

# E-Mobilizer: A Cell Phone Based Market Place

**Luping May**

Computer Science Department  
Stanford University  
Stanford, CA 94305  
[luping@stanford.edu](mailto:luping@stanford.edu)

**Jiang Xuan**

Computer Science Department  
Stanford University  
Stanford, CA 94305  
[jxuan@stanford.edu](mailto:jxuan@stanford.edu)

## ABSTRACT

Cell phone usage is extremely popular in Asia, whereas personal computers and Internet are still a luxury to the majority of Asian people. Cell phones permeate Asian societies, but the utilization of cell phone network for purposes other than interpersonal communication is seldom explored. In this paper we propose e-Mobilizer, a system for an effective exchange of large amount of textual information, to provide a cell phone based market place for micro-entrepreneurs in China. We first describe the cultural and technological background and our preliminary investigation in China. We then outline the architecture of e-Mobilizer, and analyze the challenge in designing e-Mobilizer. We focus on the issues of user interface design for cell phones for the purpose of exchanging large amount of textual information, and propose a prototype to resolve these issues.

## Keywords

Mobile interaction, cell phones, interface, SMS, WAP, Human Computer Interaction

## INTRODUCTION

Lacohee, Wakefor and Pearson [1] suggested that the multiple dimensions of social influence stem from the ways in which mobile technologies become integrated into social changes which are supported by the new kinds of communication enabled by mobile telephones. The extreme popularity of cell phones is a result of social changes, and the evolution of cell phone technology deeply influences social behavior. E-Mobilizer is inspired by the pervasiveness of cellular infrastructure in developing countries, and seeks to produce a positive social impact by creating new ways for micro-entrepreneurs to conduct their business.

The majority of people in China still don't have access to the Internet. The biggest problem facing micro-entrepreneurs in developing countries is the inability to access the larger public market and its market information. On the other hand, cell phone plays the same important roll in personal and business communication in China as the Internet does in the West. Farmers and fishermen use mobile phones to call the markets to get the best price for their produce. Small businesses use them to shop around for supplies. Here we see the opportunities that cell phones can create for Chinese micro-entrepreneurs as Internet has done

for western small business owners. In this paper we propose a system prototype to create a cell phone market place for Chinese micro-entrepreneurs to help them prosper.

Currently no successful system has been integrated with cell phones to enable effective exchange of large amounts of textual and multimedia information[3]. Some reasons for not having such a system are:

1. The input method is unintuitive and cognitively cumbersome.
2. The small cell phone screen makes satisfactory information display difficult.
3. There is no easy way to navigate through a large amount of information.

Our paper studies these issues, and then proposes a prototype to resolve these issues, in pursue of achieving effective exchange of rich textual information

## PRELIMINARY INVESTIGATION

### Mobile Technology Background

China overtook the U.S. in 2001 to become the world's largest mobile market with 180 million current subscribers and nearly 5 million new subscribers every month. The number of subscribers has reached 330 million in 2005 – greater than the entire population of United States. Currently the two most popular mobile communication technologies available in China are SMS (Short Message Service) and WAP (Wireless Application Protocol). SMS is extremely popular in China. More than 200 billion SMS's were sent each year.

Both SMS and WAP as platforms for the exchange of large amount of textual information have their limitations. SMS conversation is stateless and messages might arrive out of order. There is no standard interaction model for WAP. WAP pages vary greatly by cell phone. WAP is an effort to migrate html web pages to cell phones, instead of being specifically tailored to mobile interface[3]. On the other hand, both SMS and WAP are Carrier and platform independent, which is essential for an application such as e-Mobilizer that targets a wide range of cell phones platforms. They are also relatively cheap: the cost of SMS is about 1.2-1.3 cents per message. The price of WAP services subscription is also becoming affordable.

### Preliminary Interviews in China

Stanford Reuter Fellow Helen Wang has done some preliminary research [3] during her trip to China in January 2005. She interviewed more than 20 micro-entrepreneurs from different parts of China. They mainly make handicrafts and ethnic goods and sell them at a centralized market in Beijing. Most of the people Wang interviewed are not computer savvy, and more than 90% have never been to an Internet cafe. On the other hand, almost every interviewee has a cell phone. This confirms our hypothesis that cell phones are the most important communication tool for our target user base. Most of them also expressed strong interest in using cell phones to advertise their products.

### Interviews and User Requirements

Before the actual design, we interviewed different potential users to extract the user requirements. Our interviews were semi-structured and consisted of mostly open-ended questions. We conducted the interview in a conversational manner in order to get the most information. We targeted interviewees who are either very familiar with the Chinese society and culture, or have used various forms of online listing services. From our interviews, we identified several critical elements that lead to a purchase decision:

1. A summary of the most essential information for a product so that potential buyers can get an idea of the product at a glance
2. Price
3. Description (condition, functionalities, model, measures, product specifications)
4. Location
5. Photo(s) of a product
6. Credibility of a seller
7. Third party reviews

Our design of the e-Mobilizer system and interface is geared to allow sellers to enter and buyers to search for the

criteria above.

