Research Article

Adapting User-Centered Design Methods to Design for Diverse Populations

Cynthia Putnam
Doctoral Candidate
Dept. of Human Centered Design & Engineering
423 Sieg Hall, Box 352315
University of Washington
Seattle, WA 98195-2315 USA
(206) 543-2567

Emma Rose
Doctoral Candidate
Dept. of Human Centered Design & Engineering
423 Sieg Hall, Box 352315
University of Washington
Seattle, WA 98195-2315 USA
(206) 543-2567

Erica J. Johnson
Post-Doctoral Fellow in Central Asian Studies
Center for Eurasian, Russian and East European Studies
Edmund A. Walsh School of Foreign Service
Georgetown University
Box 571031, ICC 111
Washington, DC 20057-1031 USA
(202) 687-6080

Beth Kolko
Associate Professor
Dept. of Human Centered Design & Engineering
423 Sieg Hall, Box 352315
University of Washington
Seattle, WA 98195-2315 USA
(206) 543-2567

Abstract

User-centered design (UCD) methods such as personas and scenarios are useful tools for communicating extensive user research to design teams. However, the intensive data collection and onsite fieldwork required to create personas and scenarios can present barriers for user researchers and design teams working on technology innovations for diverse populations, including those in developing regions. This article presents a model that demonstrates how user researchers and design teams can use data collected for other purposes to source personas and scenarios and to substantively adopt user-centered design approaches. We demonstrate our methods based on research conducted in a case study in Kyrgyzstan, a country in Central Asia.

Introduction

As designers and researchers who have worked in settings in both the United States and in developing regions, we have come to recognize that traditional approaches to user-centered design (UCD) methods are difficult to deploy in developing regions (Kam, Bhagwani, Kuman, Lal, Mathur et al., 2007; Maunder, Marsden, Gruijters, & Blake, 2007). These difficulties are not confined to developing regions, but also apply to potential users from a substantively different cultural context (i.e., diverse populations) than that in which technology design occurs. UCD is part of the multidisciplinary field of human-computer interaction (HCI). HCI embraces many disciplines, including (but not limited to) computer science, cognitive psychology, anthropology, graphic design, and industrial design. While HCI broadly explores how humans interact with technology, UCD is a design philosophy that emphasizes the importance of considering the end user's needs, goals, and desires when creating products or services. This article reports on our attempt to adapt two traditional UCD methods (personas and scenarios) so that they are more easily adoptable for researchers who are working with diverse audiences and those who want to communicate their research to design teams.[1] This work also recognizes that it is difficult and resource intensive to conduct user research in developing or culturally distant regions, and our goal is to demonstrate ways that researchers can use unconventional data sources to communicate with design teams about end users.

A *persona* is an archetypal character that represents a group of users

1. In this article, the term design team includes professionals responsible for interaction design, defined by Cooper, Reimann, and Cronin (2007) as "the practice of designing interactive digital products, environments, systems and services." Actual job titles could include graphic designers, developers, interaction designers, information architects, technical writers, interface designers, product designers, etc.

who share common goals, attitudes, and behaviors when interacting with a particular product or service (Cooper, Reimann, & Cronin, 2007; Mulder & Yaar, 2007; Pruitt & Adlin, 2006). A *scenario* in a UCD context is a story that describes how a character performs an activity in relation to a product (Carroll, 2000b; Go & Carroll, 2004; Quesenbery, 2006; Rosson & Carroll, 2003). Although there is debate within the UCD community about the persona-and-scenario approach (see Chapman & Milham, 2006; Portigal, 2008), this article starts with the assumption that personas and scenarios are useful in certain circumstances, and we address how to make these design approaches more viable in diverse design settings. Traditional research employed to create personas and scenarios has focused on users in relationship to a specific product or service. Our research, however, did not fit the traditional mold as it was not associated with a specific product. Rather, it was culled from existing general social research.

As members of the Central Asia + Information and Communication Technology project (CAICT), a multiyear study of the use of information and technologies in Central Asia, we have collected thousands of data points pertaining to attitudes, behaviors, and goals in relation to technologies used throughout the region. CAICT's field research, then, was not about the design of a specific product or service. Rather, it was general research collected over several years, some of which had a design focus, and some of which was geared to larger social issues. However, as the research included technology usage and trends, we realized that the data we collected could be leveraged to build personas and scenarios to communicate about Central Asian end users. Summarizing user research into usable and actionable documentation for design teams is always challenging and even more so when relating information about a culture or group with which the design team is unfamiliar. Our analysis and discussion here focuses on the developing world, but this approach can be used when designing for diversity in general, whether for economically disadvantaged users or for other resource-constrained communities.

Because personas and scenarios must be created in relation to a product or service, we first needed to ideate a product concept. What emerged from our data, targeted at mobile phone users, was a mobile social software (MoSoSo) directory that enabled users to access listings for local businesses, rate local businesses, view ratings of local businesses, and create password-protected shared directories that could contain business listings, ratings, and message boards. We focused our initial prototype design efforts on SMS/text access to the directory, but we also envisioned voice access through telephony phone trees in later iterations.

The persona-and-scenario approach resonated with our general sense of how to communicate our data to design teams, but after looking at how most of the literature discusses personas and scenarios, it became clear that adapting those methods would be necessary. We had very rich data that were not collected with the intent of creating personas and scenarios, but that nevertheless allowed us to use these traditional UCD approaches. We believe the ability to leverage existing data sources to create personas and scenarios expands the utility of UCD methods. Because many existing data sources (e.g., the World Values Survey or the World Internet Project) are readily available, we argue that this case study can be generalized to other design projects for developing regions or for resource-constrained or diverse communities. Additionally, the methods discussed in this article might help user researchers and designers repurpose qualitative work from anthropologists, sociologists, and other researchers to create personas and scenarios.

Background

This section discusses personas and scenarios and the claims regarding their utility in the design process. In the next section, we briefly describe Kyrgyzstan. This is followed by a detailed discussion of the MoSoSo product concept that inspired this case study. Finally, we outline our research approach for leveraging existing data to create Kyrgyz personas and scenarios.

Personas

Proponents claim that personas are effective for describing users and user requirements because they increase empathy, focus, and communication, and help design teams avoid stereotypes (Cooper, et al., 2007; Kuniavsky, 2003; Mulder & Yaar, 2007; Pruitt & Adlin, 2006). Each of these claims is subsequently discussed in more detail.

Increased empathy. Grudin (2006) argues that some of the power of personas lies in our ability to empathize with fictional characters much as we do

with those in movies and books. He speculates that the more a designer engages in the persona fiction, the more aligned his mental models will be with that of the user and, therefore, the more aligned the user interface and interaction will be with real user goals and needs.

Tighter focus. Focus emancipates designers from problems that might arise when considering a full spectrum of users. It allows designers to concentrate on the highest priority goals and needs of a specific user or subset of users. In fact, Cooper et al. (2007) argue that it is better to design specifically for one person than vaguely for everyone.

Better communication. Proponents contend that personas provide a communication channel for conveying a wide range of quantitative and qualitative data (Pruitt & Grudin, 2003). Clear communication in turn facilitates consensus and efficiency in team decision-making (Mulder & Yaar, 2007). Making the assumptions about users explicit can also provide a clear benchmark to measure a design's effectiveness and provide guidance for choosing participants in later usability studies. In other words, personas that make the end user explicit can put all design team members on the same page.

Avoid stereotypes. Lacking user research, designers have only their assumptions and intuitions to guide their work. Goodwin argues that "the whole point in creating personas is to get past our personal opinions and presuppositions" (Goodwin, 2002). Personas, therefore, can replace the naïve assumptions about and stereotyping of end users by the design team.

