

ELICITING USER REQUIREMENTS FOR DESIGNING A MOBILE COMMUNITY FOR THE DEAF IN MALAYSIA

CHUI YIN WONG¹, CHEE WENG KHONG², SELINA S.P. OOI,
SIAO YING CHEAN, HAROLD THWAITES³
*Interface Design Department, Faculty of Creative Multimedia,
Multimedia University, 63100 Cyberjaya, Selangor, Malaysia.*
{cywong¹, cwkhong², harold.thwaites³}@mmu.edu.my

AND

KRISTIN BRAA
*Telenor Research and Innovation Centre Asia Pacific (TRICAP),
63100 Cyberjaya, Selangor, Malaysia.*
kristin.braa.@telenor.com

Abstract. Malaysia is a fast-paced developing nation with relatively low computer-Internet penetration, and high mobile network growth. We designed *DHeart*, a mobile-based community that provides both the deaf and hearing communities a means to share knowledge, to foster relationships, to mingle, to chat, and to get-together on the mobile network. In order to elicit user requirements for our targeted users, we conducted a user study with interviews and surveys to identify user profiling and personas for the deaf and hearing communities. As a result, the findings from the user studies helped to establish the user requirements in order to inform the design and development of *DHeart*.

1. Introduction

The advent of mobile technologies is creating a digital paradigm shift, especially in the way we communicate. Having a mobile device, such as a mobile phone, has become a necessity for communication and a commodity for everyone while on the move. We, therefore, can find an increasing trend where online communities are beginning to appear on mobile networks, reaching out to the greater masses (e.g. mobile devices, mobile social networks) that are constantly on the move. This leaves a lot of room for potential research work among Human-Computer Interaction (HCI) communities. However, there are limited studies conducted on mobile

communities for the handicapped and disabled users, particularly for the deaf community.

Malaysia is a fast-paced developing nation with relatively low computer-Internet penetration but high in mobile-network growth. For an estimated 24 million population in Malaysia, the adoption and use of mobile phones (80.8 per 100 habitants) has increased exponentially and surpassed the subscription of Internet dial-up (14.3 per 100 habitants), and fixed-line telephones (15.9 per 100 inhabitants) for the third Quarter of 2007 (Malaysian Communication and Multimedia Commission, 2007). The population of the hearing impaired and deaf is estimated at 32,000 in Malaysia, and many rely on mobile networks to communicate with friends and family. It is highly desirable for the deaf community to have a localized and alluring social channel on mobile networks that caters to their niche interest. Interactions by the deaf society through cellular and wireless networks may well be for the exchange of information, sharing special interests and hobbies, sharing experiences, live-streaming special moments, gossiping, providing medical advice, providing moral support, exchanging views, and also exchanging experiences in life.

This paper aims to elicit user requirements for designing a mobile community for the deaf in Malaysia. To identify needs and elicit user requirements, we conducted a user study with interviews and surveys, particularly for the deaf community. As a result, the findings help inform the design attributes for designing a mobile-based community, namely *DHeart*.

2. Literature Review and Related Work

2.1. DEAF COMMUNITIES IN MALAYSIA

According to the local Social Welfare Department, in 2005 there were approximately 32,000 deaf people who officially registered, out of the country's population of approximately 24 million. We believe the actual deaf population is far greater than the abovementioned figure. Although the number may seem small, the needs and demands using ICT on mobile networks through improvements on mobile technology supported by phone manufacturers, service providers and networking technologies are essential to improve their quality of everyday life and among their communities (Wong and Khong, 2007).

The main communication mode for the deaf in Malaysia is sign language. The introduction of "*Total Communication*" education has existed in local schools for the deaf population since 1978. *Total Communication* emphasizes all forms of appropriate approaches to oral, manual (sign) and auditory

training. The primary objective is to equip the deaf community with the necessary skills to communicate among each other and basic interaction skill sets. It includes oralism, lip-reading manually coded local Malay Language (*Bahasa Malaysia Kod Tangan –BMKT*), natural signs and cues in speech. The BMKT is a coded manual with its structure like a spoken language, which adheres to the basic principles and grammar of Bahasa Malaysia (the national language of Malaysia). Malaysian Sign Language (*Bahasa Isyarat Malaysia –BIM*) is the official structured sign language (Lim et.al., 2006).

