A Culture-Centered Design Approach to Improve a User Interface for Migrants

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Den kulturcentrerade designmetoden gav mycket värdefull feedback och data från migranter jämfört med ett traditionellt tillvägagångssätt som i första hand användes vid skapandet av Virtual Volunteer. Resultaten av designarbetet och användarstudierna visar att designmetoder som tar hänsyn till kultur kan vara en effektiv metod för att utveckla gränssnitt som riktar sig till migranter såväl som svenska volontärer.
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ABSTRACT
A web application known as the Virtual Volunteer has been developed by IBM, the International Federation Red Cross and the Red Crescent Movement. The aim of this application is to extend support to migrants beyond the physical help they receive. The application is also a resource for volunteers who want to help migrants. This paper explores how a culture-centered design approach can help to improve a user interface and enhance the usability for a global audience using Virtual Volunteer as a design case. By conducting multiple interviews and task completion tests with verbal protocols, the results present two independent redesigned prototypes.

The culture-centered design approach yielded valuable feedback and data from the migrants that would not have been possible to collect from a more traditional approach like the one employed when creating the Virtual Volunteer in the first place. The results also revealed that all functions in the application were not clearly understandable for the migrants as they were for the Swedish volunteers. The overall results of the design case shows that a culture-centered design approach together with common usability methods are efficient to use when developing user interfaces for migrants and volunteers.

Author Keywords
Interaction Design; Cultured-Centered Design; Cultural Filter; Migrants

INTRODUCTION
The influx of migrants flooding into Europe are impacting the mainstream of international tension. In year 2015, over a million migrants made their way into Europe by sea [18]. In 2016, over three million migrants were expected to arrive in Europe [18]. According to the statistics of the Swedish Migration Board, approximately 35,000 migrants are expected to arrive in Sweden in year 2017 [3]. The majority of incoming migrants were displaced families whose strategies were focused on improvement of livelihood as outcome [2]. As international bodies converged to enact legislation by introducing bureaucratic processes, enterprises have initiated new projects kicked-off in the interests of extending support for encouraging migrants.

In early 2016, volunteers employed at IBM, launched a partnership in collaboration with the International Federation Red Cross and Red Crescent Movement (IFRC) to engineer and deploy an interactive web application branded as the Virtual Volunteer (VV). The main goal of VV is to supply credible data retrieved via medical and legal services, establish a communication channel with Non Governmental Organizations (NGOs), including contact details for inquiry and correspondence. VV is a complement that can be used in addition to receiving help from volunteers. The application includes six different languages and is currently being pilot tested in Greece and Sweden.

Despite an increasing number of products being targeted at international and cross-cultural audiences, research shows that cultural differences remain a reality [22, 15, 11, 5, 23]. There is an ongoing discussion about making cultural adaptation as a part of product design through empirical and practice-based studies within the field of culture and usability [16, 21, 22]. Furthermore, it is yet unclear which Human-Computer Interaction (HCI) methods to use in a design process for this type of target group [8, 2, 12].

To date, there is no transparent methodology to determine if a web-based product designated for migrants would serve its interests and be considered beneficial. Henceforth, the objective and scope of this research study is to explore methods for improving a user interface (UI) of the VV as a design case and draw conclusions about their usefulness for designing and developing technological aid for migrants in need. Likewise, the secondary purpose of this paper is aimed at exploring potential capabilities of VV within the approach of CCD to recognize cultural differences using the cultural filter as proposed by Shen et al. [22].

BACKGROUND
This section outlines research and associated theories about cultural relations to web interfaces and usability. The related research justifies the influences of usability studies and co-designing in consultation with migrants to improve the state of integration.

Culture
To be able to meet the users’ needs and to make the products more meaningful, a better understanding of people’s perceptions and cultural values from a HCI perspective [11, 19, 23] is required. This paper does not study culture per se, however it uses existing definitions of culture to explain how culture affects UI and usability.

In the field of HCI, the definition of culture links to the way users interact with computers [9]. Culture in HCI is defined as ”... members of a group as distinct from members of other groupings” [9]. It does not ”... determine the behavior of individuals but it does point to probable modes of perceptions, thoughts, and actions” [6, 9]. Hofstede speaks of culture being ”like software to computers, culture works as the mental software for
Hofstede's cultural model in web interface design

Through his comprehensive cross-cultural study of 53 countries [7], Hofstede formulated the notion describing a culture through cultural dimensions. These are defined as an "aspect of culture that can be measured relative to other cultures" [7]. Hofstede identified five such dimensions that together form a cultural model: power-distance, collectivism vs. individualism, masculinity vs. femininity, long term vs. short term time orientation and indulgence. The cultural model is seen as a tool to understand how cultures can be studied and classified. For a more thorough account see [7].

