Communication as Information-Seeking: The Case for Mobile Social Software for Developing Regions

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ABSTRACT
In this paper, we describe several findings from a multi-year, multi-method study of how information and communication technologies have been adopted and adapted in Central Asia. We have found that mobile phone usage is outpacing the rate of Internet adoption, that access to the Internet is primarily through public access sites carrying with it issues regarding privacy and surveillance, that people rely on their social networks as information sources, that public institutions tend to be fairly weak as citizen resources, and that information seeking and communication are conflated in people's usage patterns with different technologies. In addition, in the developed world social networking software has grown rapidly and shown itself to have significant potential for mobilizing a population. Based on the collection of findings from Central Asia and observing patterns of technology usage in other parts of the world, our research leads to the conclusion that exploring mobile social software holds significant potential as an ICT that meshes well with preexisting patterns of communication and information seeking and also leverages the most predominant pattern of technology adoption. Many of the findings from this research echo results from studies in other geographic areas, and so we anticipate that much of this research will be relevant to developing regions generally.

Categories and Subject Descriptors
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Design, Human Factors, Languages, Theory

Keywords
Social networks, mobile social software, cross-cultural, mobile devices, cell phones, ICTs, usage patterns, design ethnography, Internet, developing world, emerging markets, Central Asia, international

1. INTRODUCTION
This paper discusses selected findings from a multi-year study of information and communication technologies (ICTs) and their usage within Central Asia, specifically the countries of Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan. This project, the Central Asia + Information and Communications Technologies Project (CAICT), began with exploratory work in Uzbekistan in 2000, and has since expanded to the general region.

Central Asia is a multi-ethnic, multi-lingual area that has several characteristics common to emerging markets and developing regions. The region is still in early stages of general ICT adoption, and existing infrastructure and economic constraints have resulted in a relatively slow diffusion pattern for ICTs. However, the characteristics of the slow diffusion pattern have made Central Asia an especially productive research site and have allowed our research to identify a variety of local conditions that impact ICT adoption and influence how an ecology of ICT usage evolves.

The CAICT project includes a multi-method approach that incorporates broad social surveys, interviews, ethnographic observation, policy monitoring, web archiving, monitoring and analysis of chat sites, focus groups, and design ethnography. The project is a longitudinal investigation of ICT adoption and adaptation patterns that will inform future design efforts.

The results presented in this paper focus on several findings from various research strands that are informing a current design effort to explore mobile social software that would be effective for developing regions. In particular, several pieces of data demonstrate that the activity of communication overlays with information seeking in the region. The goal of this paper is to extract a series of findings from the study that demonstrate the important potential of mobile social software for developing regions.

2. METHODOLOGY
The following section describes each of the methods employed as part of the data collection efforts.

2.1 Survey
A broad social survey was conducted in the region in January–March 2006. This survey was based on pilot survey work in Uzbekistan in 2002-2003 and in Kyrgyzstan in 2003–2004. The CAICT project designed the survey instrument and contracted the survey firm BRIF Research Group, located in Almaty, Kazakhstan, to administer the 2006 survey. The survey was administered to 4,000 respondents, aged 15 and older; 1000 respondents were surveyed in each of four countries: Kazakhstan, Kyrgyzstan, Tajikistan, and Uzbekistan. The survey sample was based on census information for age, gender, ethnicity, and geographic location released by the government of each country.

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The sample includes 50 sampling locations, and 12-29 respondents were interviewed in urban and rural areas from several regions of each country.

The 2006 survey explores patterns of ICT adoption and adaptation in Central Asia, and it also focuses on pre-existing patterns of information use, information seeking behavior, and levels of trust in various producers and sources of information. The survey, which was administered in Russian and other regional/national languages to residents throughout each country, contains over 300 variables. The survey will be repeated annually for three years. These results will be used as a baseline for future comparisons, allowing researchers to track change over time as ICT use in the region becomes more widespread.

In addition to the general sampling scheme, a three-stage process was used to select respondents:

- Probability Proportional to Size sample of Primary Sampling Units (PSU);
- Consecutive random sampling of households in determined PSU;
- Selection of a respondent using Kish Grid method.