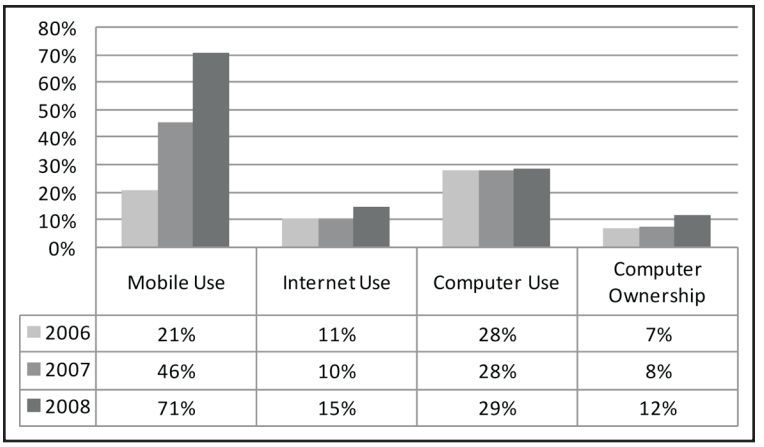
If personas achieve these benefits, proponents assert, design teams will have a useful image of the end user. Empathy will lead to the creation of an interaction experience that is more aligned with the user's needs and goals. A clear focus will lead to a consistent interaction experience with salient cues to guide the high-priority users. Good communication will lead to better decision-making among design team members. Avoiding stereotypes forces designers to dismiss their assumptions and consider real user goals and needs. If all these benefits are achieved, an improved user experience is expected. This dynamic is precisely what can lead to more effective designs for diverse populations, including in the information and communication technology for development (ICTD) space.

Scenarios

Quesenberry (2006) suggests that stories are an important augmentation to personas because stories are effective at communicating culture and transmitting persona information into a memorable format. Whereas personas describe the individuals who will interact with a product, scenarios in HCI describe the content and context of the interaction. Proponents suggest that scenarios in HCI are effective because people are prewired to receive complex information through storytelling (Grudin, 2006). Advocates of scenarios stress the inclusion of typical and significant user activities that reflect user goals when interacting with a specific product or service (Carroll, 2000a; Go & Carroll, 2004).

Depending on the discipline and granularity of detail the scenario is designed to depict, the term *scenario* can have many meanings. Other disciplines that use scenarios include strategic planning for business, requirements analysis and engineering, and object-oriented design (Go & Carroll, 2004). In strategic planning for business, companies use "what if" scenarios to prompt decision-making about alternative approaches to possible events years in the future (Kahn, 1962). HCI scenarios used for requirements analysis and engineering tell the story of a computer interaction from a system's perspective and are concerned with moment-to-moment interactions at the task level. Seminal work in this field includes the "Inquiry Cycle Model" (Potts, 1995). HCI scenarios used in object-oriented design approaches (often termed "use cases") describe the possible path a user might take through a system focusing on the task level. Object-oriented design approaches using these types of scenarios include "Responsibility-Driven Design" and automated system modeling (Jacobson, 1995; Koskimies, Systä, Tuomi, & Männistö, 1998; Wirfs-Brock, 1993). The differences in these types of scenario use are (a) the perspective from which the scenario is written, and (b) how far into the future the reader is asked to imagine possibilities.

For this article, we created HCI scenarios that Cooper et al. (2007) refer to as "context" or as "a-day-in-the-life" scenarios in their Goal-Directed Method™ design approach. This type of scenario is told from the user (persona) perspective and focuses on a specific user goals while that user is interacting with a product or service. Context scenarios are created at an early phase of development (compared to other HCI scenarios) and can be used to "explore, at



	Mobile Use	Internet Use	Computer Use	Computer Ownership
2006	21%	11%	28%	7%
2007	46%	10%	28%	8%
2008	71%	15%	29%	12%

Figure 1. Technology trends in Kyrgyzstan, based on survey data collected by the CAICT project.

a high level, how the product can best serve the needs of the personas," and "help create initial user requirements before the specifics of the product are understood" (Cooper et al., 2007).[2]

In summation, personas and scenarios help design team members think about the user's perspective. Whereas personas help design teams understand who the users are, scenarios help them understand what users want to do.

Kyrgyzstan

Kyrgyzstan is a post-Soviet country transitioning to a capitalist economy. The population, estimated at 5.5 million, is concentrated in the capital city of Bishkek in the north and in the heavily agricultural Ferghana Valley in the south. The country's population is very literate, with a literacy rate of 99%, and young, with a median age of 24.2 years (by comparison, the U.S. median age is 36.7). The ethnicity of the population is mostly Kyrgyz (65%), followed by Uzbek (14%), and Russian (13%). Most Kyrgyz (about 75%) consider themselves Muslims (*CIA World Factbook,* 2008).

Face-to-face social networks are critically important in the region (Kuehnast & Dudwick, 2004). Social networks serve as avenues for gathering and sharing information, assistance, and goods. They also offset the lack of reliable and trusted information from public institutions, such as the government, police, and court system (Kolko, Johnson, & Rose, 2007). We have also found that technology is positively associated with an individual's use and trust of their face-to-face social network (family, friends, and neighbors) for multiple types of information seeking (Putnam & Kolko, 2009).

In addition, technology growth in Central Asia has not followed the same pattern as in the West. As shown in Figure 1, Internet and computer use remain relatively low, whereas mobile phone use has increased at a rate of about 25% per year.[3] Combined with the importance of social networks, rapid mobile phone adoption provides opportunities for designing appropriate technologies that leverage existing patterns. This goal inspired our initial product concept of the MoSoSo directory.

MoSoSo Directory Concept

The responses of people in Kyrgyzstan in focus groups and interviews, as well as to surveys, prompted the idea for a mobile software service that would act like a Yellow Pages delivered via mobile phone and that would also leverage social networks. When Kyrgyzstan was part of the Soviet Union (prior to 1991), information directories were available, but no longer exist today. Some business directories can be purchased in some bookstores, but these publications do not include listings of everyday services, and they are primarily geared for the foreigner and NGO community. Moreover, although two free information lines operate in the country (similar to 411), respondents complained that it could take all day to reach an operator, and it is expensive to call the landline-based information service with a mobile phone. Throughout our work, the theme of scant public information resources has been noted. Thus, a technological solution that leverages the possibility of user-generated content seemed a likely grassroots solution to the information scarcity problem. Specifically, we identified a need for a recommendations tool/service to fill a

2. In the approach of Cooper et al. (2007), context scenarios are followed by "key path scenarios" and "validation scenarios," both of which are analogous to the more detailed scenarios used in other HCI approaches.
3. However, we found that increased mobile phone usage has not resulted in high levels of mobile Internet usage.

niche, similar to what Internet sites like "Angie's List" and online retailers like Amazon.com do in the United States. With low Internet penetration, we reasoned that Internet-based solutions would not attract the necessary volume of users to make a directory based on user recommendations useful or trustworthy. An appropriate solution to the information problem would, instead, leverage mobile phones.

In summation, three key factors inspired the shape of the service: (a) no standard phone directories are available in the country; (b) Kyrgyz highly value close social networks for information, assistance, and goods (Kuehnast & Dudwick, 2004); and (c) there is a strong upward trend in mobile phone use and ownership in Kyrgyzstan whereas the growth of computer and Internet use is relatively flat. Ideally, after we identified the MoSoSo directory as a tenable concept, we would then have conducted field studies to elicit specific user requirements and collected data specifically for personas and design scenarios. However, due to timing and economic constraints, we were unable to collect such data; instead, we leveraged data already available to us.