Hofstede's cultural model has been applied to many web design projects to determine how culture affects website design and usability [10, 23, 17, 22]. In this study, the cultural model for Sweden and Syria will be reflected using the VV. In Figure 1, it can be seen that the differences between the two countries are relatively big in each dimension. There is no score for Indulgence available for Syria.

![Figure 1. Index scores of Sweden and Syria (adapted from Hofstede 2001)](image)

Culture-centered design

Culture-centered design (CCD) is a branch of user-centered design (UCD) methodology and was introduced based on research in cross-cultural interface design [4]. Shen et al. [22] proposed a CCD process using a practice-based research with a focus on a user interface of a web site for a Chinese user group. The authors presented four iterative stages: analysis of the users culture, design implementation, iterative testing and evaluation, and re-formulation of design [22].

The CCD approach is used to bridge the knowledge gap between designers and their target users that exists due to different perceptions and cultural backgrounds. By taking into account the end user’s as well as the designer’s view on cognition and usability, the authors introduced the cultural filter. The cultural filter works as a sensitizing mechanism and is used as a “cultural lens in mind” to identify the potential user’s background regarding language, logic and taboos. The filter consists of the designer’s filter and the end user’s filter [22].

A designer approaches an interface based on personal experiences, knowledge and ideas that stems from particular socio-cultural background. In the designer’s filter, the designer should be sensitive to the user’s culture and be able to view the interface through the user’s cultural filter plane. In the first phase the designer chooses a user group, collects relevant cultural data, and finds appropriate usability and evaluation tools. In the second phase the designer engages in an iterative process where a “mental map” of the user group’s culture is created. For example, language, logical thinking-patterns and social taboos can be mapped out to help building an appropriate interface for the user group [22].

The end user’s filter is where the end user sees the product through their own cultural filter. In their first level, the user understands an interface through a cultural filter. According to the authors, theoretically, an element in the UI can be noticed by users of one culture while the same element can go unnoticed by other users due to different forms of awareness and perception.

The cultural filter does not claim to produce a strict design tool, however, it provides a useful mental map for negotiating differences between the perceptions of designer and user. In the Shen et al. study, the approach demonstrated its effectiveness in terms of improved interactivity, usability and cultural significance for a group of Chinese users.

A successful methodological framework using UCD

According to Bobeth et al. [1], it is important to collaborate with NGOs when designing and developing products for immigrants, persons who permanently stays in a foreign country. The NGOs have extensive knowledge about obstacles immigrants face in their daily life. The authors propose a methodological framework for UCD to use when designing products for immigrants. They started by writing a “barriers list” [1] based on interviews with three different NGOs that contained information about common obstacles for immigrants [1]. Later additional insights were gained through focus groups.

The Bobeth et al. study concluded that involving vulnerable newly arrived immigrants can be a challenge without NGOs as trustworthy partners. The method framework was successful to use before a development phase. Besides exploring further design challenges for Arabic user interfaces, the authors mention an interest in exploring influences on usability testing and long-term involvement of immigrants. The influences of usability tests will be considered in this study.

Service Design Approach to improve integration

Another approach was to include migrants and asylum seekers in a co-design process to design a service in Norway [12]. Using focus groups, problems within integration were highlighted. To gain a holistic view, a service blueprint with emotional icons and statement cards were used. However, these usability methods were less efficient to use in terms of co-designing. Kandal [12] suggests to designers to present the migrants with possible ideas and solutions for exploration and feedback.
Hence, designers should get involved as problems solvers. Including designers means exploring new and original solutions, while evaluating what exists. The designers should lead the way to innovative service designs that may prove useful to the society as a whole [12].

One common challenge is to find migrants who want to participate [1, 2, 12, 24]. It proved to be time consuming to visit places where migrants lived and build up relationships [12]. In Kandal’s study, to ease communication the author spoke in "broken Norwegian" and visualized through drawings [12]. Building trust between the participants and the moderator is another challenge, however there is no concrete guideline to solve this problem.

**Research question**

So far, there is a limited amount of research involving migrants during the development phase of a user interface. There is also a lack of in-depth research and appropriate methods to assist designers on how culture can be integrated in user interface design [1, 2]. The aim of this study is to investigate how a user interface can be improved through a CCD approach using the VV as a design case. The secondary objective in the process is to explore benefits and drawbacks of common usability methods in relation to culture-centered design. The aim is broken down into the following specific research questions:

- **Which, if any, cultural differences are revealed through the CCD approach?**
- **How can the discovered cultural differences be used to improve the design of a user interface?**
- **What are the benefits and drawbacks of the methods used to populate the CCD framework?**

**RESEARCH PROCESS**

To gather background knowledge and to explore cultural differences between the target groups, a CCD framework proposed by Shen et al. [22] was used to investigate the research questions. Based on 30 participants, a combination of qualitative and quantitative data was gathered to present cultural differences in usability and usability problems.

