should be reused in different components.

6.2 GETTING INPUT

6.2.1 INPUT FIELD

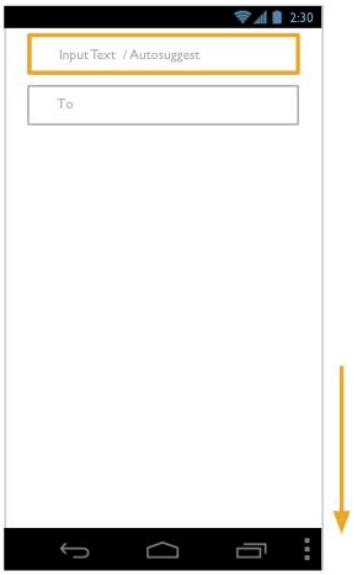


1 When an input field is selected…



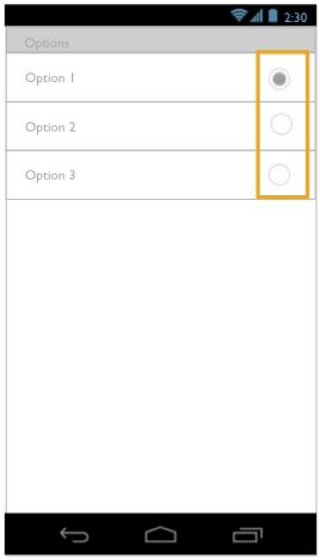
2 …the screen pans up, allowing the soft keyboard to be placed under the input field. The input field is highlighted, and text can be entered in the input field using the soft keyboard.

3 When an input has been made, in this case, a list of suggestions of available items is displayed in a list and can be selected.



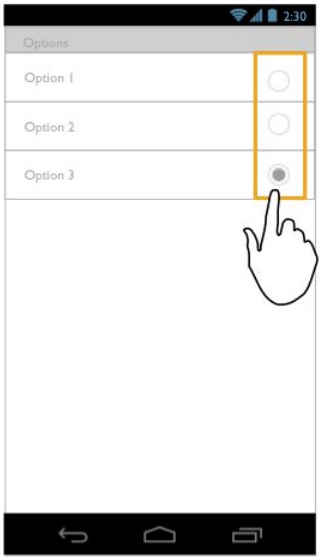
4 When the keyboard is hidden, the screen returns to its original position and the entered text is displayed in the input field.

6.2.2 RADIOBUTTON



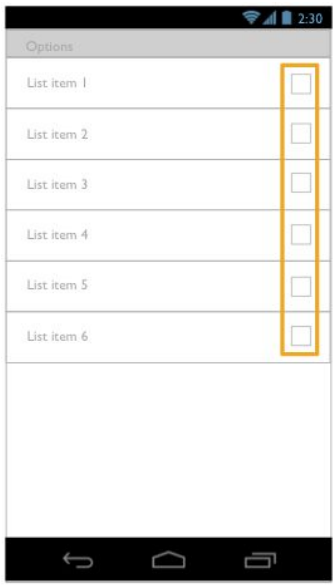
You can let users choose between single options by using radiobuttons.

1 Each item is provided with a radiobutton.



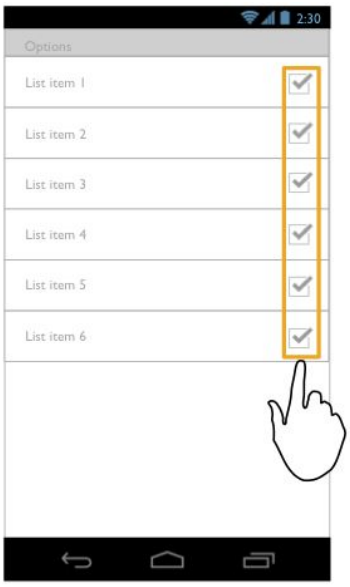
2 The user can tab the radiobutton in order to select the corresponding list item. Note: Only one of two or more list items can be selected

6.2.3 MULTIPLE CHECKBOX



You can let users perform an action on multiple items by using checkboxes.

1 Each item is provided with a checkbox.

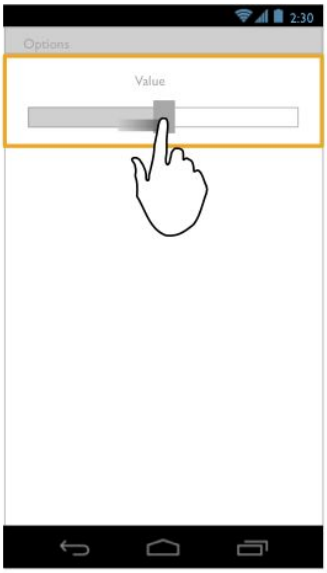


2 The user can tap the checkboxes to select the corresponding list items. Items can be deselected by tapping the checkbox again.

6.2.4 SLIDER

A slider displays the range between which the user can choose a value. The at most left value is the minimal value, the at most right the maximal value. The zoom can be smooth or gradual.