Research for Personas and Scenarios

The creation of personas and scenarios commonly uses face-to-face interviews and observation studies to examine current and possible future uses of a specific product or service (Cooper et al., 2007). When designing products for the developing world or other diverse communities, however, these common research methods are not always viable for many reasons: Budgets are limited, the ability to perform firsthand onsite research can be challenging without extensive local knowledge, and product cycle time frames can limit the feasibility of field research. Each of these factors might prevent the in-depth study of a target market that would be typical for traditional approaches to persona and scenario creation.

One solution to these challenges is to use data that are otherwise available. Many countries, market research firms, and academics conduct social survey work and ethnographies. Global projects, such as the World Values Survey or the World Internet Project, provide overviews of populations, their attitudes, and patterns of media and technology usage. Anthropologists produce ethnographies about societies around the world, and sociologists conduct in-depth studies that designers could repurpose if they had a methodology to do so.

In this article, we present personas and scenarios of mobile phone users in Kyrgyzstan. They were created using data from two previous CAICT studies: (a) a 2007 survey of 1,000 respondents in Kyrgyzstan, and (b) 16 interviews, with 12 participants. Neither study focused on user requirements or the creation of personas and scenarios for a specific product or service. The survey was conducted to identify attitudes and behaviors associated with technology use, and the focus groups and interviews were conducted to identify how mobile phones support existing and new social networks.

Using statistical analyses of the survey data and information from the interviews, we created three personas, each with an accompanying context scenario to communicate user requirements for the proposed MoSoSo directory application. This case study demonstrates that researchers can use accepted UCD methods (personas and scenarios) to help designers make appropriate technology design decisions, even when they lack the resources to conduct firsthand research on a given product or service. Our effort thus acknowledges the constraints facing many researchers and design teams who lack institutional support and/or budgets that allow for research studies focused on product design.

Data Collection Methods (Existing Data)

As we did not have the luxury of conducting primary research focused on the MoSoSo directory, we used two sets of previously collected data to create the personas and scenarios. Neither data collection was focused on user requirements for a specific product or service. The characteristics of each dataset are described below.

Survey Data

The first set of data was from an April–May 2007 large-scale social survey of 1,000 respondents, aged 15 and older, that was administered in urban and rural areas in several regions in Kyrgyzstan. The survey sample was based on government census information on age, gender, ethnicity, and geographic location. The sample included 50 sampling locations, with 12–29 respondents interviewed in each location. The survey instrument was designed by a team of researchers from the University of Washing-

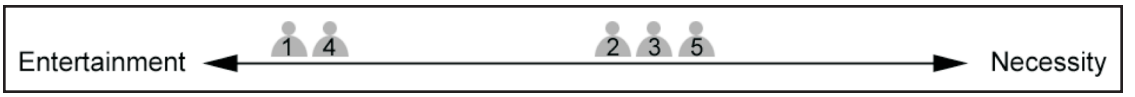


Figure 2. Example of a Cooper et al. (2007) attitude spectrum in relation to a product.

ton. The BRiF Research Group, located in Kazakhstan, administered the survey. Households were selected by a random walk procedure. Then each household respondent was chosen using the Kish Grid method, a common technique to ensure a random selection of household members (Kish, 1949).

Focus Group and Interview Data

The second set of data used to inform the personas and scenarios was from focus groups and interviews conducted by three University of Washington researchers in two Kyrgyzstan sites: the capital city of Bishkek and Kara Balta, a smaller suburban city. Researchers conducted two sessions in each location; each session involved a focus group and individual interview of three individuals, for a total of 12 adult participants. This data identified mobile phone usage patterns that inform the maintenance of social networks.

A Model for Using Existing Data

The following sections discuss how we modified traditional user requirement research approaches for creating personas and scenarios as they are discussed in the literature. While there is no one recipe for creating personas and scenarios, the literature agrees on three basic steps: (a) collect data about users, (b) segment the users, and (c) create a persona for each user segment and develop context scenarios for each persona (Cooper et al., 2007; Pruitt & Adlin, 2006). Context scenarios should illustrate the persona interacting with the product and reflect a usage goal that persona has for the product or service (Cooper et al., 2007). As we were using existing data, the first step was complete.

Because the data collection step was completed, the other two steps became more complicated and required modification from common approaches discussed in the literature. The next section compares the traditional methods for persona and scenario creation with our approach. In so doing, we provide a roadmap for others who might want to build user requirements with limited data sources and present them via personas and scenarios.

Segment the Users (Step 2): What the Literature Suggests

While marketing segments are typically defined to hone a message for increasing sales aimed at the consumer (buyer), segments for personas focus on the person(s) who will ultimately use a product (user). Demographics, psychographics (psychological factors that drive behaviors), and job roles are common approaches for marketing segmentation (Barlow-Busch, 2006). These approaches are also valid in persona segmentation, but the literature stresses focusing on differences in uses of the product for persona segments.

Mulder and Yaar (2007) argue that the best dimension with which to segment users is according to the goals they have when using the product, whereas Cooper et al. (2007) focus more on attitudes and behaviors that end users have toward the yet-to-be-designed product. Cooper et al. (2007) also advocate the use of interviews for data collection, using a clustering method to put each interview subject on spectrums of opposing attitudes or behaviors concerning the specific product. For example, when segmenting users for a software product, they used attitudinal extremes of necessity versus entertainment, as shown in Figure 2. Interview subjects are placed along various attitudinal and behavioral spectrum extremes, and then clusters of users are identified.

Segment the Users: What We Did

As discussed, in two key areas, our data sources were much different than those typically used: (a) Rarely have other publications addressed a process that used data not collected in relationship to a specific product, and (b) one dataset was from a survey that led us to use several quantitative methods. (Using quantitative methods in the creation of personas is rarely discussed in the dominant literature.[4])

4. The few examples of publications that discuss quantitative persona segmentation include Chapman, Love, and Alford (2008) and Mulder and Yaar (2007).

Persona Segmentation Using Survey Data

In our survey results, 460 respondents owned mobile phones. We segmented respondents via survey questions that most closely pertained to goals, as suggested by Mulder and Yaar (2007). These questions asked respondents whether they agreed or disagreed with 12 motivations (reasons) for why they acquired a mobile phone. Respondents could agree to multiple motivations, as shown in Table 1. This was our first modification to cited methods. Although research would typically inform goals in relationship to a specific product, we focused on motivations related to the technology that would deliver the service.

Using Phi correlations, we discovered significant positive relationships that broke into three logical groupings: (a) the motivation to replace a home phone; (b) practical motivations, including a need to make calls and mobile phone affordability; and (c) social motivations, which included a desire to receive calls and a need for a mobile phone because friends had them.

Final Groupings

We next placed the respondents in one of three groups based on their responses. We found that 354 of the 460 respondents who owned mobile phones claimed motivations that fell into one of the three final motivation groups without overlap. Our final three groups are discussed below.

Replacement group. In the final segmentation model, there were 46 (13%) individuals in the replacement motivation group. A large majority (84%) of this group reported not having a phone at home, 7% said their home phone line was bad quality, and 9% thought that home phones took too long to install. Therefore, the primary driving replacement motivation of this group was a lack of a home phone.

Practical group. There were 195 (55%) individuals in the practical motivation group. Almost all members of this group (99%) indicated a need to make calls when away from home or work as the motivation for acquiring a mobile phone. Some 2% were also motivated by mobile phones being cheaper to purchase than landlines and another 2% by getting a good price for the phone. The primary driving motivation of this group was a desire to make outgoing calls when they were away from landlines at home or work.

Social group. There were 113 (32%) individuals in the social motivation group. A majority (85%) wanted people to reach them at all times, 19% got their mobile phone because their friends had them, and 4% wanted to receive voice mail. Therefore, the primary driving motivation of this group was a desire to receive incoming calls at all times.

