Mobile phone users in Kyrgyzstan:
A case study of identifying user requirements for diverse users

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Abstract

Mobile phones are widely recognized as a potentially transformative technology platform for developing nations. However, for designers and programmers in the developed world to create viable applications for mobile phones involves first identifying and communicating user requirements for diverse users. We define diverse users as those from a substantively different cultural context than that in which the technology design occurs, including developing regions. This paper presents a case study outlining our process of using data from prior research to (1) identify a tenable mobile phone product concept for mobile phone users in Kyrgyzstan; (2) detect and communicate user requirements for that product concept to a design team; and (3) develop a working prototype of the concept for usability testing. Our resulting concept meets important user needs and goals for mobile phone users in Kyrgyzstan. We believe the process by which we developed and discuss these user requirements and the subsequent prototype can serve as an example to others concerned with creating user-centered products and services for diverse users including those in developing countries. Keywords: User requirements; user-centered design; mobile phone; mobile social software; developing world.

Introduction

Mobile phones are transforming the lives of many users in developing countries and are widely recognized as an important current and future technology platform for developing nations [1]. Consequently, many recent projects have leveraged mobile phones for applications serving diverse users in developing regions. An excellent example is "mKrishi," a mobile crop advisory service for farmers in India, which was selected as the winner of the Wall Street Journal's 2008 Innovation Award in the wireless category [2]. The mobile service helps farmers in many of their daily tasks – including giving advice on fertilizers, providing up-to-date weather forecasts, and giving market information on crop prices – all through text messaging.

In fact, numerous mobile phone initiatives, inspired by the upward trend of mobile usage worldwide, have been created for diverse users in developing countries. These include the development of "m-banking" systems intended to lower the cost of financial services in developing regions including South Africa and Kenya [3]. Mobile ownership has also been shown to benefit textile producers in Nigeria [4] and help solve health and agriculture problems in Bangladesh [5]. As part of our research in the Central Asia + Information and Communications Technologies project (CAICT), a multi-year study of information technologies and their usage in Central Asia, we have also seen a strong upward trend in mobile phone use and ownership but very little attention paid to appropriate technology-scaffolded solutions.

Our data represents thousands of pieces of information pertaining to attitudes, behaviors and goals in relationship to multiple technologies, including mobile phones, throughout the region. While our research has been primarily exploratory in nature and not necessarily intended for applied purposes, we found that several concepts for technology products and services began to germinate over the years. Many of these concepts were conceived for the mobile phone platform because of its high level of adoption. This paper presents a case study of one idea generated from our research for mobile phone users in Kyrgyzstan, called the MoSoSo (Mobile Social Software) information directory. In this paper, we (a) discuss research findings that inspired the original concept, (b) present the user requirements that we generated and aggregated using two well known user-centered design methods (personas and scenarios), and (c) present the resulting prototype developed in Adobe Flash that will be leveraged for usability. Additionally, we feel that this product concept, and the design process surrounding its development, is grounded in findings that generalize to development of technology for other similar developing regions.

Background: Kyrgyzstan

Kyrgyzstan is located just south of Kazakhstan in Central Asia. It borders China on the East, Tajikistan on

the south and Uzbekistan on the west. It is a small, mountainous country, about the size of the state of South Dakota in the United States. Its population, estimated at 5.5 million (about the same as the state of Minnesota), is concentrated in the capital of Bishkek in the north and in the heavily agricultural Ferghana Valley in the south. The country's population is young – with a median age of 24.2 years (for comparison, the U.S. median age is 36.7) – and literate (literacy rates are estimated at 99%). The ethnicity of the population is mostly Kyrgyz (64.9%), followed by Uzbek (13.8%) and Russian (12.5%). Most Kyrgyz (about 75%) consider themselves Muslims [6].

Kyrgyzstan has had economic difficulties since independence from the Soviet Union in 1991. This is not surprising considering that in 1990, 98% of Kyrgyz exports went to parts of the Soviet Union. Unemployment is high: it is estimated at 18%. Agriculture is a key sector of the economy; in 2002 agriculture accounted for about a third (35.6%) of the gross national product and about half of the employment.

Background: Research findings

Two sets of data previously collected in the CAICT research project were used to identify a tenable software concept and later ascertain user requirements: (1) a design ethnography and (2) a large scale survey. The research methods for each dataset are briefly described below.

Methods: Design ethnography

Researchers in recent years working in the field of human-computer interaction have "looked to ethnography to provide a perspective on the relations between humans and the artifacts they design and use" [7]. Historically, ethnographers have spent great lengths of time, sometimes years, in the field in an attempt to gain an empathetic perspective of the culture they are studying, with a generalized goal of "improving the human condition" [8]. Tangentially, in design ethnography the goal of gaining an empathetic understanding of a culture is specifically to expand insight to help the ideation and creation of a product or service that will improve the targeted population's lives [9]. In our design ethnography, we were focused on understanding the role of mobile phones in people's everyday lives; we were especially interested in how the phones supported existing face-to-face social networks.

As such, the design ethnography provided the primary inspiration for the MoSoSo directory concept. While not focused on a specific product, the study was intended to generate ideas and guidelines for creating design prototypes and possible solutions that support existing social networks through mobile devices. The design ethnography also helped us infer where technology might help in the social context of everyday life.