It is inevitable and natural that the command of the English language for the local deaf community is less efficient, less fluent and lower in standards compared to the normal hearing society. Somehow this social disparity has clearly shown in the daily communication between the hearing and the deaf through either traditional communication channels (e.g. pen and pencil with paper) or online communication tools (online chats, e-mails, and so forth).

2.2. EXISTING ONLINE COMMUNITIES FOR THE DEAF

Online communities can explore new forms of social networking and experience the changing concepts of community as social groups develop within a mixed realm of innovative technologies, creative systems and ubiquitous services. It changes the nature of personal identity, social organization and the connections to real-world communities. Users produce, distribute and consume creative content. The online community can provide new modes and shape the ways people work, learn, live and become any group of people who use Internet technologies to communicate with each other.

Generally and not surprisingly, the current popular online communities that attract the most frequent online traffic and users are *Friendster*, *MySpace* and *Facebook*. Those sites are popular among the young adults and the groupings tend to be sharing in general interest rather than specific interest. These online community sites share similar features such as user profiles, blogs, friend lists, sharing photos, forums and groups. In general, many deaf people also join those popular online community sites, it is uncertain as to whether or not such a site produces relevant content, and whether it is focused to the needs and interest of the deaf community.

A majority of them would like to opt for joining their own ‘clique’ groups in order to serve and share their interests on deaf issues and concerns. For instance, there are existing online community sites that cater to the needs of deaf community such as *Deaf Online*, *All Deaf Forum*, *Tag Deaf*, *Deaf Singles Connection*, *hipe!*. Table 1 compares and analyses the different features of the existing online communities. However, it is arguable whether those sites are effective and suitable to assist the deaf in bridging the

communication barriers with the hearing community whilst on the move. Owing to the accessibility of mobile phones and their abundance among the deaf community, it is highly preferable and more feasible to consider the mobile platform and cellular networks as a means to assist in promoting interactions and communication. As a result, we designed and developed a mobile-based community, namely *DHeart* created for the deaf community.

TABLE 1. A comparison of features for the existing online communities.

Comparison Charts for Existing Online Communities												
Online Community	Features											
	Forum	IM Chat	Profile	Blog	News	Email	Fun	Group	Gallery	Quiz	Log In	Others
Deaf Online Forum	●		●	●		●			●	●	●	Calendar, Discussion, Search, Avatar
All Deaf Forum	●		●		●	●	●		●		●	Calendar, Discussion, Avatar Advertisement, Search,
TagDeaf	●	●	●	●	●	●	●	●	●	●	●	Bulletin Boards, Shoutbox, Polls, Classifieds
Deaf Singles Connection	●	●	●			●	●	●	●			Browsing, E-Cards, Private Mailbox, Matching, Search
hype!	●				●		●	●				Job Hunt, Polls, GuestBook, Message box
Friendster			●	●	●	●	●	●	●		●	Classified, Video, Search, Shoutout, Bookmarks
MySpace		●	●	●	●	●	●	●	●		●	Classified, Video, Search, Comedy, Music, Film
Facebook	●		●	●	●	●	●	●	●		●	Jobs, Music, Movies, Books, Bulletin Boards
Classmates.com			●		●	●	●	●	●		●	School group, build website tools, event reunions

3. Research Methodology

We employed various research methods such as a user survey and interviews to identify the needs and to elicit user requirements for the local deaf community. Firstly, in order to explore the general perception of the local deaf community towards the usage of mobile technologies, we conducted a user survey from July till September 2007 (Wong and Khong, 2007). In the survey, we collected around 98 deaf respondents at a local Deaf Festival.