**Culture-Centered Design Approach**

The four following stages of the CCD framework are: analysis of the users culture, design implementation, iterative testing and evaluation, and re-formulation of design [22]. The end-users cultural filter was used to understand the cultural background of the target groups. Practically, this filter was generated through the cultural analysis based on literature studies about the cultures and interviews with the target groups. The initial design implementation was developed by IBM and the design was used in the iterative user tests in this study. The re-formulation of the design was done based on the analysis of the two target groups.

**Virtual Volunteer**

The research questions are examined through the web application Virtual Volunteer. The VV contains six different languages and is currently developed for two countries, Sweden and Greece. It provides assistance, services, and details procedures, rights, entitlements, legal options and safety tips for each country. It shares news and links to useful resources and also enables users to get in contact with their local Red Cross and Red Crescent staff for additional information, guidance and support. The aim is to provide the migrants with basic support and guidance into the hosted country.

**Figure 2: The current user interface of Virtual Volunteer on an iPad mini 4**

To delimit this study, the aim is to focus on the Swedish and Arabic user interfaces in Sweden. For comprehensibility the final prototype will be presented in English in this study. Figure 2 shows the current interface. From left: the Menu in English, Questions in Arabic and Communication in Swedish. The menu contains nine different functions: About, Stay Safe, Questions, Map, Communication, Links, News, Missing People and Contact. This interface was used in all usability tests.

**Pilot Study**

A pilot study with interviews and user tests were conducted on five migrants to confirm that the interview questions and tasks were applicable. Informed consent forms were given and orally presented to all participants. After the pilot study, the decision was to do user tests first and then a personal interview, because in this way, a more comfortable environment was created by doing the tasks first. Each session took 45 minutes per participant.

**Sampling**

The VV’s main aim is to help migrants and its secondary purpose is to be an aid for the volunteers. In this study the Swedish volunteers will be regarded as volunteers and the migrants from Syria as migrants.

The first target group from Syria are migrants who have lived in Sweden from 3 months to more than 1 year, and can read and speak Arabic fluently. The reason why migrants from Syria were chosen was because the Arabic user interface is fully developed by IBM and they are the majority of incoming people [3]. 20 participants (M:13, F:7) from ages 28 to 55 were recruited. The participants were identified and randomly selected at language cafes run by the Red Cross and at Swedish for Immigrants (SFI) center. Six participants have lived in Sweden for 3 months and can speak a little Swedish and English. However, a volunteer working at the Red Cross where these six migrants participated, helped to translate (from Swedish to Arabic) when needed. The remainder could...
The second target group was 10 selected Swedish participants (M:5, F:5) from ages 24 to 60. Five participants (M:3, F:2) work closely with migrants and are seen as an expert group with great knowledge in this area. Three participants work at the Swedish Red Cross as volunteers. The fourth participant works as a case worker with migrant issues at Stockholm’s diocese, the Church of Sweden. The fifth participant is a diversity coach who also works with migrants at a Swedish company, ÅF. The remaining five participants where randomly selected from the Royal Institute of Technology and are seen as potential volunteers.

**Interviews**

Semi-structured interviews were conducted on both user groups. Since the interviews were conducted after the usability tests, the interview started with a discussion about thoughts and ideas about the web application before moving on to the other topics.

**Usability tests**

Think-aloud tests with 13 main predefined tasks and 5 subtasks were given to all participants to perform on the web application; 18 tasks were given in total. The tasks were translated to Arabic by the help of a native Arabic speaker. Both the user interface and the tasks were presented in either Swedish or Arabic depending on the target group that the UI was tested on.

**Data collection techniques and analysis**

Task completion tests with verbal protocol were used to find usability problems and to investigate if there were any cultural differences in regards to usability problems found. The verbal protocol was used to observe and document the user’s emotional state. The behavior of how the user navigates in the interface was also observed and documented during each session.

Gathering data included taking notes, screen capture software and video recording. Both interviews and usability tests were done in a separate room nearby the languages cafes or SFI center. For the volunteers, interviews and tests were done at their offices or at the Royal Institute of Technology.