The survey was not targeted specifically to Internet users. Because Internet usage rates in the region tend to be quite low, the majority of the questions is geared to the general population and address information seeking behavior and communication patterns across traditional media. However, the survey does ask all respondents a series of questions about attitudes towards the Internet; the purpose behind these questions is to gauge public perception of ICTs among nonusers as well as users. All respondents are also asked if they are Internet users, and those who characterize themselves as users are administered a separate section on Internet usage patterns. It is important to note that as we report findings from this survey, n varies widely based on data validity; respondents had "don't know" and "refused" options that are not reported in the figures below.

2.2 Interviews

Interviews have also been conducted throughout this project. In 2002, interviews with Internet café operators, IT professionals in Uzbekistan and others helped to guide the creation of the survey content, and these interviews have also guided future steps of the project.[12][17]

Additionally, in the framework of the CAICT project, we aim to understand how ICTs are used in professional spheres. To that end, we have conducted semi-structured interviews with teachers in Uzbekistan, health professionals in Kyrgyzstan, and business people in Kazakhstan to learn about how these individuals utilize the Internet in their professions.

Other interview efforts include 2006 semi-structured and structured individual interviews of mobile phone users, Internet users, and computer gamers, and an interview study of mobile phone users during the Kyrgyzstan revolution in March 2005. Full results of those studies are beyond the scope of this paper and will be reported in separate papers.

2.3 Ethnographic Observation

The ethnographic observation conducted since 2003 has primarily focused on public use of ICTs. Members of the US research team as well as local researchers have participated in ethnographic data collection in each of the four countries. Data collection includes field notes and photographs. The observational data is used to provide explanatory background to the survey and interview work, and it also adds an important component to the chronicling of everyday life in the region and technology use.

2.4 Public Internet Access Sites

Employing local research assistants in each of the four countries, the CAICT project gathers information on usage patterns and user statistics of regional Internet cafés (one of the primary locations for online access and gaming in the region). This data enables us to understand who uses computer technology, the types of technology available, connection speeds, and the cost of Internet access. The regional research assistants make monthly visits to public Internet access points to report details about the volume of customers, type of customers, and type of customer activities; these observations contribute to the overall picture of Internet usage within the region. Such findings are designed to contribute as well to conversations about customization of Internet access points and their technologies.

3. FINDINGS

3.1 Internet Use Versus Mobile Use

Aggregate data from the CAICT survey reveal important differences in usage patterns in resource constrained regions than those seen in more highly resourced areas. For example, mobile phones are a far more ubiquitous technology for communication and information seeking purposes than the Internet, and use of computers does not automatically translate into use of the Internet.

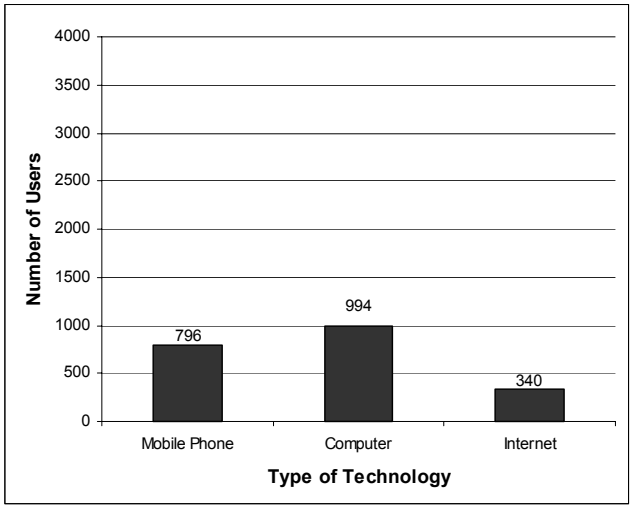

Figure 1. Mobile Phones, Computer and Internet Use in Central Asia in percent; N=4,000

As Figure 1 indicates, people in the region use mobile phones at roughly twice the rate of the Internet. Of the 4000 respondents to the survey, 796 reported using or owning mobile phones compared to 340 who reported being users of the Internet. These two technologies are considered together as elements of a general ICT environment. When this study began in 2000, the Internet was beginning to diffuse, but mobile phones were barely present. [10] [11]. In the past six years, the landscape of ICT availability

and usage has shifted dramatically with activity concentrated on the mobile industry.