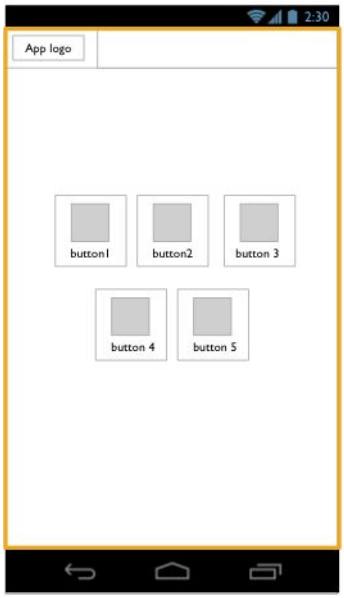
1 The slider consists of a horizontal strip divided into two parts by a control. The left highlighted part corresponds with the value that's currently selected. The right part shows how much room the user has to adjust the value.



2 When the user slides the control to the right, the left highlighted part grows and the corresponding value is displayed.

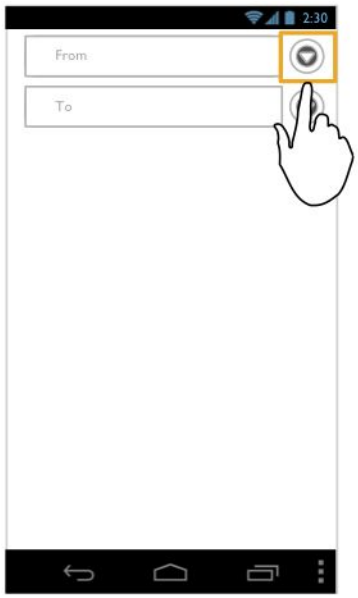
6.3 NAVIGATION

6.3.1 DASHBOARD



I The dashboard is the welcoming screen of your app, it provides a starting point for the user. A features dashboard lays out the key functionality of your app. It provides easy access to important tasks and functions. Features are displayed as an icon plus title in a layout.

6.3.2 TABS



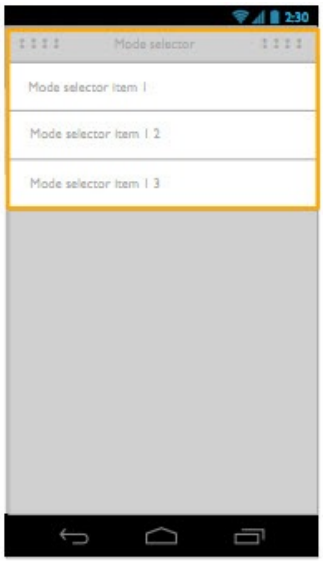
1 Instead of using the text input, the input fields (in this case: from, to) can be filled with items, which are listed in tabs. The tabs can be accessed by clicking on the mode selector icon.

2 The content (from, to) is divided into 3 tabs. Each tab represents an aspect or section of the topic. There can be two or more tabs.

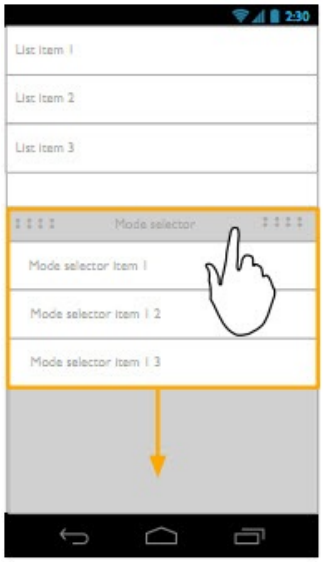
2-3 When a tab is tap selected, that tab gets highlighted and the content corresponding to that aspect is shown. In this case, the content of tab 1 is a list of items. Tab 2 is a map.

6.3.3 SLIDING DRAWER

1 The sliding drawer control is placed at the bottom of the screen. When the user taps and holds the control and drags the control up, the sliding drawer attached to it slides into the screen.

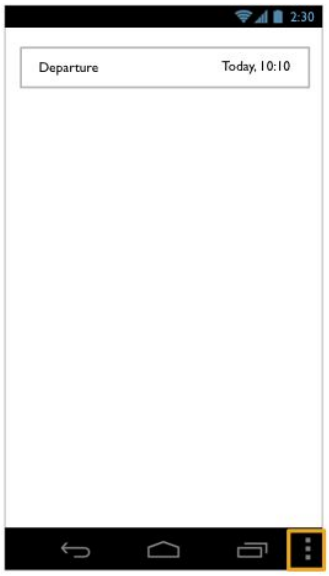


2 The user can let the control go at a certain point. Depending on the speed of the dragging gesture and where in the screen the control was released, the window shade will slide back to its initial position. The Window Shade contains items which can be selected.