![Figure 3: (a) Using web cam and iPad mini 4. (b) Using Quicktime Player on Macbook Air and iPad mini 4.](image)

In Figure 3 a), the first seven participants were recorded using the web camera on a Macbook Air laptop. Only the hands, the voice and how the participant interacted with the application on the iPad could be seen. In Figure 3 b), the remaining participants were recorded using a web screen recorder. The iPad was paired with the laptop where the audio and the screen interaction was recorded; here, the physical interactions with the hands could not be seen. For the redesigns, the prototyping tools Sketch and InVision have been used.

**RESULTS**

The results were analyzed using the end-users cultural filter as a "pair of glasses" to map out the cultural differences and usability problems between the two target groups using the VV. This section presents the results of mapping out the differences between the two target groups.

**Target group 1 - Migrants**

The task completion tests, verbal protocol and the interviews with the migrants are presented below.

**Task completion rates**

No participant successfully completed all the tasks. This was mainly due to issues with the user interface design. Other reasons were that the participant had the misconception that the task was correctly completed even though it was not and also because moderator assistance was needed. There were several cases where icons were not correctly interpreted, the titles were unclear, users had problems navigating the interface and finding the functions.

![Figure 4: Task completion rates of 18 tasks completed by target group 1.](image)

In summary, Figure 4 shows that Task 17, which was to use the Maps function was the most difficult one to use. The settings button was unclear and the search function was hidden in the map. 11 out of 15 participants could not find the Share-icon (Task 13). The Missing People function had a lot of information, and some participants had a hard time solving Task 5. Furthermore, some icons in the Communication function was also needed to be redesigned.

**Verbal protocol**

A thorough introduction about the background and purpose was given to each participant, still they tended to ask for help almost directly when solving a task. Typical questions included: "Is this correct?", "I don't know" or "I'm not sure". When the moderator explained again that the task should be solved without any assistance participants tried to find a way of solving the task or stated "I understand, but I can't find it" and asked for assistance anyway. For example when solving the task of finding the Share-button, only four participants could completely solve the task. Even though they understood the task, the element went unnoticed.

The results show that the verbalization pattern included variation from expectation (13), stated irritation (2),
stated confusions (13), questions (14) and positive comments (11). Verbalization of variation from expectation could be e.g: "Wait what?! Is that supposed to look like a Shower?" [about the icon on Communication]. Stated irritation could be e.g. when the Settings-button in the Map did not work as expected or when the Emergency Number could not be found. This was followed by the user sighing and then giving up. Confusions were also seen when e.g. going to Missing People where comments such as: "In my country, when we lose a family member we directly call the police".

- Participant #12

More than half of the participants asked these two questions: "Why are the emergency contacts not in a separate page? I want to find it faster.”

The participants did give suggestions for improvements. Comments like:

“Please, can I draw on a piece of paper?” [talking about the icons on the Communication].

- Participant #16

“I wish I could use this application offline. I don’t always have WiFi available, especially where I stay now.”

- Participant #18

More than half of the migrants want the application to work offline because they do not have access to the Internet at their current stay or during the journey to the host country.

Half of the participants mentioned that they do not watch or read news. The participants had gone through long journeys to come to Sweden and would avoid to get notifications about what is happening around the world. If they really needed to know, they either ask friends or family through the phone or use the search engine Google.

Interviews

All 20 migrants were from Syria and each of them had their own different story about their journey to Sweden. The goal of the interviews was to understand problems encountered in the host country, whether they could think of mobile services for smartphones supporting them, and discuss service ideas by benefiting from the migrants experiences.

18 participants had smartphones with them. The channels they were using were mainly Facebook, Viber and WhatsApp; when WiFi was available. Most of them used the phones mainly to transfer money to friends and family.

The attitudes towards the problems encountered in the host country between women and men were significantly different. All of the participants claimed that learning the language was the most difficult problem in the host country. The attitude to learn the language was different between men and women. The women claimed that they felt stressed and had time constraints due to taking care of their children and cooking food at home. Other statements were also about their current asylum residence that affected their family life. The women were more vulnerable of their emotional well-being. All eight female participants thought mobile services for smartphones could support them well. Especially the Communication function in the VV were considered highly valuable.

The attitude to learn the language was more positive among the male participants. One of the participants discussed an idea to exchange services between a Swede and a migrant in order to e.g learn the language and each others cultures. All of the male participants did also believe that mobile services for smartphones could benefit for them. One participant mentioned that he would like to interact with Swedes both physically and through mobile services.

"Today I only meet some Swedish people at Red Cross cafes and most of them are migrants like me. I would like to exchange my knowledge with Swedes.”

- Interviewee #5

Connecting with local population is another challenge. Life in the accommodations for migrants are protected and making contact with the local community is difficult. One participant lived in Kiruna for a year before the asylum request had been granted, it was then the participant could start living and become independent again.