Twelve participants (four groups of three participants each) were interviewed by a team of University of Washington and Kyrgyz researchers at two sites in Kyrgyzstan in 2006: the capital city of Bishkek and a small town outside of the capital, Kara Balta. Two of the participant groups represented a multigenerational family, and two of the groups were young adults with shared social ties.

In the group interview, participants were asked to describe (a) a recent experience that was hard to do; (b) their patterns of telephone use, both land lines and mobile phone; (c) how they typically find news; and (d) how they used technology in their daily lives. After the group interviews, each participant was interviewed separately and asked (a) to discuss their experiences from the previous day, (b) to describe their last visit to the local bazaar, and (c) to describe who they communicated with in the previous week.

Methods: Survey

The secondary set of data utilized for this project was from an April-May 2007 survey of 1000 respondents, age 15 and older, administered in urban and rural areas from several regions in Kyrgyzstan. The survey sample was based on government census information on age, gender, ethnicity, and geographic location. The sample included 50 locations, both urban and rural; 12-29 respondents were interviewed in each location. The survey was administered by the BRiF Research Group located in Kazakhstan. While this paper focuses on the 2007 results, the survey was administered once before in 2006 and one time since in 2008.

BRiF administered the survey in Russian and other regional/local languages. In addition to the general sampling scheme, a three-stage process was used to select respondents that included Probability Proportional to Size sample of Primary Sampling Units (PSUs), consecutive random sampling of households in each PSU, and selection of a household respondent using a Kish Grid method [10].

The survey instrument was designed by a team of researchers from the University of Washington, pilot tested with local researchers, and then revised based on analysis of pilot data. Survey questions and specific formats were developed in response to initial open-ended interviews, ethnographic field notes, pilot tests, and research on performing surveys in post-Soviet contexts.

BRiF used several steps to guarantee high quality fieldwork including (1) approximately 30% of interviews were checked through a back visit to the respondent's home; (2) interviewers were trained through workshops and practiced in a pre-testing phase; and (3) statistical analysis of logical inconsistencies were double checked

with the original paper questionnaires and eliminated if necessary.

Key findings supporting the MoSoSo concept

There were three key findings from the design ethnography, survey, and previous research by our group and others in the region that inspired the MoSoSo directory concept. The service was ideated specifically in response to patterns of technology use already in place in the region that also incorporated our findings related to social structures and unmet needs, or pain points, in everyday life. The relevant findings are detailed below.

Finding 1 – finding from design ethnography: *There is a lack of easily accessible, reliable, and free information about phone numbers.*

The design ethnography revealed that there are no standard yellow pages available in the country. While there are two free information lines, 109 for domestic information and 106 for international information, interview participants complained that it could take anywhere from ten minutes to all day to get through to an operator. Additionally, while there is a mobile directory available by phone, participants were reluctant to use it because it was a pay service. And while there is a published directory available at bookstores, it is expensive, often not easy to find, and not perceived as reliable.

Finding 2 – finding from previous research from our group and others in the region and supported by the design ethnography: *There is a strong reliance on social networks to accomplish tasks in everyday life.*

The reliance on a face-to-face social network is a key component of daily life in Kyrgyzstan. The importance of close social networks for information, assistance, and goods has been a repeated element in our research as part of the CAICT project and in other investigations focused on Kyrgyzstan [11] [12]. As Figure 1 shows, social networks have strong trends of reciprocity, and people report a reliance on extended friend and family networks for goods and information exchange.

Finding 3 – finding from the survey: *There is a strong upward trend in mobile phone use and ownership.*

As previously discussed, over the three-year period of conducting the survey, there has been a sharp increase in mobile phone use while other technology use has increased only slightly, see Figure 2.

Key:

GIVE Help (pointing away from the center)

RECEIVE Help (pointing towards the center)

● Each dot represents ONE interview participant responding "Yes" to giving or receiving help

Job = (inner circle) To improve job or employment situation(finding a job, finding information about improving your business, etc.)

Daily Tasks = (middle circle) To improve ability to accomplish daily tasks (find good prices at shops, pay bills, locate businesses, get health advice, etc.)

Meet People = (outer circle) To meet new people who are important to you either socially or professionally

Figure 1: Patterns of information exchange among social networks as reported by participants

	Mobile Use	Internet Use	Computer Use	Computer Ownership
2006	21%	11%	28%	7%
2007	46%	10%	28%	8%
2008	71%	15%	29%	12%
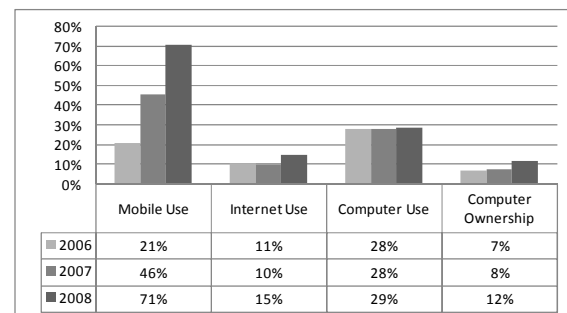
Figure 2: Technology trends in Kyrgyzstan

These three findings provided the underpinnings for the MoSoSo directory. The product needed to (1) act as a directory to address the lack of a telephone information directory, including business information; (2) act as a recommender system to leverage the existing reliance on social networks; and (3) be delivered on a mobile phone. Our market review revealed similar services available in the United States that were built in response to technology usage patterns in place; our goal in this work has been to make sure that we are using relevant data to support

appropriate technology already in place for diverse populations.