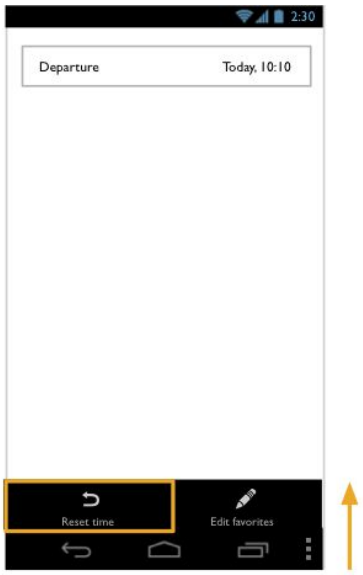


3 After having selected an item, the window shade closes automatically or the window shade can be closed by dragging the window shade control back down, pressing the back-button, or when it was opened that way, by tapping on the control bar.

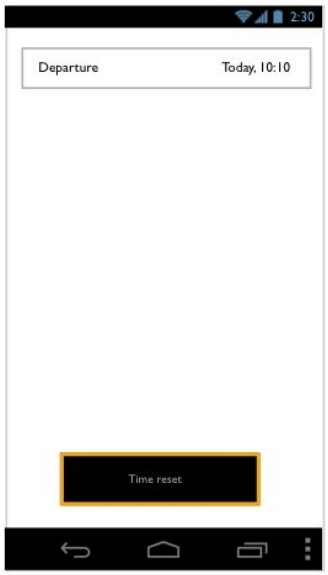
6.3.4 OPTIONS MENU



Options can perform a lot of different tasks, depending on the content that is displayed on the screen. In this case, two examples are shown.
1 When the user presses the menu key…



2 ...the options menu slides into the screen, and one, two or more options can appear. The user can, in this case, reset the time or edit the favorites. Tabbing an option button performs the action.

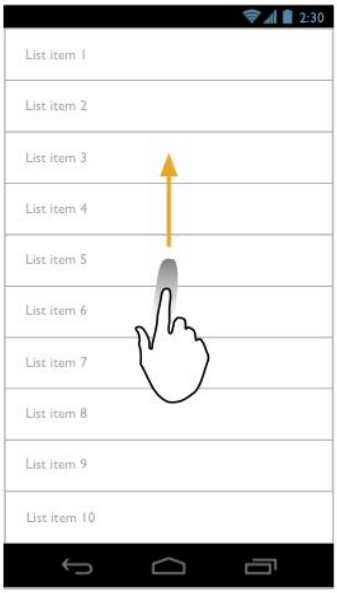


3 A toast message can, but mustn't confirm that the option has been completed.

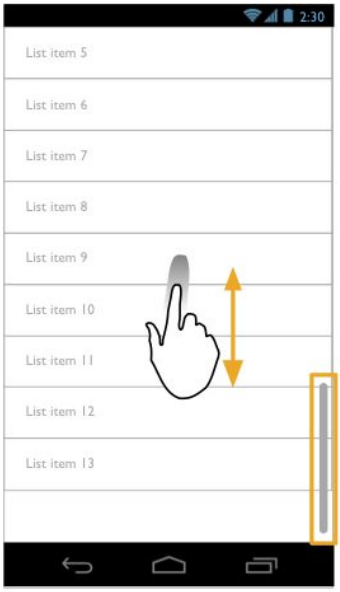
6.4 SCREEN INTERACTIONS

6.4.1 SLIDE TO SCROLL

1 Content is viewed in a list.

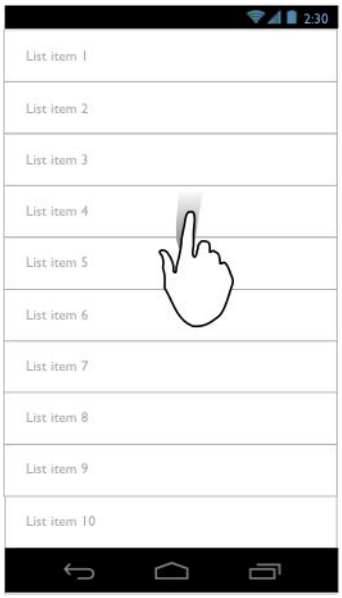


2 To view more content, the user puts his finger on the screen, and swipes it up. The screen moves up with the finger in the same direction. The user can also swipe in the opposite direction.



3 An indicator shows how much content is still available. When the user lets the screen go, it stays in the same position.

6.4.2 FLING TO SCROLL



1 The user makes a quick and fast fling up with his finger over the screen.

2 Dependent of the speed of the finger, the content moves through the screen in the same direction. An indicator shows how much content is still available.

3 Slowly the speed of the screen's movement decreases until it will eventually stop moving. The indicator also stops moving, and will slowly fade out.

6.4.3 PINCH AND SPREAD

1 Pinching & spreading gestures can be used to respectively enlarge (zoom in) and shrink (zoom out) an object (eg a map). The content is usually displayed full screen.

2 A user can touch the screen with two fingers and spread the fingers to magnify a specific target. The level of magnification is stepless and depends on how far the fingers are spread.