In considering the general ICT environment, we have also found it useful to break out measures of computer use and Internet use. Again, as seen in Figure 1, many more people report using computers than the Internet, and this is an important distinction when tracking "computerization" of a society. The national policies in the region often trumpet information technology and projects to integrate computers into the government and other workplaces. But the addition of computers often translates to the presence of individual workstations, stopping short of the transformative step of networked machines and networked environments. Nearly one-quarter of the respondents, 994, report having used a computer compared to the 340 who report using the Internet. The high response rate regarding computer use can be related to the introduction of computers into the workplace and also computers-in-schools projects. Although many computers-in-schools projects deploy the machines primarily for skill-based exams, they still serve to introduce people to computer technology.

It is also worth noting that, in general, respondents who use the Internet have been doing so longer than respondents report using mobile phones. As Table 1 indicates, mobile phone adoption in the region began later, but spread more quickly. The rapid growth of mobile phone usage can be seen in a variety of developing regions, and is attributable to a variety of factors, including price and the limitations of existing telecommunications infrastructure. [2] [5].

Table 1. Length of Mobile and Internet Use (in months)

	Mobile Phone (n=796)	**Internet (n=340)**
All countries	22.68 (SD = 17.33)	31.73 (SD = 21.45)

3.2 Patterns of Online Activity

Internet use in the Central Asian context differs considerably from that found in other countries which possess extensive Internet infrastructure and a higher diffusion rate of ICTs, such as the United States, Canada and Australia. Figure 2, below, indicates the frequency with which self-reported Internet users access the Internet. The vast majority of Internet usage in the region occurs via dialup connections, and connection to the Internet backbone can run through ISPs connecting with various regional neighbors, including China and Russia, (we discuss the implications of the infrastructure on usage patterns and constraints in section 4.1).

Part of the motivation for the CAICT project was to develop a more detailed understanding of what constitutes Internet use. Simple reporting of numbers of Internet users provides an incomplete picture of how the Internet is actually taking root within a country. Therefore, the CAICT survey asks respondents to characterize their use. As Figure 2 shows, using the Internet one or two times a week may constitute frequent use for respondents.

Complementing the survey findings with ethnographic results also leads to the awareness that these Internet usage sessions can be relatively short. Because most people gain access to the Internet in a situation where their time is metered and the cost is relatively high, they spend relatively short amounts of time online. Generally speaking, Internet access in the region costs about US$1/hour. Average monthly wages in the region range from US$30-US$60/month, with Kazakhstan having a higher per capita income.

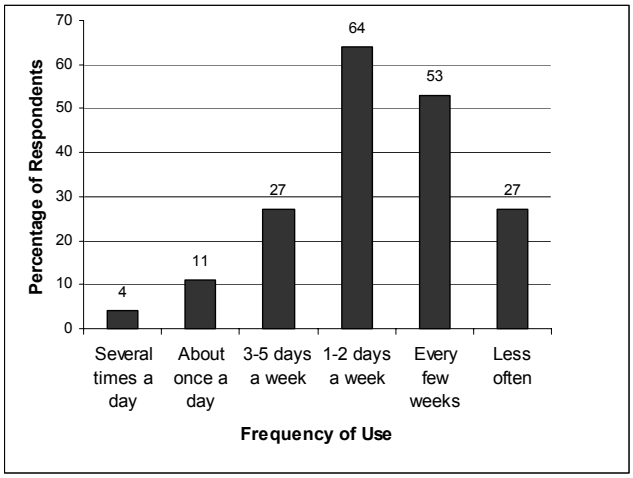

Figure 2. How often do you use the Internet, regardless of place? (N=186)

The most frequent pattern of access reported is one to two days per week, followed by accessing the Internet every few weeks. Only 4 out of 186 respondents reported using the Internet several times a day, and 11 reported using it about once per day. By contrast, 27 people reported using the Internet less often than every few weeks.

The data from the survey demonstrates, then, that even for the early adopters in the region, the Internet does not tend to be a technology for daily use. Internet has not taken root as part of everyday life in the same way that it has in more developed regions, especially as broadband is only sporadically available and most people gain access to the Internet outside of the home.

When people do go online, they tend to engage in both information-gathering activities – such as finding news or seeking information about a job – as well as communication activities such as sending email. Browsing the Internet for fun and other entertainment activities are also popular uses for the Internet. Figures 3 and 4 provide more detail on these and other activities.

Unsurprisingly, e-commerce is a barely visible presence in the region. This is due to several factors, including the lack of a banking structure with credit or debit cards to support online transactions. New "web cards" have appeared in some places, which allow people to purchase something akin to a gift card that comes preloaded with a certain amount of cash that can be used for online transactions. There is also no particular imperative for local businesses to develop a web presence to facilitate ecommerce, and so this sector of Internet development has been slow to emerge.