Note that the primary motivation of each group was significantly negatively associated with the other primary motivation statements. These negative associations confirmed the logic of our initial persona segmentation groupings. In sum, we first looked for an appropriate survey question that captured how users would use the MoSoSo directory and that approximated user goals when using the product. After choosing "user motivation for acquisition of their mobile phone," we determined if there were, indeed, distinct groups through significant Phi correlations. Once satisfied that these groups were potentially different, we determined that the three groups differed in other areas as detailed in the next sections.

Persona Group Differences

We analyzed the survey data through the lens of our proposed three groups to look for important group differences. Using multivariate analyses of variance (MANOVAs), we conducted omnibus tests on three constructs relevant to our personas: (a) demographics; (b) mobile phone attitudes, behaviors, and experience; and (c) other technology.

Construct One: Demographics.

There were 10 variables in this construct, including age, years of schooling, living in an urban versus rural location, household size, gender, marital status, number of children, self-reported socioeconomic status (SES), employment status, and student status.

Construct Two: Mobile phone attitudes, behaviors, and experience.

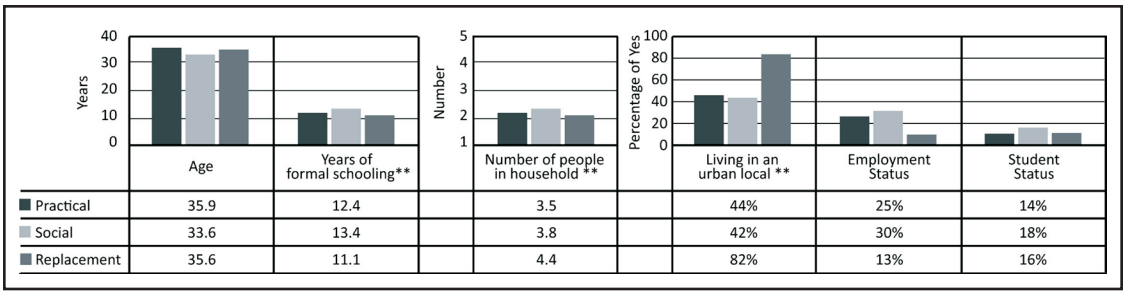
There were 22 variables in this construct. Ten variables asked respondents to rate several attitudes about mobile phones on a scale of 1–4. Eight variables asked respondents to report on possible mobile phone usage behaviors. One variable focused on the respondent's actual mobile phone usage patterns. Another variable explored how respondents acquired their first phones,[5] and still another asked respondents how much they would

5. This variable was dummy coded (0, 1): Received as a gift (the most common answer) was coded as 1.

Table 1. Phi Correlations for Motivations to Acquire a Mobile Phone.

	n	1.	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.
1. I do not have a home phone	460	—											
2. My home phone is bad quality	460	−.08	—										
3. It takes too long to get a home phone	460	−.20**	−.19**	—									
4. To make calls when away from home	460	−.25**	−.04	−.06	—								
5. It is cheaper than a home phone	460	.03	−.03	−.03	−.06	—							
6. I got a good price	460	.04	−.04	−.04	−.19**	−.36**	—						
7. My friends all have mobile phones	460	.02*	−.01	.03	−.02	.35**	.32**	—					
8. I like to receive voicemail	460	−.02	.19**	−.02	−.06	−.03	.09	−.26**	—				
9. I like people to reach me at all times	460	−.14**	.03	.02	−.32**	.09	.17**	−.13**	−.05	—			
10. Easier to make international calls	460	−.01	−.03	.05	−.19**	−.04	−.05	−.04	−.03	−.09*	—		
11. I need it for work	460	−.26	−.01	−.10	−.01	−.01	−.02	−.03	−.01	−.05	−.01	—	
12. Convenience	460	−.08	−.03	−.03	−.03	−.04	−.05	−.04	−.04	−.04	−.04	.17**	—

Notes: Positive significant correlations are in bold face. Statements are reordered here to emphasize groupings; the last three statements were not significantly positively associated with any of the three groupings, so they were omitted from evaluation.



	Age	Years of formal schooling**	Number of people in household **	Living in an urban local **	Employment Status	Student Status
Practical	35.9	12.4	3.5	44%	25%	14%
Social	33.6	13.4	3.8	42%	30%	18%
Replacement	35.6	11.1	4.4	82%	13%	16%

Figure 3. Construct One: Notable Differences in Demographics.
*** = significant differences found in the MANOVA omnibus test*

miss their phones if they no longer had them.[6] The last variable in this construct examined the frequency of mobile phone use.[7]

Construct Three: Other Technology

There were seven variables in this construct, including computer ownership, computer and Internet use, frequency of computer and Internet use, landline ownership, and cable or satellite TV availability in the home.

Several steps were taken to assure assumptions for MANOVA tests were met. Homogeneity of variance/covariance was tested through Box's Test of Equality (Tabachnick & Fidell, 2007). Whereas the first two constructs met the Box test requirements, Construct 3 did not and therefore could not be analyzed through a MANOVA. Consequently, items for Construct 3 were analyzed using univariate ANOVA and Chi-square tests, with a Bonferroni adjusted alpha.

Construct One: Demographics

The groups differed on the best linear combination of the 10 demographic outcomes, Wilks'$\Lambda = 0.868$, $F_{(20, 684)} = 2.52$, $p < 0.001$, $\eta 2 = 0.069$, meaning that approximately 7% of the variance is accounted for by demographic group differences. Follow-up, pair-wise comparisons, using a Bonferroni adjustment, showed that groups differed significantly on three of the 10 variables in the construct: years of schooling, living in an urban versus rural location, and household size. In Figure 3, we also show findings that were important to the persona descriptions, but non-significant in the MANOVA model, including average age, employment status, and student status.

It is important to note that although we are using inferential statistics to analyze the quantitative data (and are careful to control type-one error inflation for each construct), significance for a variable is a fairly high bar to clear. An alpha of 0.05 means that group differences need to be so extreme that they would only happen by chance in fewer than 5% of cases. Additionally, using a Bonferroni adjustment means that, in the univariate follow-up test, the 5% alpha is distributed among *all* the variables in the construct. Whereas this type of rigor is important in evaluating experimental data, personas are ultimately descriptive tools. Consequently, we feel that descriptive data describing group differences that do not reach the bar of statistical significance should, nevertheless, be included in the personas to increase the overall breadth of their descriptions; especially data that follow clear, but non-significant trends. For example, see Employment Status in Figure 3.

Construct Two: Mobile Phone Attitudes, Behaviors, and Experiences

The groups differed on the best linear combination of the 22 mobile use outcomes, Wilks'$\Lambda = 0.665$, $F_{(44, 378)} = 2.95$, $p < 0.05$, $\eta 2 = 0.185$, meaning that approximately 19% of the variance is accounted for by mobile phone attitudes, behavior, and experience group differences. The variables in the mobile phone construct accounted for almost three times the variance in group differences when

6. Most (52%) said they would miss their phone "a lot," skewing the data; therefore, the variable was dummy coded so that "a lot" was coded as 1 and all other answers coded as 0.
7. Most (73%) used their phone several times a day, which introduced skewed data; therefore, the variable was dummy coded so that "several times a day" was coded as 1 and all other answers were coded as 0.