3 To zoom out, the user touches the screen with two fingers and pinches them together. Again, the level of magnification is stepless, and dependent on how close the fingers are pinched. Content can not be viewed smaller than the original size.

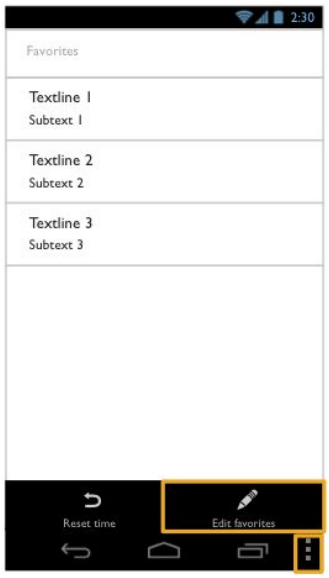
6.4.4 BUTTONS TO ZOOM

1 The user can use buttons to zoom in or out in a map. The control buttons are placed at the bottom left side of the screen.

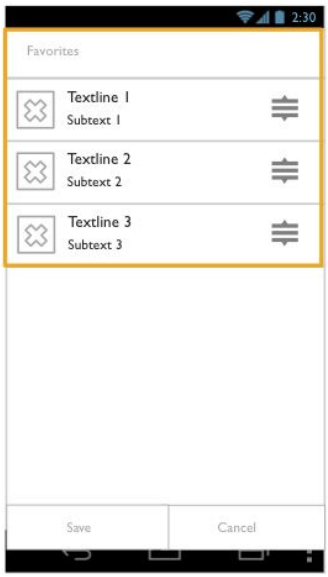
2 Tabbing the + button zooms into the map. The level of magnification is fixed, and the screen content is adapted to the magnification.

3 Tabbing on the - button zooms out by the same level of magnification. There is a limited number of zoom levels (eg. 8 zoom levels).

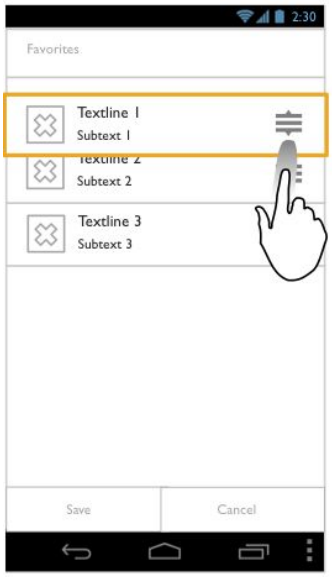
6.4.5 DRAG AND DROP



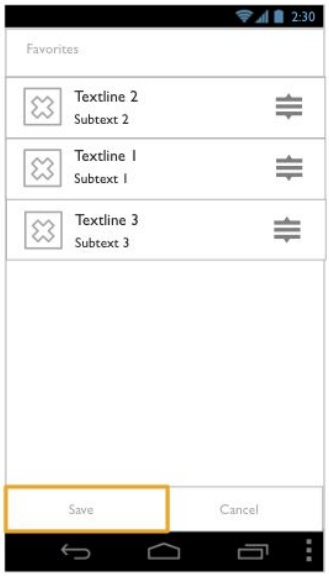
1 The user presses the key for the options menu and the options menu slides into the screen and he wants to change the order of his favorites.



2 The drag & drop mode is accessed, that can be identified by a visual target, added to every list item and a button bar with buttons for confirming and canceling the actions at the bottom of the screen.

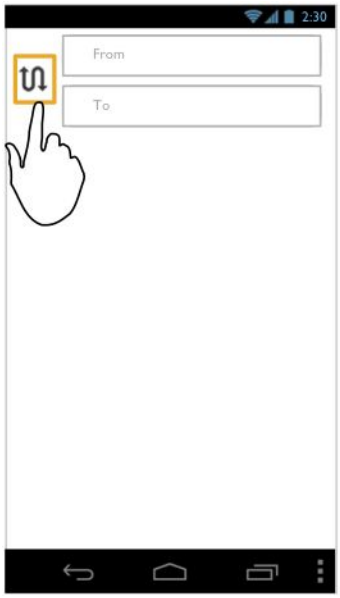


3 The user can tap & hold the target, and drag it to a different position on the list. He can also remove a favorite by tabbing on the delete button.



4 When released, the item is dropped at that particular position. The user can tap Save or Cancel to complete the action.