Similar products in the United States

In the U.S. there are many Internet sites that rely on the users themselves to provide recommendations and ratings. Angie's list (www.angieslist.com) is an example of a site in which subscribers rate and view ratings for multiple local contractors through a subscription service. Other examples include Yelp, which is a restaurant reviewing service; tripadvisor, which covers hotels; and Ebay, which is perhaps most well known for the ratings by users, especially in a format that helped in the last decades to increase user trust in an emergent system.

Additionally, an increasing number of online retailers incorporate a recommendation system. For example, when purchasing a product at Amazon.com, a user can see how other consumers rated a particular item and read comments left by previous purchasers. Users are also shown a list of "customers who bought this item also bought" as another level of suggestion.

These examples of recommendation systems in the United States work well; however, they are delivered via web pages and using the Internet. While many smartphones afford Internet access, our survey research indicated that Kyrgyz often acquired their phones as gifts (49%) or bought their phones used (10%), resulting in a large pool of older (non-Internet capable) phones. Only eight respondents in the 2007 survey (1% of mobile users) had ever accessed the Internet from their mobile phones.

Additionally, overall Internet use rates are low, with only 15% of the population reporting even sporadic Internet use by 2008. Consequently, a recommendation service that was only available through the Internet would not gain the critical mass of users needed to be considered trustworthy. In other words, the general population is not habituated to receiving information via the Internet, whereas they **are** used to making habitual use of their phones to communicate and their social networks to get information [11]. While the lack of smart phones and Internet use provided design constraints for the delivery system, we also had to consider **user** constraints that designers and developers would need to consider while developing the service.

Methods for identifying and communicating user requirements

Ideally, after we identified the MoSoSo directory as a tenable concept, we would then have conducted field studies to elicit specific user requirements. However, because of timing and economic constraints, we were unable to collect such data. We also argue that an inability to conduct field research to determine user requirements for a specific application is likely to be a common constraint faced by design teams working on applications for developing regions. In user-centered design (UCD) methods, it is important for the design team members to understand the life experiences, expectations, and challenges faced by the end users; this can be especially difficult when the end user is part of a population very unlike the design team [13]. In other work we have outlined in detail how existing data can be adapted for UCD methods, including for the creation of personas and scenarios. In this paper we discuss how we otherwise address UCD approaches to identify and communicate user requirements and how those approaches specifically informed the design process reported here. The prototype discussed here is tied directly to personas created based on previous research. In essence, our data drove the persona creation, and the personas and associated scenarios drove the prototype design.

A persona is an archetypal character created to represent a group of users who share common goals, attitudes, and behaviors when interacting with a product or service [14] [15] [16]. A scenario is a story describing a character in an activity. For our purposes here we are using a high-level scenario told from the persona's perspective, which Cooper et.al. (2007) refers to as "context" scenarios. These types of scenarios describe typical and important user activities in relation to a product [17] [18] but do not delve into details describing a task step by step. Proponents claim personas and scenarios are effective for user requirements because they increase empathy, focus, and communication, and they help design teams avoid existing stereotypes [14] [15] [16].

Although research studies that employ personas and scenarios traditionally focus on users in relationship to a specific product and service, we adapted these methodologies to work with our existing data. Detail on our methodological approach can be seen in other work [19]; briefly, starting with the survey respondents, we applied a segmentation model based on user motivation to acquire a mobile phone. Our analysis resulted in three segmentations: (1) a practical user who was motivated to acquire his phone so he could make calls when away from home or work (named Parxat); (2) a social user who acquired a phone because her friends had phones and she wanted to be available to be reached at all times (named Shirin), and (3) a replacement user who acquired her phone because she did not have a landline (named Roza). We then analyzed the survey data through the lens of the three persona segments looking for differences among three constructs: (1) demographics; (2) attitudes about mobile phones and behaviors associated with their use; and (3) other technology experiences.

Next, we mapped the user segmentation model to the twelve participants from the design ethnography. This information was used to fill in back stories, profiles, and

realistic home and work lives for each of our three persona segments and create the context scenarios.

Identifying user requirements

To communicate essential user requirements to our design and development team, we encapsulated several critical user requirements for the MoSoSo directory in three personas, each representing a segmentation from the survey findings, and scenarios taken from real-life stories collected from the design ethnography. Each of the scenarios highlights the importance of social networks and how mobile phone services can support those existing networks. We identified six key user requirements for the MoSoSo directory:

Requirement 1 - Allow individuals and businesses to add and edit business entries in a public directory via SMS/text:

From finding one - this allows MoSoSo to perform a yellow-pages/directory function.

Requirement 2 - Allow users to create and join private shared group directories (to support social networks) via SMS/text:

From finding two - several of our interview participants discussed how they relied on their family, friends, and neighbors for recommendations and advice for services.

Requirement 3 - Allow users to broadcast (push) or post (pull) information within their private shared group directories via SMS/text:

From finding two - our interview participants discussed several instances of trying to get a group event together. This function would further support social networks.