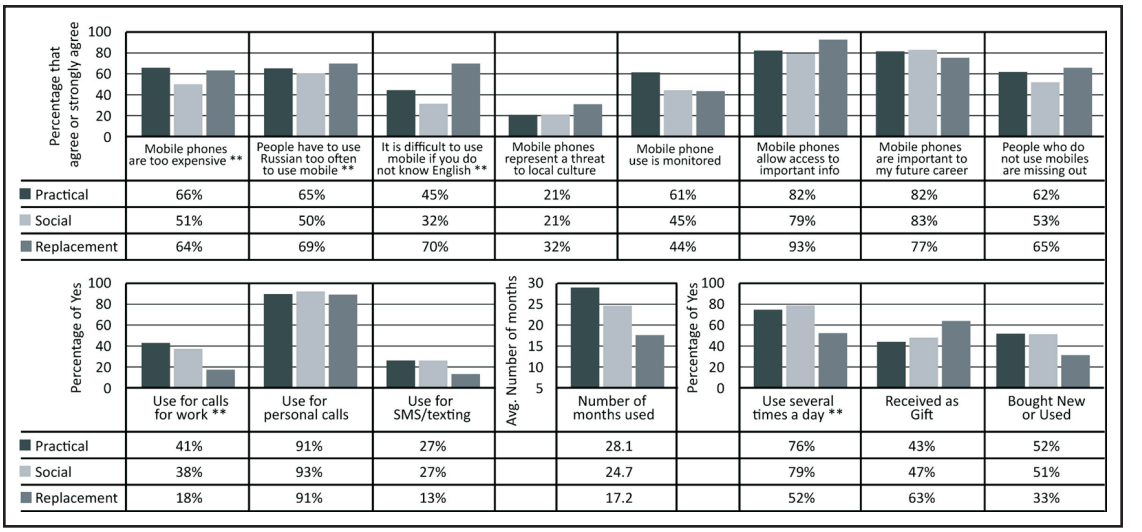


Figure 4. Construct Two: Notable Differences on Attitudes, Behaviors, and Experience.

*** = significant differences found in the MANOVA omnibus test*

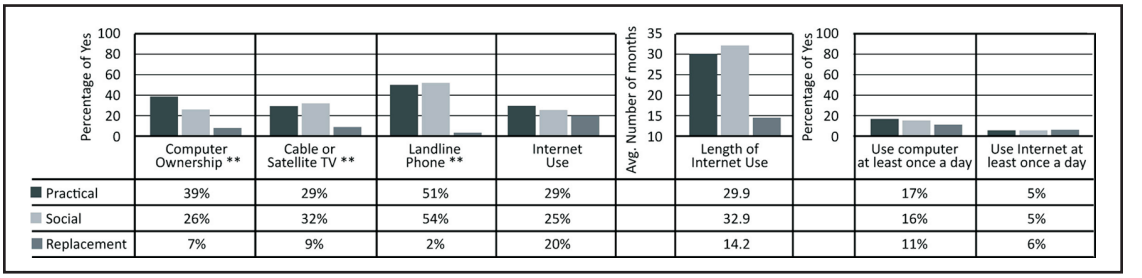


Figure 5. Construct Three: Notable Differences in Other Technology Use.

*** = significant differences found in Chi-square tests*

compared to the demographic construct and were an important validation of the segmentation model. In other words, the groups differed more on their mobile phone attitudes and usage than they differed on demographics. Follow-up pair-wise comparisons, using a Bonferroni adjustment, showed that groups differed significantly on 5 of the 22 variables in Construct Two, as shown in Figure 4.

Construct Three: Other Technology

We created the technology construct because it is commonly advised to include computer, Internet, and other technology usage in persona development, if the product is technologically based (Mulder & Yaar, 2007). Items for the last construct were analyzed using univariate ANOVA and Chi-square tests, with a Bonferroni-adjusted alpha for each variable in the construct (0.05/7 variables = adjusted alpha of 0.007). Computer ownership, having a landline phone, and cable/satellite TV were all significantly different among the three persona groups. Figure 5 shows computer and Internet use details that were not significantly different, but that were incorporated in the final personas. Many of these details show interesting trends among the three user groups, such as Internet use and length of Internet use.

In sum, the segmentation model provided a lens through which we evaluated the multiple variables in the survey and provided an interesting depiction of mobile users in Kyrgyzstan. Our steps were to: (a) find a meaningful segmentation model that would reflect how users would utilize the MoSoSo directory, namely their motivation (goal) to acquire a mobile phone; and (b) investigate whether our initial

Table 2. Interview Participants by Motivation Group.

Interview ID	Location	Participants	Roles	Primary motivation
KG_UF1	Bishkek	Urban Family	Father (KG_UF1_F1)	Practical
			Youngest son (KG_UF1_S2)	Social
KG_UY1	Bishkek	Urban Youth	Female Friend 1 (KG_UY1_F1)	Social
			Female Friend 2 (KG_UY1_F2)	Social
			Male Friend 1 (KG_UY1_F3)	Social
KG_RF1	Kara Balta	Rural Family	Father (KG_RF1_1)	Practical
			Mother (KG_RF1_2)	Did not own a mobile phone
			Younger brother (KG_RF1_3)	Practical/Social
KG_RY1	Kara Balta	Rural Youth	Male Friend 1 (KG_RY1_1)	Social
			Male Friend 2 (KG_RY1_2)	Practical/Social
			Female Friend 1 (KG_RY1_3)	Social

segments demonstrated significant differences in three constructs that were important for persona creation that might affect how, when, or if individual respondents would use the MoSoSo directory. To encapsulate this data into a set of memorable personas, we needed more than simple statistical differences. We needed realistic back stories and scenarios based on people's experiences that would illustrate user requirements. To create these stories, we turned to focus group and interview data.

Persona Segmentation of the Interview Participants

We segmented the 12 interview participants into the three established user groups, based on their descriptions of: (a) telephone use, both land lines and mobile phone, and (b) how they used their mobile phone and other technology in their lives. See Table 2 for interview identifications and descriptions. In the next section, we describe how the interview data were integrated and used for the final persona and scenario creation.

Create the Personas and Scenarios (Step 3): What the Literature Suggests

The literature suggests a few basic guidelines on persona content. The guidelines include the use of a non-posed photo (Mulder & Yaar, 2007; Pruitt & Adlin, 2006), a personal name beginning with the first letter of the segmentation group name, a biographical profile, and personal information that affects usage patterns in relation to the product (Pruitt & Adlin, 2006). Additionally, it is commonly advised to include computer, Internet, and other technology usage, if the product is technologically based (Mulder & Yaar, 2007). Finally, user goals for the product are considered critical (Cooper et al., 2007).

Personas are presented through many mediums, including posters and 8½″ × 11″ sheets of paper (Pruitt & Adlin, 2006). Others have experimented with more interesting mediums, such as employing action figures (Nieters, Ivaturi, & Ahmed, 2007), creating living spaces in which the design team interacts in the same types of physical spaces as the

personas (Goodwin, 2006), and placing a summary persona on reference cards (Pruitt & Adlin, 2006). Pruitt and Grudin (2003) suggest creating a "foundation document" that explicitly links the final personas to the supporting data that emphasize their connection to the underlying empirical research.

Recall that context scenarios are intended as a simulation of the persona interacting with the product that focuses on usage patterns and persona goals in a specific context. Carroll (2000b) suggests that scenarios need three basic elements: (a) the setting where the action takes place, (b) one or more actors [i.e., personas], and (c) a plot that details a sequence of events and actions. Scenario representations can be presented as storyboards, prototypes, videos, or in a sequenced narrative (Cooper et al., 2007).

Kyrgyz Case Study: What We Did

We followed the guidelines above as closely as possible to create our personas and scenarios. We used photos from interview participants and gave our personas Kyrgyz names, with the first letter matching the first letter of the segment group. The culturally appropriate names also clearly identify the personas as representatives of a non-Western audience. We used our interview data for the biographical and personal content and the survey data to identify technology usage patterns. Identifying user goals, however, was more difficult. Because we were unable to travel to Kyrgyzstan to re-interview participants about their goals for a MoSoSo service, we inferred goals from our existing data.