6.4.6 CHANGE INPUT FIELDS

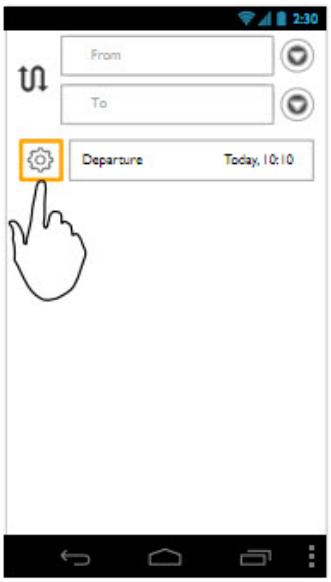


1 The user can easily switchover between the two input fields by tabbing on the icon on the upper left side.

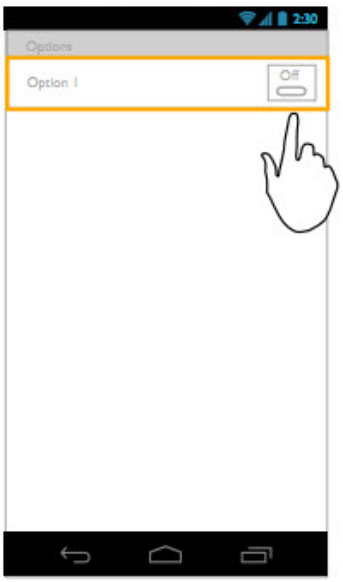
2 This can be repeatedly done.

6.5 DEALING WITH DATA

6.5.1 DATA OPTIONS

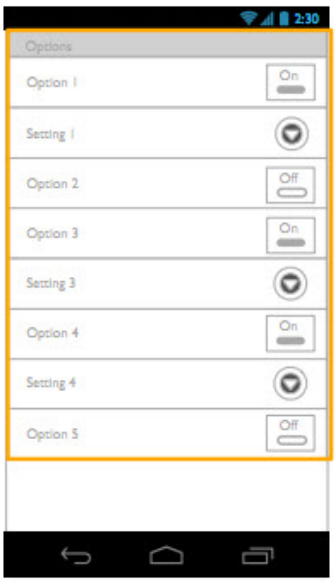


1 The user can access custom settings and adjust them to his needs by clicking on the icon on the upper left side.



2 The content is shown in a list. There are options which can be switched on and off by tabbing on the On/Off Button.

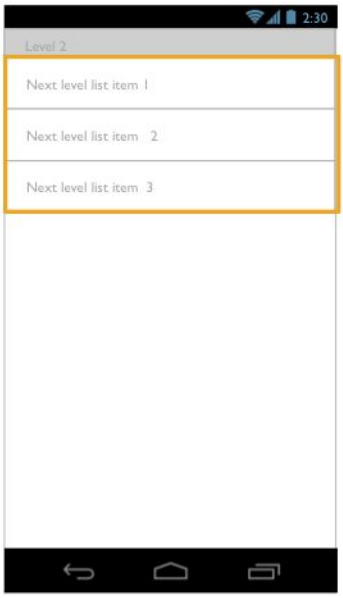
3 When the Button is set to On, a setting item is listed below the option tab. This setting item is directly linked to the options.



4 There can be multiple options and settings in a list.

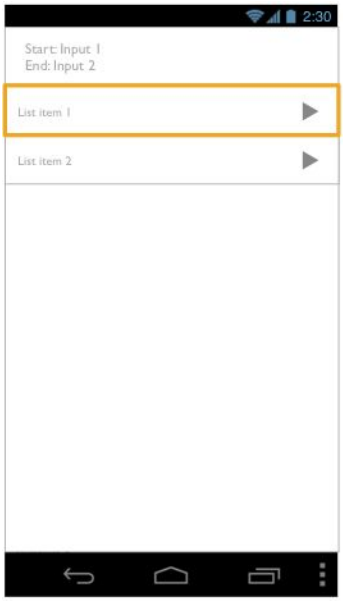
6.5.2 DATA DRILL DOWN

1 Information and items, in this case settings, are organized in lists over multiple levels. Tapping on an item in the list…



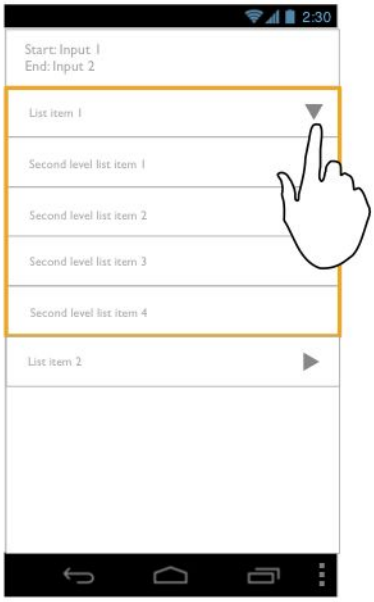
2…opens, in this case, the final level.

6.5.3 EXPANDABLE LIST



Items are organized in groups (often by category) in a two-level list. Groups can individually be expanded to show its children. Expandable lists are able to show an indicator beside each item, indicating the current state of the item:

1 collapsed or...

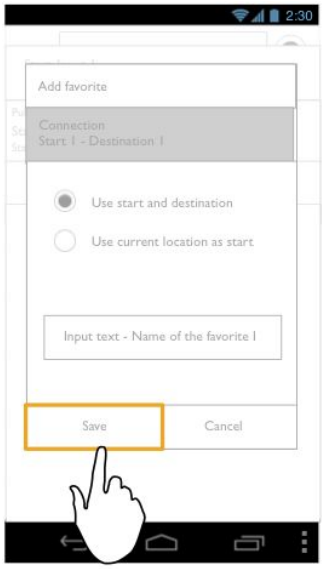


2 ...expanded.