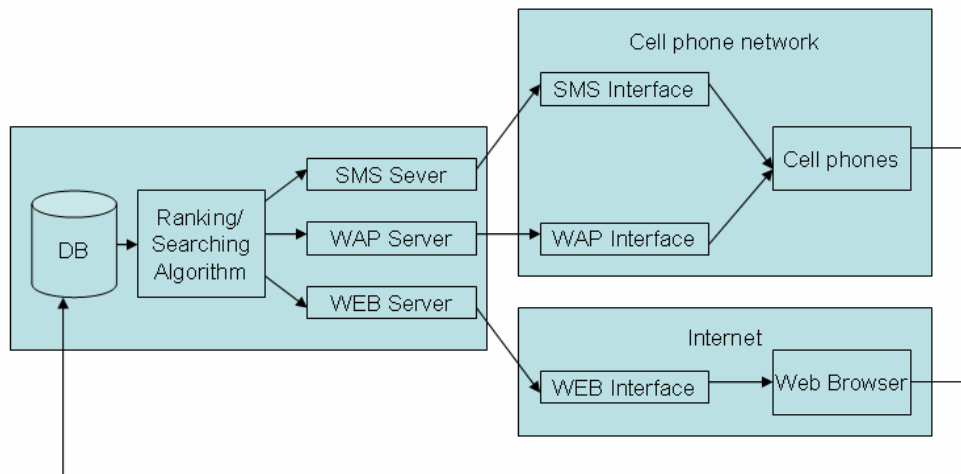
## THE DESIGN OF E-MOBILIZER

### The Architecture

Based on our investigation of the cultural and technological background, we propose an architecture to provide listing and searching services to both WAP and SMS users, as well as Internet users. The system consists of:

- A WAP server to support WAP interaction. The front-end is connected with the wireless carrier's mobile network through a data connection link.
- A SMS server to support SMS interaction. It is connected to the SMSC (Short Message Service Center) through the standard SMPP (Short Message Peer-to-Peer protocol).
- A regular Web server to support regular Web interaction. The Web server expands the audience for our product listing.
- A database shared by the above three different components. Each component can access the same information in the database, but renders the information on its own unique interface.
- A search Engine to classify, rank and search advertisements posted by SMS, WAP or Web users.

Since there are well established protocols for web server and search engine, we will not discuss the implementation details of these components here. Our main challenge is to design smooth WAP and SMS interactions to support our service. Our interface has to be simple and effective enough to attract busy small business owners. We will discuss in detail our methodology of designing the interaction for e-Mobilizer, including comparisons between designing for SMS and WAP interfaces.



**E-Mobilizer System Architecture**

## The Interface

Information input and display for handheld device have remained a challenge for mobile interface design. Our prototyping and user testing focus on tackling the three main problems in this domain: *input, display and navigation*. Our design principles are: *structural but flexible, informing, but not enforcing*.

### Input

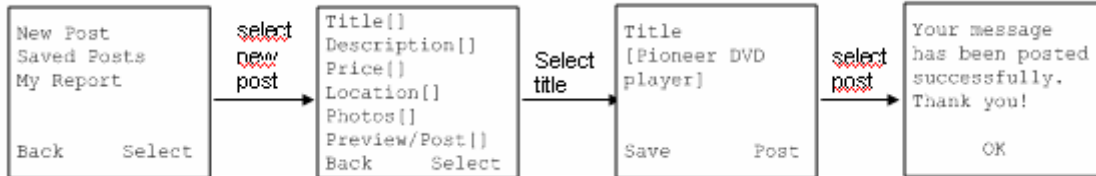
Using cell phone to input information is very cumbersome, especially for people who are used to type on a regular keyboard. However, a lot of people in Asia have adopted typing on cell phones and can enter text much faster than western users. [4] Although we discuss various approaches to ease the input process, we also want to point out that using cell phone to input text message is not as impossible as a lot of western consumers think.

When designing the input procedure, we want to assure that

users can focus on the product information they want to advertise, with minimum attention to the actual input procedure itself. Our approaches to achieve this include:

- Store user preference and identity information such as location, product category and photos to save users from repeating input.
- Provide an easy way for users to reuse or update any stored information
- Call center for further help when necessary

For the seller, the simplest WAP ad only takes 3 selections: select new post action → enter a summary (title) of product → post. The seller can also choose to enter more information such as location, detail description, price, third party reference, etc. We save each user's last used location, category and contact information. We also provide them with easy ways to modify each piece of information if needed.