To make these inferences, we examined respondents' answers to focus group and interview questions. One question, in particular, asked participants to describe a recent task that was hard to complete. The responses provided data that elaborated on challenges participants had experienced completing everyday tasks. On the basis of these stories, we imagined how the MoSoSo directory could have been part of a solution to their problems. For our final scenarios, we also included details from individual participant interviews in which participants described their experiences from the previous day.

We designed the persona presentation for an $8\frac{1}{2} \times 11$" sheet of paper. Additionally, we created a detail sheet for each persona that tied each data point for the persona to the specific data from which it was extracted. This detail sheet was a simplified stand-in for the "foundation document" discussed above (Pruitt & Grudin, 2003). We present our context scenarios here as numbered sequences (Cooper et al., 2007).

Findings: User Requirements, Personas, and Scenarios

Our resulting three personas were: Parxat, the practical user, Shirin, the social user, and Roza, the replacement user. Each of the one-page persona presentations included: (a) a photo that looks like a real person, not a model (Mulder & Yaar, 2007; Pruitt & Adlin, 2006); (b) key differentiators (Mulder & Yarr, 2007), (c) personal information formatted as a bullet list (Mulder & Yarr, 2007), (d) computer and Internet usage that characterizes the technical abilities of each persona and illustrates significant behavior patterns (Mulder & Yarr, 2007; Cooper & Reimann, 2003), (e) a personal profile written in prose (Mulder & Yarr, 2007; Pruitt & Adlin, 2006), and (f) user goals for the product that emphasize end goals (Mulder & Yarr, 2007; Pruitt & Adlin, 2006). We also encapsulated several critical user requirements for the MoSoSo directory in the context scenarios.

User Requirements Reflected in the Context Scenarios

We identified six key user requirements for the MoSoSo directory that allowed individuals to: (a) add/edit business entries in a public directory via SMS/text, (b) create and join private group directories that are shared by family or friends to support social networks via SMS/text, (c) broadcast (push) or post (pull) information within their private shared group directories via SMS/text, (d) contribute and rate services in both the public directory and in private shared directories via SMS/text, (e) retrieve recommendations or information from the public directory and from shared private directories via SMS/text, and (f) retrieve information from the service without using SMS/text. Each scenario highlights specific user requirements as suggested in the literature (Cooper et al., 2007).

Practical Parxat

Parxat's background story of being a computer game club owner is largely based on that of interview participant KG_RY1_2 who, at the time of the interview, was a 25-year-old computer game club owner. Since the persona segment represented 55% of the survey respondents, we identified him as the

primary persona whose goals and needs are the most important for the MoSoSo directory to meet. See Figures 6 and 7.

We identified three defining characteristics for the Parxat persona: (a) he uses his phone for work calls, reflecting the fact that 41% of practical users in the survey data use their phone for work, a rate higher than that of any other group; (2) he purchased his phone, reflecting the practical group's greater likelihood—more so than our other two groups—to have bought their phones; and (c) he is more tech savvy than the other two personas, based on the higher likelihood of his owning a computer. We made Parxat a little bit older than the mean age for the practical group (35.9 years) to emphasize the difference with the social group. All other personal data were based on survey data.

Parxat's technical information and mobile phone use was mostly based on survey findings. We found, however, that our interview participants were more likely to use text messaging than the 27% rate of use extrapolated from the survey. Since the MoSoSo service needs some text interfacing, we exaggerated Parxat's texting ability to align it with the reported text use of interview participant (KG_UF1_S1), whom we had situated in the practical segment.

The quotes attributed to Parxat's persona are lifted directly from the interview participants and emphasize his strong reliance on friends. Parxat's goals for the MoSoSo directory, as a small business owner, are inferred from the interviews.

Parxat's Context Scenario

For Parxat's context scenario, we focused on two specific user requirements: (a) add business entries, and (b) contribute and rate services in both the public directory and in private shared directories via SMS/text. See Table 3.

Social Shirin

The context scenario for the social user came from male participant KG_UF1_S2, who conveyed his experience in a student group where he functioned as both a member and organizer. Shirin was also identified as a primary persona because her segment represents 32% of the survey respondents. See Figures 8 and 9.

We identified three key characteristics for Shirin: (a) she uses her phone to primarily call friends, emphasizing the fact that 93% of social group members use their phones for social calls; (b) she is the least likely to feel that mobile access is too expensive, reflecting the fact that only 50% of the social group felt that mobile phone use was too expensive (significantly less than the other two groups); and (c) she is somewhat tech savvy, reflecting our finding that the social group had the second highest level of experience with computers and the Internet. We made Shirin a little younger than the mean age for the social group (33.6 years) to emphasize the group's difference from the practical group. All other personal data were based on survey findings.

Like Parxat, we also exaggerated Shirin's texting enthusiasm and based her texting rate on interview participant KG_RY1_1, whom we had placed in the social segment. The quotes in Shirin's persona are directly from interview participants who we had located in the social group and focus on social aspects of her life. Shirin's goals for the MoSoSo directory, like those of Parxat, are inferred from the interviews.

Table 3. Parxat's Primary Context Scenario.

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 advertise his shop in the 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 phone tree system, he decides to locate his shop under the public information space heading of "Computer cafe/club." The entry system allows Parxat to set up two types of advertisements, one for users who use 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 positive vote. Ilzat already has a friends group that he belongs to in the MoSoSo directory and offers to not only give Parxat's shop a good vote in the public information space, but to also add it as a recommended computer club in his group's information space.

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 6. Parxat Persona.