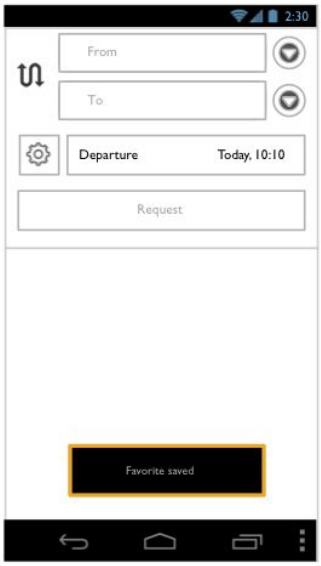
There can be multiple expandable list items.

6.6 NOTIFICATIONS

6.6.1 TOAST

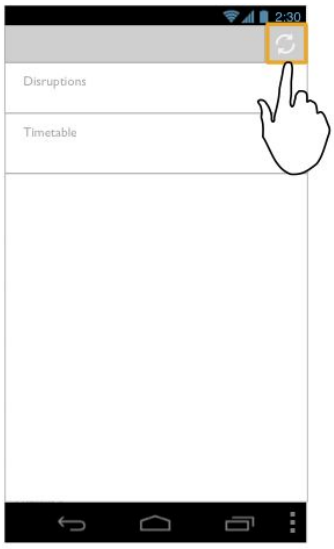


1 A toast message can be triggered by an action the user takes, or be fired by an app itself.

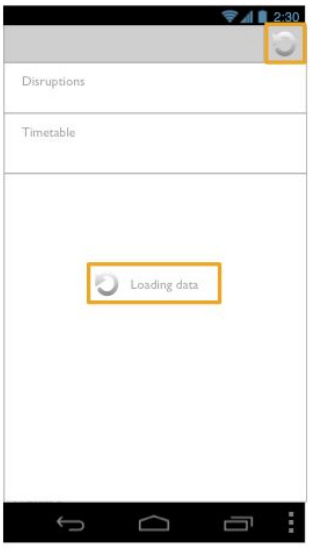


2 The toast message automatically fades in and out on the surface of the current screen and only fills the amount of space required for the message. A toast message does not accept user input. The user's current activity remains visible and interactive when a toast message pops up. The toast message can appear even if the application isn't visible.

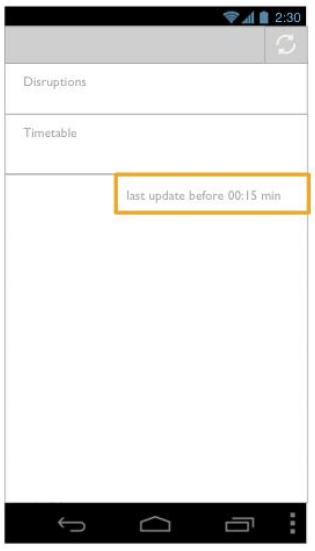
6.6.2 PROGRESS WHEEL



1 The user taps on a refresh button. In this case, he wants to refresh the disruptions and timetables of a route.



2 The refresh button is replaced by a progress wheel, showing the user that the content is loading. This progress wheel allows user interaction while loading.
or
A blank page with a progress wheel can also be displayed, showing the user that the content is loading. No user interaction is possible while loading.



3 When loaded, the refreshed content is displayed. In addition, the past time since the last update can be shown in a real-time count.

7. SUMMARY AND OUTLOOK

With this deliverable we laid the basis for the user interface design of the intended MASELTOV services. The goal was to better understand specific aspects playing a role when designing for diverse target groups and the accordant influence of culture. So we needed to understand the concept of culture in this context and its influence on design preferences, interaction habits, and usability.

As a first step, we investigated the relation of culture and user interface design with the help of a literature analysis. It was found that basic interaction elements work as well for diverse target groups but details should differ to avoid frustration and refusal. Especially the differences of low- and high-context cultures as well as religious influence need to be taken into account. Also methods like usability evaluations should be adapted for some cultures. Another approach to the issue of cultural differences was to involve members of the MASELTOV target groups directly in the design process. Therefore, we conducted two participatory design sessions with Turkish and Arabic users. The findings confirm that basic interactions were used as well – probably also learnt through own or observed experiences with smartphones. However, specific aspects like privacy were very important for immigrants.

To provide more concrete support for designers we also collected design guidelines. On the one hand cross cultural design requires special attention but on the other hand specific needs of Arab and Turkish users have to be considered as well. Finally, we presented some interaction patterns that shall be used as basis for all MASELTOV user interfaces in order to assure consistent functionality.

The next step is to create the first user interface mock-ups (D2.5) that will be the base for the development of the MASELTOV services in work packages 6, 7 and 8.