Other things they wanted more were to easily access information about when and where meetups are. Currently they get most of their information from their friends and families. Alternatively, the Swedish Public Employment Service, news channels, or other social media channels.

"I didn’t always trust the apps that was on the market. Because I don’t want the government or others to use my personal information for example where I am right now or use my saved pictures of my family.”

- Interviewee #13.

Several participants talked about trust issues during the journey to Sweden. Due to the circumstances in Syria they did not use applications that were developed by unknown or random people in case the app could get hold of personal information or could see the person’s current location.

"First of all, I don’t think people will read all the information that is in the application. Most of the migrants have gone through a lot and would like to get help immediately. However, if they have settled down and have time to read this will be relevant.”

- Interviewee #14

The Missing People function has a lot of information in text form. The user had to scroll down a lot in order to come to the end of the section. Most of the participants said it was useful, however the same participants mentioned that they would not read it unless they have time to do so.

Target group 2 - Volunteers

The task completion tests, verbal protocol and the interviews with the volunteers are presented below.

Task completion rates
The rates for the volunteers are presented in Figure 5. As for the migrants, the volunteers did not successfully complete all the tasks either. Here, the Maps function (Task 17) was also the most difficult one to use. The reasons for the failed tasks were only because of the design of the user interface. Compared to target group 1, this group had a larger success rate. In addition, the share-icon was recognized by all volunteers. No task was rated below 50%, which means that the user interface was easier to use for the volunteers.

**Verbal protocol**

Compared to the migrants, the volunteers went straightforward to the tasks without hesitating. The thorough introduction about the background and the purpose was also clear. One main difference between these two groups was that the migrants tended to apologize when the task failed. While the volunteers tended to give more critical comments such as "this is not a good design" or "this icon should be redesigned".

From the analyzed results the verbalization pattern included variation from expectation (5), stated frustration (0), stated confusions (4), questions (5) and positive comments (5). Verbalization of variation from expectation could be e.g:

"This does not look like a shower in my opinion. You should check the internationally recognized ones." [About an icon on Communication].

- Participant #3

"I believe having a tent as refugee camp is degrading the migrants. Not all, especially in Sweden, live in tents. I would like to see a house...” [About an icon on Communication].

- Participant #4

**Interviews**

The volunteers explained what kind of problems they could encounter during their work with migrants and gave suggestions to improve the UI in the VV.

"The News channel in the app should not be called News as the content is only from the Swedish Migration Board. I believe we should focus on news about asylum process in this channel.”

- Interviewee #4

The asylum process is one of the main concerns for a migrant in the hosted country. Several participants mention that there should be a function in the VV where the focus is solely on asylum. One participant mentioned that creating trust between the application and the migrant is important. One participant also mentioned from experience that migrants from Middle East collaborate as groups and get help through families and friends first. This did also go along with what the migrants said during the task completion tests.

Most of the participants were positive to the functions in the VV and mentioned that most of the functions could be useful when working with the migrants. They also believed that all the functions can be useful for the migrants as well. However, they also believed that more features such as links, questions and answers should be extended. Some participants also mentioned that a transportation feature could be useful in the Maps-function to be able to show where e.g. the nearest bus station is. The participant from the Church of Sweden wanted to collaborate with the stakeholders of the VV to e.g. put in information about the activities at the local parishes.

**Design improvements**

The results from mapping out the differences and similarities using the cultural filter revealed that two independent prototypes needed to be created. In both prototypes, the News function was removed based on the analysis of the interviews and the verbal protocols.

**Figure 6: Prototype 1 based on data analysis of the migrants**

In Figure 6, prototype 1 shows the menu to the left where the application has eight functions; About, Communication, Questions & Answers, Advice, Asylum Seekers, Meet Ups, Ask IFRC and Emergency Contacts. Compared to the original UI of the VV, some titles are rewritten for clarity. The following functions are removed based on what the migrants want: Maps, News and Missing People. To the right in Figure 6, the desired Meet Up-function is designed. Currently, it contains meetups at language cafes and events at the local parishes of the Church of Sweden. These sections can be expanded with more events in the future. Using the end-users cultural filter, the verbal protocol revealed that only four migrants noticed the share-icon. This led to a re-design where the icon changed to a text-based button.
Figure 7: Prototype 2 based on the data analysis of the volunteers

Compared to prototype 1, prototype 2 presented in Figure 7 has ten functions shown in the main menu to the left: About, Communication, Questions & Answers, Maps, Advice, Links, Asylum Seekers, Advice, Ask IFRC and Emergency Contacts. All functions except the News-function are still in the application. The search box is more visible and the settings button has changed icon based on the participants suggestions in the Maps-function shown to the right in Figure 7. In the original version, the settings button contained a long list with services. In prototype 2, the services are merged into four main services. These shows locations to IFRC and Red Cross centers are, food canteens serving free food, Medical services, and places to find transportation. Mapping all transport facilities is a bit too unrealistic. In the initial release, the aim is to have this function in the largest cities.