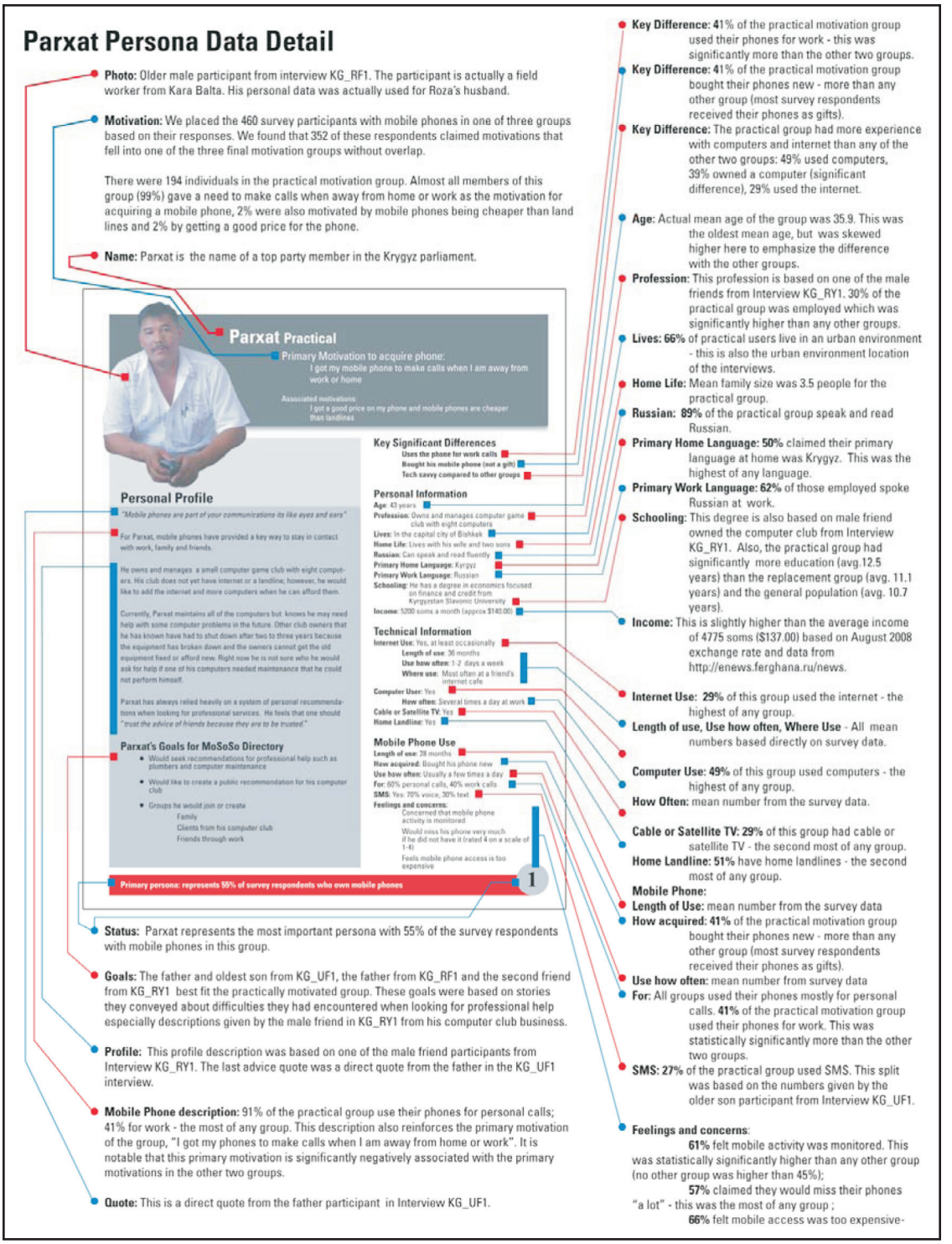


Figure 7. Parxat Persona Data Detail.

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

Primary persona: represents 32% of survey respondents who own mobile phones

2

Figure 8. Shirin Persona.

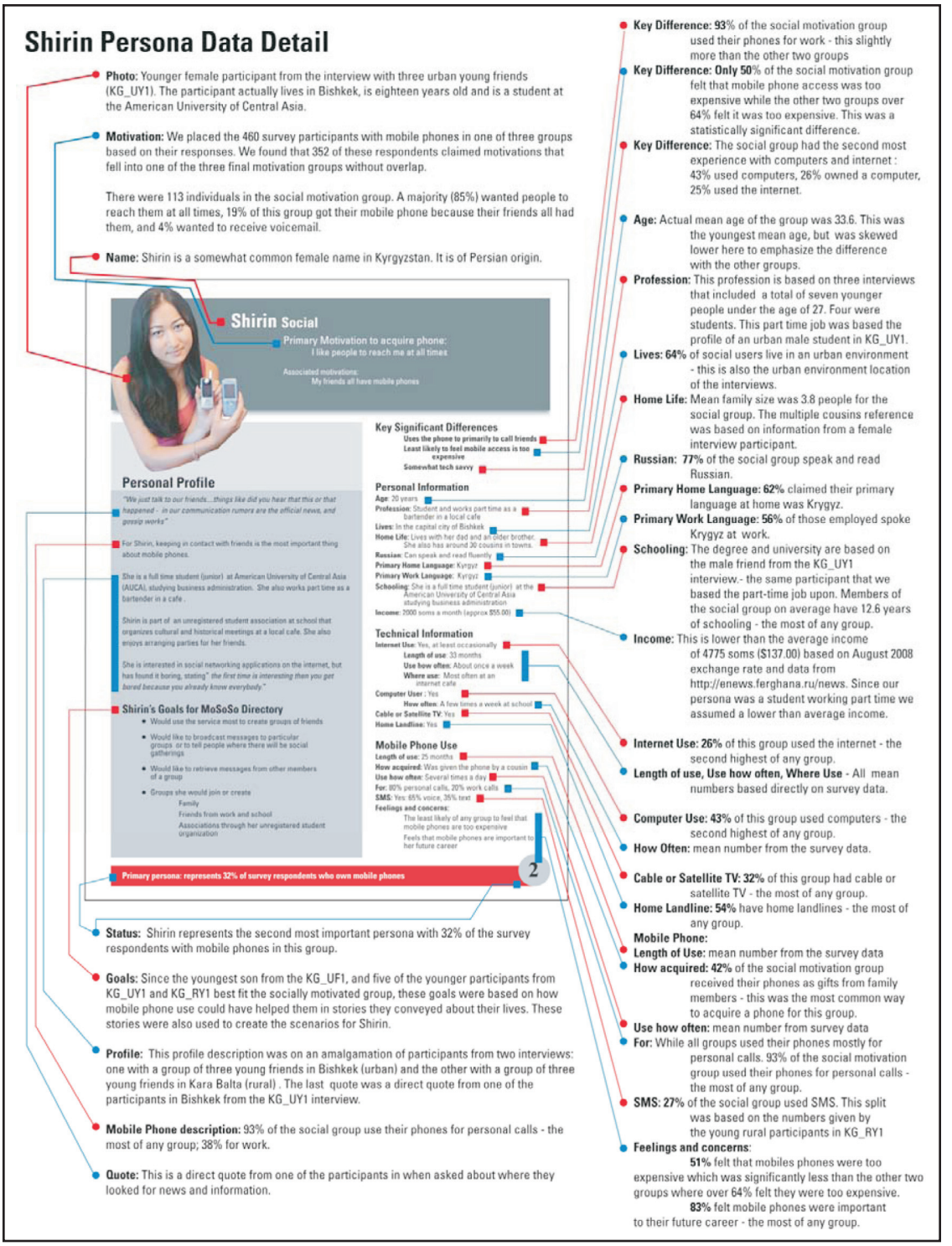


Figure 9. Shirin Persona Data Detail.

Table 4. Shirin's Primary Context Scenario.

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 group for her student organization.
3	She also wants to set up the group so users can get notices in several different ways. They can (1) call in for new information, (2) ask for a text alert that there is new information and then call in, or (3) sign up for text broadcasts.
4	A few days later, once the group has been set up, she sends out a message about an upcoming meeting for group members.

Table 5. Roza's Primary Context Scenario.

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 began to call friends and family to see if anyone knew of a good mechanic with expertise fixing their make and model of car.
3	Her sister-in-law suggested Roza call the general information line. This suggestion frustrated 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 good.
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 the neighborhood group.
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 that the neighborhood group recommended.

Shirin's Context Scenario

For Shirin's context scenario, we focused on two user requirements: (a) create and join private shared group directories to support social networks via SMS/text, and (b) broadcast (push) or post (pull) information within their private shared group directories via SMS/text. See Table 4.

Replacement Roza

Roza's biographical background was derived primarily from an interview with suburban family members (KG_RF1). The father's brother lived in a village where the one landline was housed in a community building that closed at 5:00 P.M. See Figures 10 and 11. Because Roza's persona segment only represents 13% of survey respondents, we identified her as a secondary persona whose goals and needs are less of a driving force in the design of the MoSoSo directory than those of the other two personas.

We identified three key characteristics for Roza: (a) she is the least likely to use her phone for work; (2) she lives in a rural area, reflecting survey results that indicate 82% of the replacement group lived in a rural area; and (3) she is not tech savvy, which reflects our finding that the replacement group was the least tech savvy. Roza's remaining personal data were based on survey findings for her segment.

As with the previous two participants, Roza's technical information and mobile phone use were based on survey findings. Since none of our interview participants fit in the replacement group, Roza's quotes are from interview participant KG_UF1_F1, who emphasized the importance of social networks (rather than technologies) when finding services.