8. REFERENCES

Andrew, P. 2010. Tips and Thoughts on Cross-Cultural Global Web Design, [online] [10.05.2012] Available at: http://speckyboy.com/2010/06/30/tips-and-thoughts-on-cross-cultural-global-web-design/

Arno, C. 2010. How to design Websites That Appeal Across Cultural Divides. [online] [10.05.2012]. Available at: http://tutorialblog.org/how-to-design-websites-across-cultural-divides/

Aryana, B., and Liem, A. 2011. Country-Specific Usability Evaluation: Experiences from Iran and Turkey 2nd Proceedings of the 2nd International Workshop on Comparative Informatics.

Aykin, N., Honold Quaet-Faslem, P., Milewski, A., E. 2006. Cultural Ergonomics. In: G. Salvendy (Edt.). Handbook of human factors and ergonomics. Hoboken, N.J: John Wiley, pp. 177-190.

Aykin, N., Milewski, A. E. 2005. Practical issues and guidelines for international information display. In: Aykin, N. (Ed.) Usability and Internationalization for Information Technology. Lawrence Earlbaum Associates, Mahwah, NJ.

Barber, W., and Badre A. 1998. Culturability: The merger of culture and usability. *Proceedings of the 4th Conference on Human Factors & the Web*. Basking Ride, NJ, USA. http://research.microsoft.com/en-us/um/people/marycz/hfweb98/barber/

Brock, A. 2005. "A belief in humanity is a belief in colored men:" Using culture to span the digital divide. *Journal of Computer-Mediated Communication, 11*(1). http://jcmc.indiana.edu/vol11/issue1/brock.html

Callahan, E. 2005. Cultural similarities and differences in the design of university Web sites. In C. Ess & F. Sudweeks (Eds.), Culture and computer-mediated communication: Towards new understandings. Special issue of Journal of Computer-Mediated Communication, 11(2).

Chavan, A. L. 2002. Usability Evalusation – Indian 'Ishtyle" CHI2002 Workshop 15: It is a Global Economy out there. Unpublished paper (referenced in Aykin et al. 2006)

Clemmensen, T., Hertzum, M., Hornbaek, K., Shi, Q., & Yammiyavar, P. 2009. Cultural cognition in usability evaluation. *Interacting with Computers, 21*(3), 212-220.

DePalma, D., McCarthy, J. C., Armstrong, A. 1998. Strategies for global sites. Forester Research Report No. 3, Cambridge, MA.

Ess, C., and Sudweeks, F. 2005. Culture and computer-mediated communication: Toward new understandings. *Journal of Computer-Mediated Communication, 11*(1). http://jcmc.indiana.edu/vol11/issue1/ess.html

Faiola, A. and Matei S.A. 2005. Cultural cognitive style and web design: Beyond a behavioral inquiry into computer mediated communication. Journal of Computer-Mediated Communication, 11(1). http://jcmc.indiana.edu/vol11/issue1/faiola.html

GNOME Documentation Style Guide 2012. Writing for localization. Sun Microsystems. Retrieved August 22, 2012, from http://developer.gnome.org/gdp-style-guide/stable/.

Hemayssi, H., Sanchez, E., Moll R., and Field C. 2005. Designing an Arabic user experience: methods and techniques to bridge cultures. In *Proceedings of the 2005 conference on*

Designing for User eXperience (DUX '05). AIGA: American Institute of Graphic Arts, New York, NY, USA, Article 34 .

Hewling, A. 2005. Culture in the online class: Using message analysis to look beyond nationality-based frames of reference. *Journal of Computer-Mediated Communication, 11*(1). http://jcmc.indiana.edu/vol11/issue1/hewling.html

Hall, E. T. 1977. Beyond culture. Garden City, NY: Anchor Press/Doubleday.

Hall, M., de Jong, M., and Steedhouder, M. 2004. Cultural differences and usability evaluation: Individualistic and collectivistic participants compared," *Technical Communication* (51:4), 489-503.

Hall, S. (ed.). 1997. Representation: Cultural representations and signifying practices. London: Sage.

Herskovits, M.J. 1955. Cultural Anthropology, New York: Knopf.

Hofstede, G. 1994. Culture and organizations: Software of the mind. London, UK: Harper Collins.

Hofstede, G. 2001. *Culture's consequences: Comparing values, behaviours, institutions, and organizations across nations.* 2nd ed. Beverly Hills, CA: Sage.

Hoft, N. 1995. International technical communication: How to export information about high technology. Wiley, New York.

Honold, P. 2000. Interkulturelles Usability Engineering. In: Eine Untersuchung zu kulturellen Einflüssen auf die Gestalung und Nutzung technischer Produkte. VDI-Verlag, Düsseldorf

Horton, W. 2005. Graphics: The not quite universal language. In: Aykin, N. (Ed.) Usability and Internationalization for Information Technology. Lawrence Earlbaum Associates, Mahwah, NJ.