Requirement 4 - Allow users to contribute and rate services in both the public directory and in private shared directories via SMS/text:

From finding two - in both the survey and interviews, participants showed a much higher level of trust in information from known social networks.

Requirement 5 - Allow users to retrieve recommendations or information from the public directory via SMS/text:

From finding one - this requirement gives users options to find recommendations outside their group and support the yellow pages concept in cases where

the group may not have recommendations for some services.

Requirement 6 - Additionally, especially for the Roza persona, it is important that users can retrieve information from the service without using SMS/text:

From other findings - both the survey and the interview data revealed that only the more advanced users utilized text (less than 50%); therefore, it was important to make the system as accessible as possible without SMS/text input (via voice).

Communicating user requirements through scenarios and personas

The three personas are briefly described below with their associated user scenario(s). Note that each scenario highlights specific user requirements.

Parxat. The Parxat persona segment represents 55% of our survey respondents; therefore we considered users that fit Parxat's profile to be our primary focus. Parxat's background story as an owner of a computer club is largely based on an interview participant who owned a computer cafe that did not have Internet access. We developed a business owner as one of the personas to specifically illustrate the interaction of a business with the system as described in requirement 1. See Figure 3 for the graphic representation of the Parxat persona.

For Parxat's primary context scenario we focused on two user requirements: (a) requirement 1 - allowing users to add a business to the public directory and (b) requirement 4 - allowing users to rate a business in both the public directory and a shared private directory.

1. When Parxat arrives at his small computer club in the morning, he sees a flyer advertising the MoSoSo directory. The flyer explains that as a small business owner he can add his business to a public information space where users can vote to recommend shops and services.

2. Parxat calls the service and discovers that listing a service requires using text.

3. Navigating the service through a series of text messages, he decides to locate his shop under a category called "Computer cafe/club." The entry system allows Parxat to set up two types of advertisements, one for users who utilize text and one for users who do not use text.

4. Later, Parxat asks one of his clients, Ilzat, to call the service and submit a vote. Ilzat already belongs to a private shared directory. Izlat offers to not only give Parxat's shop a good vote in the

public directory, but to also add it as a recommended computer club in his private shared directory.

Parxat's secondary scenario is focused on two user requirements: (a) requirement 5- retrieving information or recommendations from the public directory and (b) requirement 2 - allowing users to create and join private shared directories.

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1. Parxat's small computer club is doing well; however, he knows he could do better if he had Internet access for his customers.

2. Parxat has never set up a network, and he does not even know where to start. He asks around to his friends, customers, and family if anyone knows someone who can help. No one in his social network has any ideas.

3. Parxat decides to text the MoSoSo directory to find a recommended network technician.

4. While not knowing any of the people who are recommended in the directory, Parxat is skeptical, but he gives a technician, named Dima, a call.

5. Since Dima's business is very new, he wants to do everything he can to get a good recommendation from Parxat.

6. One month later, Parxat has an Internet connection in his club, Dima has a recommendation from Parxat in the public directory, and Parxat and Dima start their own private shared directory for computer and Internet club owners.

Shirin. Shirin's persona segment represents 32% of the survey respondents. She is also considered a primary persona because her persona segment represents almost a third of all survey respondents. Shirin's scenario framework came from an interview participant who conveyed a story of his unregistered student group where he functioned as both a member and organizer. We chose this framework for Shirin specifically to illustrate some of the social features of the service described in requirements 2 and 3. See Figure 4 for Shirin's persona graphic.

For Shirin's primary scenario, we focused on (a) requirement 2 - allowing users to create and join private shared directories (to support social networks) and (b) requirement 3 - allowing users to broadcast (push) or post (pull) messages to members of the shared private directory.

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1. As a cofounder of an unregistered student organization, Shirin is always trying to find ways to recruit new members on campus and let existing members know about upcoming events and meetings.

2. After hearing about the MoSoSo directory, she decides to set up a private shared directory for her student organization using SMS/text.

3. She also wants to set up the directory so that users can get notices in several different ways. They can (1) call in for new information, (2) ask for a text alert when there is new information and then call in, or (3) sign up for text broadcasts.

4. A few days later, once the shared directory has been set up, she sends out a new message about an upcoming meeting for group members using SMS/text.

For Shirin's second scenario, we focused on user requirement 3 - allow users to broadcast (push) or post (pull) messages to a private shared directory. While this scenario is not specifically related to providing directory information services, it does build out functionality related to the social networking components of the system.

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1. Shirin's boyfriend, Talik, works at the same cafe she does.

2. It is common for the workers from their cafe to challenge workers from other cafes to battle on a paintball course.

3. Talik enjoys organizing these events and has set up a MoSoSo shared directory to assist his organizational efforts. Everyone in the group has agreed to accept broadcast messages.

4. On Saturday, their cafe is supposed to fight a local cafe; each agrees to recruit ten workers.

5. However, when Saturday comes around, only seven workers show up. His cafe will have to forfeit if they cannot recruit ten people.