**A Simple Post Takes 3 selections**

Notice that the same set of information is needed for SMS users, but the interactions are very different. For SMS users who want to advertise a product, we first send them a short instruction and a simple template. Users can save the template on their cell phone and use it to compose their advertisement. We initially considered a conversational model for SMS interaction, in which we send the users a serial of short messages, each asking for a specific question such as location or description. The users can then reply with the corresponding information. This conversational model makes it very clear to the users what information they are expected to enter, but is both time consuming and cost ineffective. Furthermore, SMS messages might arrive out of order causing confusion.

```
<title>:[enter title here] <description>:[enter description here] <price>:[enter price here] <location>:[enter location here]
```

### SMS template for seller

Using our template gives user a clear guideline to follow, making it possible for the server side to extract correct information, and speed up the interactions. We also saved reusable information for SMS users as we do for WAP users. In the case of SMS, user can just leave a part of the template empty to indicate that they want to use last entered information for that part.

### Display

Chinese characters have several advantages over English in terms of displaying on a small screen. First, all Chinese characters have the same length. Each line on the screen can fit in the same number of characters, thus maximizing the screen usage. Second, Chinese language is very concise. A complex idea can be expressed in very few words. For WAP interface, this means that we are likely to be able to fit the description of a product within one screen. For SMS this makes it possible to fit an entire advertisement within one SMS message (70 Chinese characters), making it convenient to use our template model.

From the business cards Helen Wang collected, we observe that people use very few Chinese words on their name cards to give very concise information about their business. In some cases, they even write short poem to let customers remember their product or service. The unique characteristics of Chinese language is a great advantage for our design.

### Navigation

Many existing search applications tend to return far more results than needed. From our interview we learn that most users only look through the first 10 to 20 results. Too many return results also make it hard to navigate through them.

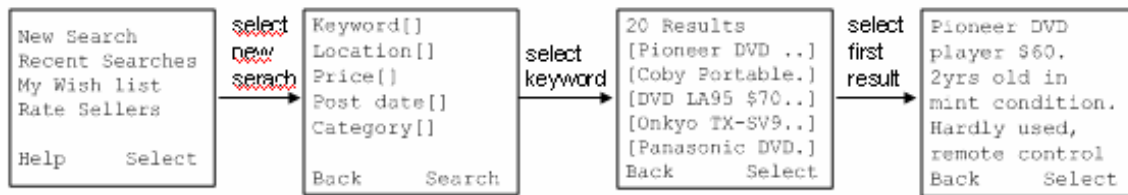
This problem is accelerated when the results are displayed on a small cell phone screen. Our approach to counterpart this problem is:

- Localized search. Most Chinese people still don't own a car, so they prefer to purchase products nearby. Our search will be restricted by locations, hence reduce the amount of return results.
- Structural presentation of results to allow user zoom-in and zoom-out of information space quickly.

Our design of the navigation flow is inspired by the Elision search method employed by ParcTab at Xerox [5]. Our application returns only 10 results at a time, sorted by it's

ranking of relevance to the search condition, each result represented by a short title. The users can choose to "zoom in" into one of the results, or go to the next 10 results. The users can choose to refine the search if the 10 result are not close to what they are looking for. They can also add a result to their wish list so they can come back to it later.

For the WAP interface, the navigation is achieved by selectable links and soft buttons [6]. For the SMS interface, users indicate the direction of their navigation by replying to our message with easy to remember key words such as "next", or simply sending back a new search request using our template.



**A Simple Search Takes 3 Selections**

### User Testing

We conducted our user testing in two stages. The first stage was low fidelity testing using sketches, paper and pencils. From this stage of testing we collect feedback on general requirements and features expected of our system. For examples, testers expressed that the ratings of sellers are very important. They also wanted a way to save items that they are interested for further review. As a result we added the rating and wish list features to our system.

In the second round of user testing, we design an interactive prototype using Web Auth to create a more realist experience for the testers. We asked user to post or search advertisements using our interface, and encourage them to explore other features such as rating and getting a report. The high fidelity testing uncovered some usability problems more specifically related to the interface. One user mentioned that his cell phone do not have an "OK" or "Select" button, which leads us to redesign all our soft buttons to be usable on more general cell phone types.

In general, testers comments on our system positively. They said our idea is very useful and applicable to the real world.

### CONCLUSION

We have proposed a cell phone application system that we believe will benefit an enormous number of people in Asia. Our application is tailored to existing technologies, and no changes need to be made to the client side's devices. The e-Mobilizer system can be implemented, tested and upgraded in a short period of time. Our interfaces are made to be easily adapted by people who have little or no experience with computers and/or Internet. While at the

same time we also provide access to our network via the Internet, helping our sellers to reach an even broader audience.

Event though cell phones are limited for sharing large amount of information, for specific application targeted specific group of users, cell phone could be the right and powerful media for the application. E-mobilizer is exactly such an application.

### ACKNOWLEDGMENTS

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