Ishida, R. 2007. Designing for International Users. Slides 44 to 76 [online][10.05.2012] Available at: http://www.w3.org/2007/Talks/0706-atmedia/slides/Slide0440.html

Khanum, M. A., Fatima, S., Chaurasia, M. 2012. Arabic Interface Analysis Based on Cultural Markers. In the International Journal of Computer Science Issues, Volume 9, Issue 1, pp.255-262

Kuhn, M. 2001. A summary of the international date and time notation. Retrieved January 22, 2004, from http://www.cl.cam.ac.uk/~mgk25/iso-time.html.

Kuhn, M. 2003. International standard paper size. Retrieved January 22, 2004, from http://www.cl.cam.ac.uk/~mgk25/iso-paper.html.

Kyrnin, J. Color symbolism chart by culture, Understand the Meanings of Color in Various Cultures Around the World [online][10.05.2012] Available at: http://webdesign.about.com/od/color/a/bl_colorculture.htm

Microsoft (Dr. International Team) 2002. Developing international software. Microsoft Press, Redmond, WA.

Mushaweh, O. 2010. Showcase Of Web Design In The Arab World, [online][10.05.2012] Available at: http://www.smashingmagazine.com/2010/09/19/showcase-of-web-design-in-the-arab-world/

Nielsen, J. 2011. International Usability: Big Stuff the Same, Details Differ. [online] [10.05.2012] Available at: http://www.useit.com/alertbox/international-sites.html

Portaneri, F., Amara, F. 1996. Arabization of Graphical User Interfaces. In: del Galdo, E. M., Nielsen, J. (Eds.) International User Interfaces. John Wiley & Sons, Inc.

Rehm, M., Bee, N., and André, E. Wave like an Egyptian: accelerometer based gesture recognition for culture specific interactions. In *BCSHCI '08: Proceedings of the 22nd British HCI Group Annual Conference on HCI 2008*, pages 13–22, Swinton, UK, UK, 2008. British Computer Society.

Rizvanoglu, K. 2010. Generating guidelines for choosing appropriate metaphors in GUIs through the analysis of cross-cultural understanding of metaphorical icons: an explorative study with French and Turkish users on an e-learning site, Digital Creativity 2010, Vol. 21, No. 3, pp. 173–185

Nisbett, R.E., 2003. The geography of thought: how Asians and Westerners think differently – and Why. Brealey, London.

Frandsen-Thorlacius, O., Hornbæk, K., Hertzum, M. and Clemmensen T. 2009. Non-universal usability?: a survey of how usability is understood by Chinese and Danish users. In *Proceedings of the 27th international conference on Human factors in computing systems* (CHI '09). ACM, New York.

Gray, G., Brown, S., Macanufo, J. 2010. Gamestorming. A Playbook for Innovators, Rule- breakers, and Changemakers, Sebastopol. http://www.gogamestorm.com/?p=494

Rogers, K. 2008. The culture of China's Internet: Developing web content for the world's fastest growing online market. *Intercom*, 10–13.

Rubinstein, R. and Hersh, H. 2011. International usability testing. In Usability testing essentials. Ready, set … test! C.M. Barnum, Ed. Elsevir Inc: Burlington, MA, 319-354.

Sun, H. Exploring cultural usability. In *Proc. International Professional Communication Conference 2002*, 319-330.

Spartan 1999. Multimedia Presentation on the Colors of Culture. Retrieved January 22, 2004, from hht://www.mastep.sjsu.edu/Alquist/workshop2/color_and_culture_files/frame.htm.

UAE Federal Government Web guidelines. 2009. http://www.emiratesegov.ae/c/document_library/get_file?uuid=0f098afc-a3b0-4734-ba8e-d958048b13e3&groupId=11734

van den Haak, M.J., de Jong, M.T. and Schellens P.J. 2003. Retrospective versus concurrent think-aloud protocols: Testing the usability of an online library catalogue. *Behaviour and information technology*, 22, 339–351.

Vatrapu, R. 2002. Culture and international usability testing: The effects of culture in interviews. Master's thesis, Virginia Polytechnic Institute and State University.

Vitols, G., Arhipova, I., Hirata, Y. 2011. Improvement of engineering website for cross-cultural accessibility and usability. Engineering for Rural Development. no. 10/2011.

Morton, J.I. 2003. Color matters. Retrieved Juni 10, 2003, from http://www.colormatters.com.

Arabic Translation Challenges 2010 [online] [10.05.2012] Available at: http://www.globalization-group.com/edge/2010/05/text-expansion-contraction-in-translation/

Turkish Translation Challenges 2011 [online] [10.05.2012] Available at: http://blog.globalizationpartners.com/turkish-translation-challenges.aspx

Microsoft Globalization step-by-step [online] [24.05. 2012] Available at: http://msdn.microsoft.com/en-us/goglobal/bb688110

Kuhn, M. 1999. Metric typographic units. Retrieved January 22, 2004, from http://www.cl.cam.ac.uk/~mgk25/metric-typo/.