The following re-designs applies to both prototypes:

Figure 8: Redesigns of icons

The original icons can be seen below the redesigned ones in Figure 8. The text below each icon appears only if the user presses on the icon.

Since it was unclear to choose language and location when the user went to VV the first time, a redesign is shown in Figure 9. The user gets to the starting page where language and location is chosen. This can be changed later in the main menu as well.

Figure 9: Starting pages

In Figure 10, the Communication-function has four categories. In the middle picture in Figure 10, the first icon pressed shows the translated Swedish word. The word will be translated into the language based on the country location.

Figure 10: Communication page

The Asylum-function in Figure 11, consists mainly questions, answers and links concerning asylum. The

Figure 11: Asylum page and Missing People page
Several researchers [14, 12, 13, 7], for people in Syria not have time to read through everything. According to more than half of the migrants mentioned that they would because it is less time-consuming and more user-friendly. The migrants mentioned that they would rather use features were not working properly. The migrants Prototype 1 did not include for a more simple web application with less functions, face [7].

In comparison, the volunteers still wanted most of the current functions in the web application, with some re-designs of the user interface. This was because they thought the functions could be relevant when helping migrants. According to Hofstede [7], Sweden has a low index score in uncertainty avoidance. This means that the Swedish society maintain a more relaxed attitude. Also, a high score in indulgence means that they possess a positive attitude and tendency towards optimism [7].

Although the Hofstede’s theory could be used in practice when looking at Western and Eastern cultures, his model faced some important criticism. One of them was the analysis for Arab countries. For Arabic-speaking countries [14], Hofstede chose to group the results based on the assumptions of them having identical cultural traits [14]. The index scores for Syria are based on both Hofstede’s findings and other researchers who later have contributed to his findings. Several studies (e.g. [20, 14, 13]) have built upon Hofstede’s cultural model and concluded that his model only partially reflects the design characteristics of Arabic web interfaces. Hence, his cultural model cannot be solely regarded to find cultural differences in a user interface.

Other cultural differences could be that people in Syria might use technology differently compared to people in Sweden. For example, the share-icon went unnoticed and most of the participants did not know what it represented. The share-icon could be a common design using the designer’s cultural filter, but using the end-user’s cultural filter this could be an uncommon design. In addition, more than half of the tasks were either partially successful or completely failed when the migrants tried to solve the tasks. Evidently, the volunteers who used the same user interface failed less than half of the tasks. This can be due to that the VV has been developed using a target group from the product owners own culture and without using the cultural filter.

Discussions about cultural differences and how the discovered differences improved the design of the user interface will be presented in this section. The methodological challenges using a CCD framework are discussed. Finally, a discussion about what other designers should think about when designing a user interface for these types of target groups is presented.

Cultural differences in UI and usability
As seen in Figure 1, the cultural dimensions show that Sweden has a low index score in Power Distance compared to Syria. According to Hofstede, the communication is direct and participative in the society in Sweden [7]. Seemingly, in this study this was shown through the verbal protocol when the tasks were solved. For example, when a task was partially completed or completely failed, the volunteers tended to blame the UI and were more willing to speak up when something went wrong. While the migrants tended to blame themselves when e.g. not noticing an element in the UI or when completely failed the task. A reason for this could be that for people in Syria, offense leads to shame and the loss of face [7].

The analysis revealed that the migrants were searching for a more simple web application with less functions, particular focus was on Communication and Meet Ups. Prototype 1 did not include Map, News and Missing People. In short, Maps was not interesting because of the features were not working properly. The migrants mentioned that they would rather use Google Maps because it is less time-consuming and more user-friendly. The Missing People-function has a lot of information and more than half of the migrants mentioned that they would not have time to read through everything. According to several researchers [14, 12, 13, 7], for people in Syria time is money. The News function was not interesting as they already are in a crisis state, hence would like to avoid to read the news. The people in Syria take care of themselves in groups in exchange for loyalty [7]. The migrants also mentioned that they trust their families and relatives as their channel of information. This can be a reason why the News-function was not interesting. In addition, due to high uncertainty avoidance in Syria, security is an important element in individual motivation [7].