6. Talik broadcasts a message to all group members who are part of the shared private directory; he discovers that several people in the group forgot about the event and that his broadcast reminded them. Consequently, the cafe is able to challenge the rival cafe on the paintball course.
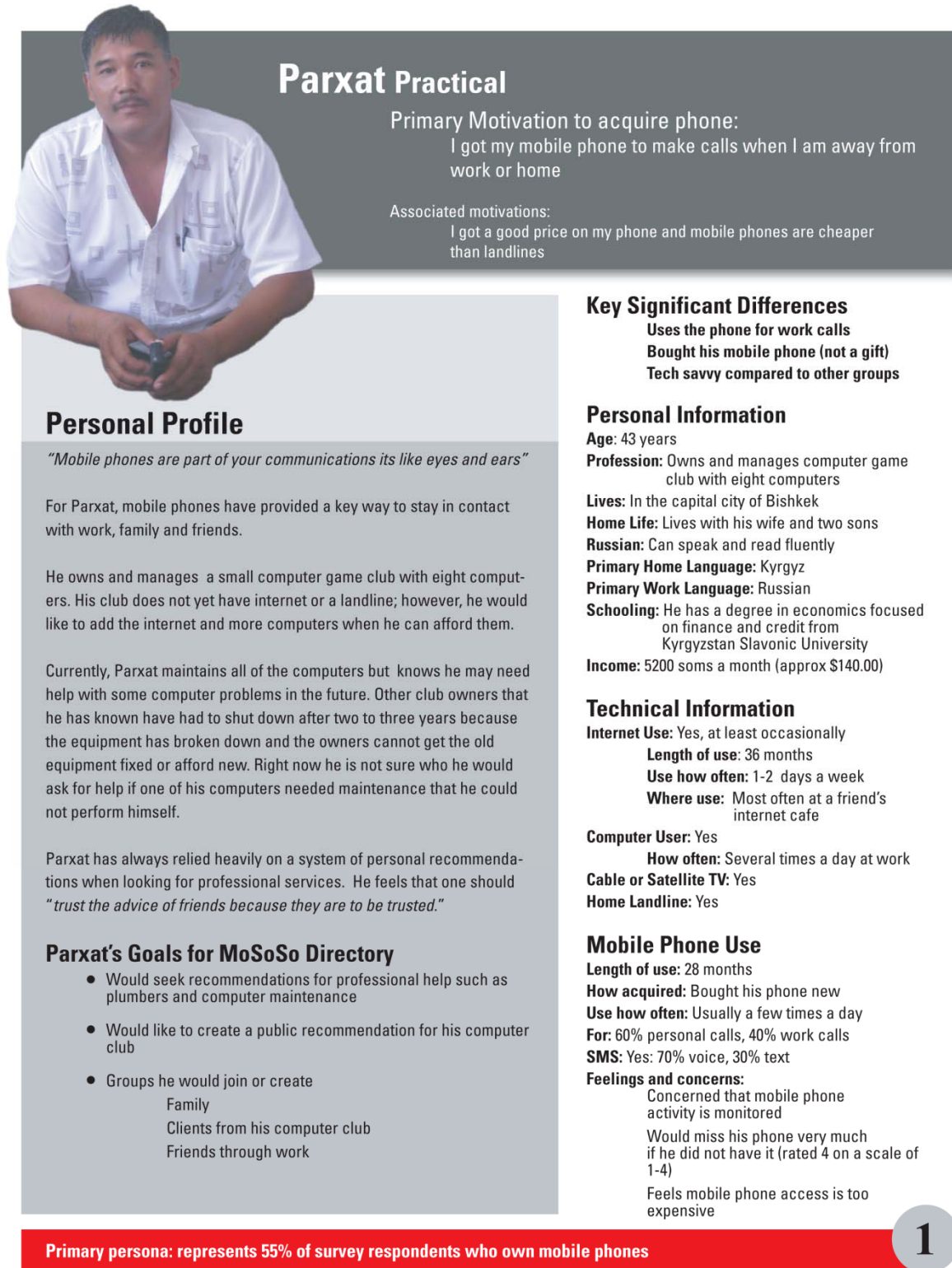
Parxat **Practical**

Primary Motivation to acquire phone:
I got my mobile phone to make calls when I am away from work or home

Associated motivations:
I got a good price on my phone and mobile phones are cheaper than landlines

Personal Profile

"Mobile phones are part of your communications its like eyes and ears"

For Parxat, mobile phones have provided a key way to stay in contact with work, family and friends.

He owns and manages a small computer game club with eight computers. His club does not yet have internet or a landline; however, he would like to add the internet and more computers when he can afford them.

Currently, Parxat maintains all of the computers but knows he may need help with some computer problems in the future. Other club owners that he has known have had to shut down after two to three years because the equipment has broken down and the owners cannot get the old equipment fixed or afford new. Right now he is not sure who he would ask for help if one of his computers needed maintenance that he could not perform himself.