Roza's Context Scenario

Roza's context scenario came from urban father participant KG_UF1_F1, who described his recent difficulty in finding a mechanic. Roza's scenario focuses on one specific user requirement: allow users to retrieve information from the service without using SMS/text.

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

Secondary persona: represents 13% of survey respondents who own mobile phones

3

Figure 10. Roza Persona

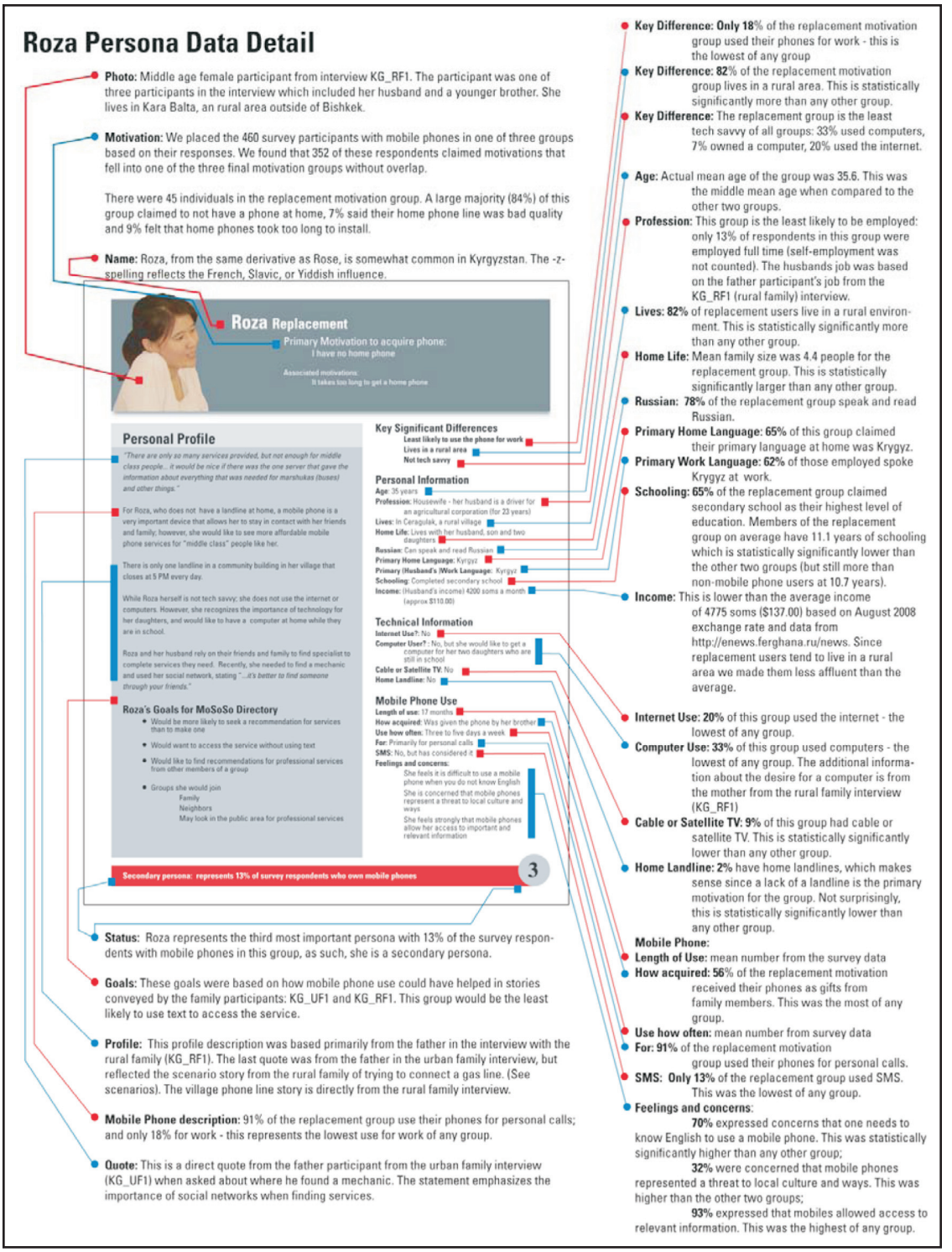


Figure 11. Roza Persona Data Detail.

Each of these context scenarios illustrates particular user requirements of the MoSoSo directory, based on real stories about difficulties users encountered in their lives, the importance of social networks, and how the MoSoSo service might support those existing networks and solve a problem. The personas amalgamate multiple sources of data to provide an idea of who the users are, and the scenarios describe a particular interaction with the proposed service. Together, the personas and scenarios roll up complex data from multiple sources into communication conduits that design teams can use to understand end users.

Discussion

The case study presented here discusses how we used existing qualitative and quantitative data to create personas and scenarios that identify user requirements and communicate user needs. The data were not collected in relation to a specific product or service. However, after the product idea of a MoSoSo directory was generated, we revisited the existing data to help create UCD deliverables. We began by segmenting the audience through statistical analysis of survey questions and identified three groups that were differentiated by their motivation to acquire a mobile phone: practical, social, and replacement. We then analyzed the survey data for additional differences among the three groups. The differences reflected in the final personas were based on three constructs: (a) demographics, (b) attitudes about mobile phones and mobile phone usage, and (c) other technology experience. Whereas quantitative datasets were useful for user segmentation, the richer qualitative data were needed to create personal profiles and scenarios.

Once each interview participant was placed in the appropriate segment, the interview information was used to fill in biographical stories. The resulting persona information was amalgamated into a single sheet for each persona to provide a memorable image of end users. The scenarios presented here were based on real-life stories in response to interview questions about difficulties the participants had encountered. For each context scenario, we inferred how the MoSoSo directory could help the participants navigate those difficulties, and we focused on specific user requirements.

Because design research for diverse populations, including developing regions, is expensive and demands significant resources and expertise, we argue that using existing data sources can reduce costs while still representing the user needs of these populations. Designing for diverse populations is crucial for both development and economic reasons. Whereas on-the-ground studies are irreplaceable as data sources, other approaches are needed if design is to address increasingly diverse users. User researchers and designers can make significant headway toward creating appropriate designs by extracting user requirements from existing data sources.

Additionally, we demonstrate that personas and scenarios make compelling communication summations of user research that help define user requirements. Because there is little information about how to create personas and scenarios using existing data, the methods presented here will help researchers (a) create effective conduits of user research (personas and scenarios) that capture and communicate user requirements to design teams, and (b) allow a broader range of designers, including those in workplaces that lack financial resources and/or cultural expertise, to make use of such approaches to develop creative and appropriate technologies for diverse users.

Future Work

We plan to use the work presented here in two very different studies. The first is part of an investigation in which we hope to identify the variables that affect how useful, actionable, and usable personas and scenarios are from the perspective of design team members. In part of that study, several professional design team members will be asked to interact with the personas and scenarios presented here in an experimental lab setting. Additionally, they will be asked to reflect on previous use (if relevant) of personas and scenarios and whether interacting with personas/scenarios that represent a diverse audience has an effect on their utility. We hope to identify which claims made of personas and scenarios in the literature are met, and what circumstances affect their usefulness.

We are also in the process of developing a second version of the MoSoSo prototype for usability testing. Version one was created by design team members who used the personas and scenarios pre-

sented here. In late March 2009, we conducted eight usability tests in Bishkek, Kyrgyzstan, using a rough prototype of version one created in Adobe Flash. This early prototype lacked voice functionality; all interaction was through text with a simulated phone displayed on a computer. Our initial results presented rich data with respect to the functionality as well as the user interface. The basic concept was enthusiastically received by six of our eight participants. Our future work will include continual iteration and testing of the MoSoSo directory prototypes to see if our development process that relied significantly on existing data did indeed generate a usable and useful product. ■

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