In the second phase, we conducted the user studies via in-depth interviews and brief observations from October 2006 till January 2007. Two main target groups were identified as our potential users in this study. They were local deaf community with the age from 16 to 45 years old, and also the hearing group, who basically consisted of parents and friends of the deaf and those who were interested to communicate with the deaf. In order to reach out to the right community, we approached local NGOs and organizations such as the Malaysian Federation of the Deaf (MFD), Majudiri Y Foundation for the Deaf (MYF), Kuala Lumpur YMCA Deaf Club, and Kuala Lumpur Society of the Deaf. We interviewed each of the 10 interviewees who represented the deaf and the hearing groups respectively.

Due to the fact that the majority of local deaf community conversed in Bahasa Malaysia (the national language of Malaysia) and BIM (Malaysian sign language), we conducted the survey and interviews sessions using ‘sign language’ and a ‘pen-and-paper’ approach to explain further enquiries. Having said this, one of the authors, who also played an important role as a *user (deaf)-cum-designer*, provided invaluable input to the overall design and development of *DHeart*.

4. Analysis of Results

Based on the data gleaned from user surveys and interviews, we concluded the findings into a User Profiling exercise. This exercise subsequently produced several Personas and narrations during conceptual studies for designing *DHeart*.

4.1. USER PROFILLING

Below is a summary of the user profiles for the deaf community:

- Target users (age, gender, physical condition):
16-45 years old; female and male; deaf or partially deaf.
- Educational background:
There are around 68% of Malaysian deaf teenagers and adults who understand Bahasa Malaysia, and 32% understand English in an acceptable advanced level equivalent to the British “Ordinary” (O) level in the local education system. The low percentage of English comprehension is due to the widespread use of Kod Tangan Bahasa Melayu and Manual Sign Language in Bahasa Malaysia, which is mainly taught as the main command of “language” to the deaf under the special education system in the country. In the past few years, the local deaf community started to improve their English with the support of e-Pekak ICT portal being introduced. The educational background of the local deaf has increased tremendously to the diploma and degree level compared to the past with non-degree qualifications. Most deaf students and teenagers who study in special schools are exposed to vocational training which includes problem solving, decision making and also different living skills in life.
- Learning styles:
Basically the deaf people are visual and verbal (text-based) learners.
- Occupation:
Social workers (working at NGOs), IT administrators, accountants, designers, clerical workers, administrative staff and students.
- Lifestyle:

Like other hearing people, the deaf have their own hobbies such as shopping, sports, social activities and so forth. They like to spend time doing chatting via instant messengers, browsing the Internet, playing games, watching movies and also texting via mobile phones.

- Attitude towards computer, Internet, and mobile phone experience:

Novice, experienced or experts.

- Computer experience:

Some deaf use personal computers daily, or at least twice a week. Some are conversant with graphical software such as Adobe Photoshop and Adobe Illustrator. Basically, they are able to use the Internet for browsing, information retrieval, chatting via instant messengers, and reading blogs. Some prefer to use a webcam to conduct 'sign' language activities with their family and friends for better communication depending on the available network connectivity.

- Problems the deaf face in their daily lives:

The command of English for the deaf is generally lower standard compared to the hearing groups that affect their understanding of written language. This scenario is obvious when the deaf may find difficulties to understand the verbal expressions (e.g. uuh, ahh, yup, err..., etc.) and also short form in SMS (e.g. '2day' stands for 'today', 'tmr' means 'tomorrow', etc.)


The deaf finds that the written messages in chat and messenger software programs are 'boring and dull', where they are required to type long sentences. Inevitably, this takes up a lot of time typing. It is also noted that a chat tool which allows for 'signing' instantly is preferred. Although the deaf generally like emoticons (e.g. smiley faces) in the instant messengers, they sometimes find it difficult to comprehend the meaning of the emoticon without an explicit description of it and also to explain it in sign language. The deaf also find that there is a need for a dictionary facility to pose as a communication aid to explain a situation that the deaf person may be feeling. Again, this poses the need for an intermediary device or aid to help the deaf communicate with others using sign language directly via mobile services. This is not available yet in the country.