Parxat has always relied heavily on a system of personal recommendations when looking for professional services. He feels that one should "*trust the advice of friends because they are to be trusted."*

Parxat's Goals for MoSoSo Directory

- Would seek recommendations for professional help such as plumbers and computer maintenance

- Would like to create a public recommendation for his computer club

- Groups he would join or create
    - Family
    - Clients from his computer club
    - Friends through work

Key Significant Differences

Uses the phone for work calls
Bought his mobile phone (not a gift)
Tech savvy compared to other groups

Personal Information

Age: 43 years
Profession: Owns and manages computer game club with eight computers
Lives: In the capital city of Bishkek
Home Life: Lives with his wife and two sons
Russian: Can speak and read fluently
Primary Home Language: Kyrgyz
Primary Work Language: Russian
Schooling: He has a degree in economics focused on finance and credit from Kyrgyzstan Slavonic University
Income: 5200 soms a month (approx $140.00)

Technical Information

Internet Use: Yes, at least occasionally
    Length of use: 36 months
    Use how often: 1-2 days a week
    Where use: Most often at a friend's internet cafe
Computer User: Yes
    How often: Several times a day at work
Cable or Satellite TV: Yes
Home Landline: Yes

Mobile Phone Use

Length of use: 28 months
How acquired: Bought his phone new
Use how often: Usually a few times a day
For: 60% personal calls, 40% work calls
SMS: Yes: 70% voice, 30% text
Feelings and concerns:
    Concerned that mobile phone activity is monitored
    Would miss his phone very much if he did not have it (rated 4 on a scale of 1-4)
    Feels mobile phone access is too expensive

Primary persona: represents 55% of survey respondents who own mobile phones

1

Figure 3: Parxat persona graphic

Shirin Social

Primary Motivation to acquire phone:
I like people to reach me at all times

Associated motivations:
My friends all have mobile phones

Personal Profile

"We just talk to our friends….things like did you hear that this or that happened - in our communication rumors are the official news, and gossip works"

For Shirin, keeping in contact with friends is the most important thing about mobile phones.

She is a full time student (junior) at American University of Central Asia (AUCA), studying business administration. She also works part time as a bartender in a cafe .

Shirin is part of an unregistered student association at school that organizes cultural and historical meetings at a local cafe. She also enjoys arranging parties for her friends.

She is interested in social networking applications on the internet, but has found it boring, stating" *the first time is interesting then you get bored because you already know everybody.*"

Shirin's Goals for MoSoSo Directory

- Would use the service most to create groups of friends
- Would like to broadcast messages to particular groups or to tell people where there will be social gatherings
- Would like to retrieve messages from other members of a group
- Groups she would join or create
  - Family
  - Friends from work and school
  - Associations through her unregistered student organization

Key Significant Differences

Uses the phone to primarily to call friends
Least likely to feel mobile access is too expensive
Somewhat tech savvy

Personal Information

Age: 20 years
Profession: Student and works part time as a bartender in a local cafe
Lives: In the capital city of Bishkek
Home Life: Lives with her dad and an older brother. She also has around 30 cousins in towns.
Russian: Can speak and read fluently
Primary Home Language: Kyrgyz
Primary Work Language: Kyrgyz
Schooling: She is a full time student (junior) at the American University of Central Asia studying business administration
Income: 2000 soms a month (approx $55.00)

Technical Information

Internet Use: Yes, at least occasionally
  Length of use: 33 months
  Use how often: About once a week
  Where use: Most often at an internet cafe
Computer User : Yes
  How often: A few times a week at school
Cable or Satellite TV: Yes
Home Landline: Yes

Mobile Phone Use

Length of use: 25 months
How acquired: Was given the phone by a cousin
Use how often: Several times a day
For: 80% personal calls, 20% work calls
SMS: Yes: 65% voice, 35% text
Feelings and concerns:
  The least likely of any group to feel that mobile phones are too expensive
  Feels that mobile phones are important to her future career