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Other cultural differences could be that people in Syria might use technology differently compared to people in Sweden. For example, the share-icon went unnoticed and most of the participants did not know what it represented. The share-icon could be a common design using the designer’s cultural filter, but using the end-user’s cultural filter this could be an uncommon design. In addition, more than half of the tasks were either partially successful or completely failed when the migrants tried to solve the tasks. Evidently, the volunteers who used the same user interface failed less than half of the tasks. This can be due to that the VV has been developed using a target group from the product owners own culture and without using the cultural filter.

Methodological challenges
In total, 30 participants participated in this study. The study focused on a combination of qualitative and quantitative data gathering. Using this combination gave the capacity to strengthen and justify the qualitative findings. Related to Bobeth et al. recommending [1], semi-structured interviews gave a deeper insight into the problems both that the migrants and volunteers are tackling today. The task completions together with verbal protocol did also reveal similarities and differences in usability problems, which was discussed in the previous section.

Applying a CCD framework
Heimärtner [4] criticizes the CCD framework to be
very similar to the standard usability process defined in "ISO9421-210"[4]. The author continues that the framework proposed in the Shen et al. study also does not differ from the other approaches called "intercultural design, culture-oriented design or cross-cultural design". Heimgärtner highlights that Shen et al. [22] have based their work on existing research by e.g. [16, 9] and others who refer to cross-cultural interface design [4]. In the end, Heimgärtner [4] claims that there are "no really different approaches" related to the different concepts between the approaches mentioned above. Heimgärtner does have a point since the methodology in this study used common usability methods. However, smartphones and services have been localized at the superficial level in the user interface. In other words, languages, images, symbols and functionalities are reflected without any unconscious cultural effects.

Importance of the user’s cultural filter
The product owners of the VV developed the user interface based on personas, scenarios and a few interviews from users of their own cultural filter. Based on the cultural theories, it is important to thoroughly understand different cultural traits in designing interfaces for a global audience, since smartphones has been already prevalent in our day to day lives. Hence, in this study the CCD framework was chosen to be applied in this study primarily due to the concept of the cultural filter.

In this study, the end-user’s cultural filter was used as "a pair of glasses" when the designer re-formulated the design of the user interface. Practically, this means that the designer takes extra regards to user patterns, research methodology, ways of interaction under different cultural context. In this study, the designer searched for any cultural differences in solving the tasks by understanding e.g. how each target group solved the tasks and by analyzing the verbal protocol. Since the VV and the study was a short-term run, it is difficult to conclude that the findings solely depend on cultural differences. No significant differences in preference according to icon style were found. However, regarding the share-icon, culture also has a strong effect on what users look for in a system's interface and how they interpret such interface. This simply shows the possibilities the cultural filter could bring by making the designer become more aware about cultural disparities. The finding that the share-icon went unnoticed was in line with the Shen et al. theory about missing an element in the UI, due to different perspectives and awareness [22].

Using the cultural filter made the designer become more open and aware of the end-users cultural background. Not only about the end-users cultural background, but also to become more reflective about why there were differences when solving the tasks between the two target groups. The CCD framework proposed by Shen et al. presents four iterative stages [22]. However, in this study the design implementation was already implemented by IBM and IFRC. If the stages proposed by Shen et al. were to be strictly followed, the design implementation should be done after the analysis of the users background using the cultural filter. For this study, using an already implemented design on the end-users did not effect the framework per se, as the framework is only a suggestion for designers to avoid mistakes when designing a UI from a CCD perspective.

Short-term vs. Long-term migrants user feedback
Out of 20 migrants, six of them had lived in Sweden for three to five months. Similar to Kandal [12], the short-term migrants did not give as much feedback compared to the rest of the participants who have lived in Sweden for one to three years. This could be due to the language barrier between the moderator and the participant. Due to this, only the analysis of the interviews from the short-term migrants were undertaken through broken English and Swedish. Even though the tasks were in Arabic, the communication between the moderator and the participant became too complex.

Speaking in migrants' mother tongue
Another crucial aspect is to have moderators who can speak the participants mother tongue to avoid misunderstanding. Not only will the communication become easier, it will also create a safe space between the two. Since the participants were recruited from different language cafes and Swedish Red Cross locations in different places in Stockholm in this study, it was too difficult to recruit a moderator who was able to come in these different times, days and places in Stockholm. Furthermore, Bobeth et al. [1] criticize in their paper that even though it is highly valuable to cooperate with NGOs; they are not trained to conduct e.g. interviews and translating the answers. Hence, they could miss relevant details and valuable information can get lost. To strengthen the results, moderators who are designers and researchers who can speak the participants mother tongue or who are based in the countries origin, can give deeper results concerning cultural differences in the UI [1].