4.2. PERSONA

The user personas were the results and insights derived from user studies which we then translated into personas. Cooper (1999) outlined '*personae or personas as fictitious characters that are created to represent the different user types within a targeted demographic (profile) that might use a site or product.*' Personas are given characteristics and are assumed to be in particular environments based on known users' requirements so that these elements can be taken into consideration when creating scenarios for

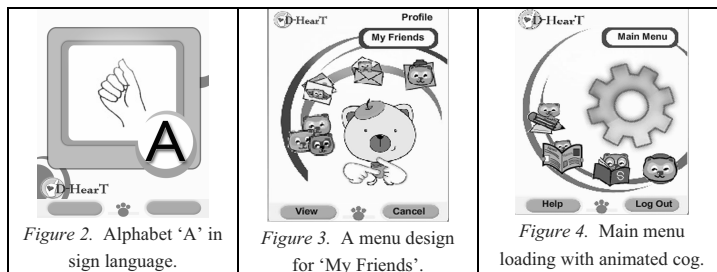
conceptualizing a site. In this study, we created 2 main categories of user personas representing the deaf and hearing community. Due to the length of this paper, we reported one example of user persona for a working deaf user (see table 2).

TABLE 2. A user persona for a working deaf.

<p>Name: Aqlam Jafri Age: 35 Gender: Male Occupation: Information System Admin Nationality: Malaysia</p>	
<p><i>Figure 1. Aqlam Jafri.</i></p>	
<p>Education History:</p>	
<p>He was the first deaf Malaysian student who graduated from Gallaudet University, Washington DC, USA. He has a Bachelor Degree in Computer Information Systems. He previously studied in the special primary school and hearing secondary school in Johor Bahru before Gallaudet University. He is skillful in Bahasa Malaysia sign language and also American Sign Language. Sometimes he will fly to USA to learn new sign language and receive training in assistive technologies. As return, he will transcend the training across to the local deaf community. He serves on the working committee of KLSD (Kuala Lumpur Society Deaf).</p>	
<p>Computer Experiences:</p>	
<p>He is skillful in using a computer. He is good at teaching and providing training of ICT to the deaf students and active in helping the local deaf community. Apart from ICT, Aqlam also teaches the deaf about soft skills like leadership in order for them to solve problems in their daily lives. He likes to chat with his deaf friends using the Yahoo! and MSN messenger. However, he finds limitations in using instant messenger, and would opt for something more specific for the local deaf.</p>	
<p>Lifestyles:</p>	
<p>He loves to spend his time with his own daughter and wife every weekend. He is active in social work and contributes to the local deaf community. He has a high commitment to his work and plays an important role in local NGOs and deaf clubs in creating a deaf culture awareness campaign.</p>	
<p>The problem Aqlam faced while communicating with the deaf and hearing people:</p>	
<p>Aqlam sometimes find difficulty in using his mobile phone, especially sending SMS to his deaf friends. For instance, he has a 3G mobile phone but most of the deaf people do not have 3G mobile phones. He prefers to see a fellow deaf's facial expression whilst he himself is 'signing' through the video phone. The SMS feature is very limited for the deaf community with less accurate expressions. He communicates with his hearing friends using Yahoo! Messenger, especially for meetings and discussing projects. He hopes to utilize the video features in the chat room for the benefit of the deaf community.</p>	

5. Conclusion

Overall, we presented user studies from a user survey and in-depth interviews of the local deaf community. The insights gleaned from the user profiling exercise and persona helped to inform the overall design and development of a mobile-based community, *DHearT* interface. Below are some screenshots of *DHearT*:



Due to language barriers, we found it challenging to approach the local deaf as a non-community member. We learnt that having a user-designer played an important role in breaking the communication barrier and helped building the rapport with the clique community. To find out how usable and acceptable *DHearT* is among the deaf, we will report and discuss the findings of a user evaluation study with the real users in future papers.

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