2

Figure 4: Shirin persona graphic

Roza Replacement

Primary Motivation to acquire phone:
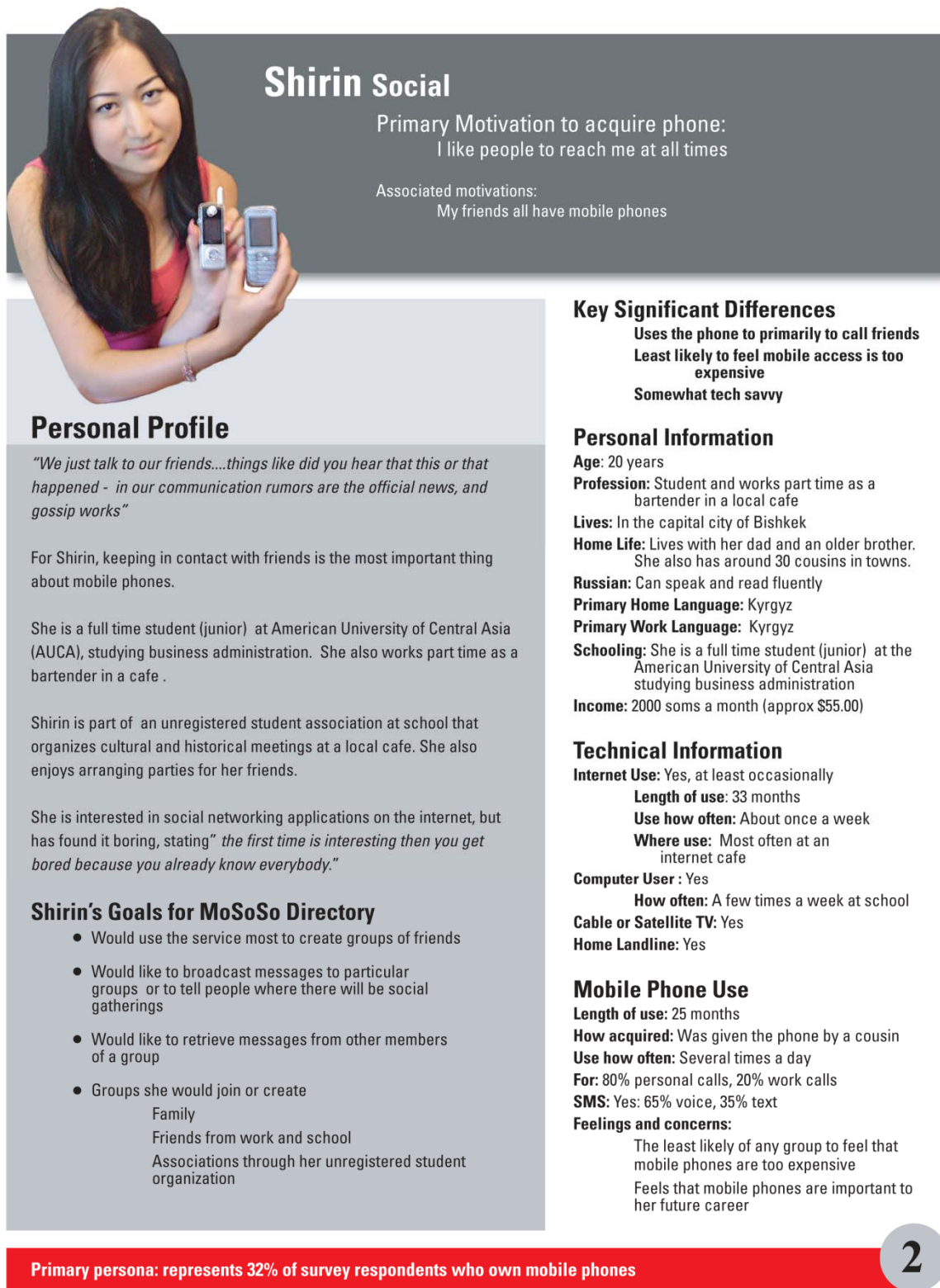I have no home phone

Associated motivations:
It takes too long to get a home phone

Personal Profile

"There are only so many services provided, but not enough for middle class people... it would be nice if there was the one server that gave the information about everything that was needed for marshukas (buses) and other things."

For Roza, who does not have a landline at home, a mobile phone is a very important device that allows her to stay in contact with her friends and family; however, she would like to see more affordable mobile phone services for "middle class" people like her.

There is only one landline in a community building in her village that closes at 5 PM every day.

While Roza herself is not tech savvy; she does not use the internet or computers. However, she recognizes the importance of technology for her daughters, and would like to have a computer at home while they are in school.

Roza and her husband rely on their friends and family to find specialist to complete services they need. Recently, she needed to find a mechanic and used her social network, stating *"...it's better to find someone through your friends."*

Roza's Goals for MoSoSo Directory

- Would be more likely to seek a recommendation for services than to make one

- Would want to access the service without using text

- Would like to find recommendations for professional services from other members of a group

- Groups she would join
    Family
    Neighbors
    May look in the public area for professional services

Key Significant Differences

Least likely to use the phone for work
Lives in a rural area
Not tech savvy

Personal Information

Age: 35 years
Profession: Housewife - her husband is a driver for an agricultural corporation (for 23 years)
Lives: In Ceragulak, a rural village
Home Life: Lives with her husband, son and two daughters
Russian: Can speak and read Russian
Primary Home Language: Kyrgyz
Primary (Husband's)Work Language: Kyrgyz
Schooling: Completed secondary school
Income: (Husband's income) 4200 soms a month (approx $110.00)

Technical Information

Internet Use?: No
Computer User? : No, but she would like to get a computer for her two daughters who are still in school
Cable or Satellite TV: No
Home Landline: No

Mobile Phone Use

Length of use: 17 months
How acquired: Was given the phone by her brother
Use how often: Three to five days a week
For: Primarily for personal calls
SMS: No, but has considered it
Feelings and concerns:

She feels it is difficult to use a mobile phone when you do not know English

She is concerned that mobile phones represent a threat to local culture and ways

She feels strongly that mobile phones allow her access to important and relevant information

3

Figure 5: Roza persona graphic

Roza. Roza's persona segmentation represents only 13% of our survey respondents; as such, we consider Roza a secondary persona and wrote only one scenario for her. See Figure 5 for Roza's persona graphic.

Roza's biographical background was derived primarily from the rural family group interview. The father's brother lived in a village where only one land line was available in a community building that closed at 5 p.m. Roza's persona was developed specifically to illustrate the more casual technology users that the system was targeting. Roza's scenario focuses on user requirement 6 - finding local services without needing to text.

1. When Roza's husband, Ermek, left for work this morning, he discovered that their car would not start. He called a co-worker who luckily was able to pick up Ermek on his way to the local farm where they both work. Ermek asked Roza to find a mechanic to fix the car as soon as possible.

2. Trusting her social network for answers, Roza begins to call friends and family to see if anyone knows of a good mechanic with experience fixing their make and model of car.