Trust issues
In the pilot test and sometimes in the task completion tests, comments such as: "Will this interview be uploaded on media channels?". It was not convenient to start with an interview about the participants personal story about their journey to Sweden, because it made the user uncomfortable and insecure. Even though the purpose of this thesis was clearly stated in the informed consent form and was told orally, there was still a mistrust between the interviewer and the interviewee.

The reason why the method changed to only recording the screen was because the migrants felt uncomfortable. Even though the participants approved that the hands were filmed, some became very nervous during the tests. Still, filming the hands method is better if the moderator is doing the tests alone. It was easier for the moderator to observe other things happening around the tasks. Changing to the second method was harder for the moderator but more comfortable for the participant. It was hard for the moderator since the moderator was alone in the tests. Using the second method requires more hands-on documentation at the same time as the moderator needs to observe and listen to the participant.

Managing time
As highlighted in Kandal’s study [12], most of the time went to traveling to different language cafes to meet migrants. In some occasions, there were no one from
Syria who attended the language cafes. The main challenge was to find newly arrived migrants who wanted to participate in this study. The migrants had gone through traumatic experiences and did not have the energy to participate. The time also went for finding people for the volunteers. The replies from most of the NGOs was that there were many volunteers who helped migrants in year 2015; when the crisis was the highest. It was difficult to find these volunteers today as most of them have moved to different places in Sweden. For all 30 participants, the data gathering lasted from beginning of March until middle of May.

**Contribution to future development**

It is tempting to take the easiest way out and use scenarios, personas and users from the designer’s own cultural filter because it is cheap and convenient. However, using target group from the designer’s own cultural background can lead to a user interface like VV. A very important discovery was that the volume of feedback from the migrants was much larger than from the volunteers. The results in this study show that by actually interviewing the end-users and analyzing the results using a cultural filter as “a pair of glasses” gave a greater knowledge about what the users actually want in the UI. The CCD process led to an attention to avoid feature bloating. Given the impact that culture has on people’s behavior, truly intuitive global user interface should reflect the cultural orientation of its users and not just be a translation of a Swedish user interface.

Another point, is to think about which migrant problem the designers are trying to solve. The product owners of the web application wants to help migrants on the move and migrants when they arrive to a new country. These are two different problems that is difficult to merge into one solution. Through the interviews the migrants revealed different stories about the circumstances they were in on their move to Sweden. These migrants will not have the time to enjoy the experience of any web application, but rather in desperate need for getting help to know they are safe. Comparing this to the migrants that have arrive to a new country to create a new life in Sweden, gives another approach to solve the problem. In addition, the product owners do also want the application to be a resource for volunteers who evidently want different features compared to the migrants.

**Future Research**

Future work includes to explore how a CCD framework together with the cultural filter is useful when creating a UI for a global audience to meet optimal reception of information, **how are the most relevant features chosen based on several cultural disparities?** Each individual has their own needs and desires, yet with the cultural filter, the designers and researchers should focus on the similarities in each culture to "mentally" or "physically" map out these and design an appropriate and substantial product through the iterative stages proposed by Shen et al.. Furthermore, other aspects such as psychological condition of the users at certain time and location after certain experiences, e.g. trust on others, desires to start a new life, and hope to succeed, should be studied more closely.

**Conclusion**

It is tempting to design a user interface using only personas, scenarios and interviews from the designers cultural filter. This study urges any future designers to go beyond that and perform a thorough study of the end-users cultural filter. This will increase the quality of feedback and the quality of the final product. This may seem obvious, but evidently it was not for the designers who created the VV.

In the design case of the VV, the CCD approach led to two independent prototypes for the target groups. The study presents the importance of taking the users behavior, habits and needs into account so that web applications can reach a wider adoption. The cultural filter helped the designer to be aware and reflective about the end-users cultural background. The filter led to an efficient way of re-formulating the design by mentally mapping out differences and similarities between the two target groups. This research also suggests that the usability methods should be localized to support differences in cognitive and interaction styles. By conducting interviews and using a verbal protocol during the task completions led to a straightforward way of understanding the users expectations in terms of user experience. The main drawbacks using common usability methods were trust issues regarding filming the migrants hands and to not have researchers who could speak the users mother tongue.

The results about cultural differences between Syria and Sweden cannot be conclusive, but they do point to strong benefits and user acceptance. Further research through iterative design processes has to be done to see how the two prototypes can be merged to best fit both target groups. As for now, the suggestion is to create separate web applications for the two target groups due to the differences of features needed. The results do also point to avoid feature bloating which leads to the question considering which migrants problem are the product owners trying to solve?

In conclusion, the overall results show a significant step in the right direction to make cultural adaption as a part of product design through empirical and practice-based studies within the field of culture and usability.

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**References**