3. Her sister-in-law suggests that Roza call the general information line. This suggestion frustrates Roza because it can take several hours to get through the information line and then she will have no idea if the mechanic will be up to the task of fixing her car.

4. Rather than calling the information line right away, Roza calls a neighbor who tells her about the MoSoSo directory and gives Roza a password for a shared group directory that many in her neighborhood are part of.

5. Since Roza does not use text messaging, Roza is pleased to find she can interact using only her keypad by answering questions that guide her to a list of locally recommended mechanics.

6. After navigating her way through the phone tree, Roza finds a mechanic whom the neighborhood group recommends.

In summation, while each scenario illustrates particular user requirements of the MoSoSo directory, the personas provide an idea of who the users are by amalgamating multiple sources of data. Together, the scenarios and personas provide a compelling way to describe and communicate user requirements to designers and developers who helped build the prototype.

Prototyping the MoSoSo application

We are developing prototypes in two phases focusing the first phase on user requirements critical for the primary persona segments, Parxat and Shirin. For phase one we focused on SMS/text input to allow (a) businesses to add their information to a public directory and edit or delete their information later (requirement 1), (b) users to create and join shared directories (requirement 2), (c) users to contribute and rate businesses in shared directories or in a public directory (requirement 4), (d) users to retrieve and make recommendations in both shared directories and public directories (requirement 5), and (e) users to post messages to a shared group directory (requirement 3, phase one).

Later phases will include the additional requirements of (a) allowing users to broadcast (push) or subscribe to messages in a shared directory via text (requirement 3, phase two) and (b) allowing users to retrieve information from the service without using text (requirement 6). By developing the prototype, we were made aware of some of the limitations of creating a SMS/text-based interface.

Limitations: SMS/text interface

The most salient and difficult limitation enforced by designing for SMS/text interface is the 160-character limit (which includes spaces and returns) for each message in English and 140-character limit in Russian (because the Cyrillic alphabet is not supported by ASCII). Since we were initially designing for novice users, we added instructional text which used extra characters; the character limitation forced us to use some phrasing in the instructional text that we knew would be difficult to understand. Additionally, since most users in Kyrgyzstan pay for each outgoing message, it became critical to design the system so the user would need to send a minimal number of messages. It also became apparent that the interface needed to be designed with a future expert mode in mind that would not include instructional text.

Version one prototype

Our version one prototype was built using Adobe Flash using text formatted in XML to help with the translation into Russian. See Figures 6 and 7. Since the prototype was built for interaction on a personal computer, it did not accurately duplicate a real text interaction on a phone. However, for these initial usability tests, we were more concerned with whether users would understand the interaction design un-confounded with the laborious actions involved in triple tapping text messages.

We designed the interface to look like a phone to help the participants understand that they were pretending to use a mobile phone; the number buttons were not active. Interaction with the prototype involves the participant reading the instructional text, clicking into the screen, typing their message back to the MoSoSo system, and then clicking the send message button.

The version one prototype was tested for usability in Bishkek, Kyrgyzstan, in the last week of March 2009 (too late to include the results in this paper). The usability sessions were interpreted by Russian speakers and facilitated by members of the CAICT team who have been trained in usability methods. Additionally, the Russian speakers were trained in usability methods for test reliability.

Figure 6: Initial home screen in English and Russian

Discussion

Mobile phones are becoming increasingly ubiquitous in all parts of the world. However, capturing and conveying user requirements and then creating appropriate products for developing countries is difficult. Communicating user needs is more challenging when considering technologies designed for geographically and culturally diverse communities because it is likely that design team members will have minimal previous knowledge about end-user needs.

The case study presented here discusses our process of (1) identifying a tenable product concept; (2) ascertaining user requirements and communicating user needs through the creation of personas and scenarios — all using preexisting qualitative and quantitative data; and (3) developing a version one prototype to be tested for initial usability in Kyrgyzstan. While it is ideal to travel to the users and conduct field studies for the creation of user requirements, it is not always affordable or feasible to do so. Additionally, we recognize that designing for diverse communities is crucial for both development and economic reasons, and we would argue that user researchers and designers can make significant headway in creating appropriate designs by extracting user requirements from existing data sources.

Finally, as mobile phones become more powerful, it is important for designers to remain aware that users in developing nations may not have access to advanced feature sets, be comfortable performing more advanced actions such as texting, or be able to afford data plans. While a solution like the MoSoSo Directory may serve as a design pathway that ultimately proves to be temporary, we feel it would provide an important service that would meet multiple user needs and goals. Furthermore, it can be implemented with technology currently available and will work within the constraints defined by the users and within the limitations their phones. We believe the process by which we developed the user requirements for the MoSoSo Directory can serve as an example for others concerned with creating user-centered products and services for developing countries and diverse populations.

Future work

Following the results from our usability tests using the version one prototype, we plan to iterate our design and conduct additional usability tests using local participants. Additionally, we plan on developing prototypes that work on mobile phones to better simulate the final product. Design iterations tested with multiple populations (which include local participants) will allow us to explore the viability of robust information delivery and exchange via SMS. Since diverse users and resource-constrained communities can be found in various contexts, from developing countries to poor neighborhoods in developed countries, we feel it is beneficial to improve designs that accommodate as broad a range of usage scenarios as possible.

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Acknowledgments

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