Electronic mailing lists are also among the least popular online activities from those asked about in the survey. Only 26 of 337 Internet users report using listservs, which is especially relevant because mailing lists are a potentially important element of informal education and general information which could have particular importance in the largely information-impoverished region.

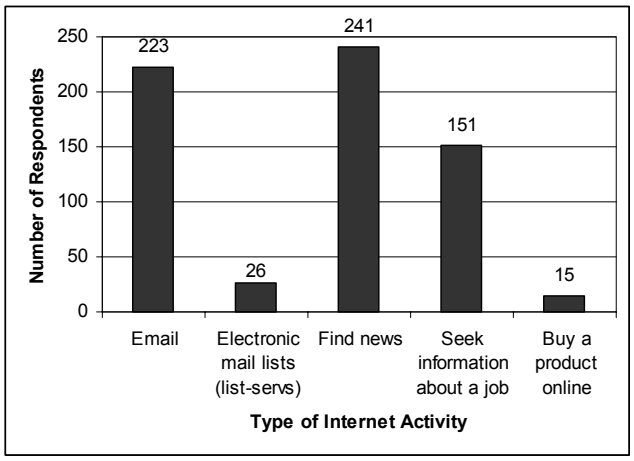

Figure 3. Types of Internet activities (N=337)

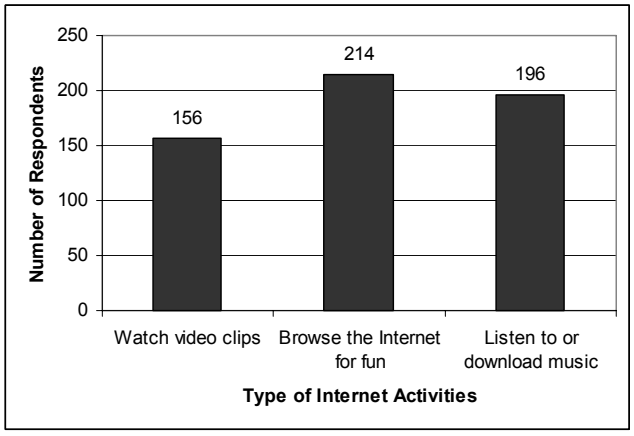

Figure 4. Types of online Internet activities (N=337)

No particular pattern emerges from the usage data about information seeking versus communication, unless we contrast email with listservs. The use of the Internet to find news at such a high rate (241 respondents; the most frequently reported activity) is likely due in part to the lack of robust local news coverage. Self-censorship among media outlets is common practice in the region, and some explicit censorship practices remain. [6]

The entertainment aspects of the Internet have also taken hold in Central Asia. Ethnographic observations and data from the monthly Internet access points collected by local researchers demonstrate that Internet cafes often offer music download services for phone ringtones, and they also offer CD-burning services. International copyright laws are loosely if at all observed in the region.

Internet cafes also often offer movie rentals on site so customers can watch DVDs on the computers. CD-burning and movie viewing are two examples of non-Internet reliant services that local businesses offer in order to accommodate customers with a range of budgets. Music burning or movie viewing are charged at different rates than Internet access, so providing non-Internet services allows a small business to draw in customers who might not be able to afford Internet access. Overall, Internet usage activities span both information seeking and communication, although other survey findings help to contextualize email usage within a broader network of communication with friends and family.

3.3 Trust in Institutions/Family and Friends

Because of the corruption endemic to the Soviet system and the rapid and traumatic changes that followed the collapse of the Soviet Union, citizens of post-Soviet countries are skeptical and even distrustful of official institutions and media [7][8]. In particular, the courts and police, which were instruments of Stalinist terror and Soviet social repression, continue to be viewed with distrust [15].

Figures 5, 6, and 7, below, provide an overview of patterns of trust in the region. The survey asks respondents about their trust and confidence in a variety of institutions; these figures report respondents' trust in official institutions, traditional media and the Internet, and social networks. Central state-associated institutions such as police and the courts suffer from a somewhat low rate of trust from the general population. This pattern dovetails with evidence from other surveys, interviews, and ethnographic observation that emphasize the importance of social networks for people in the region.

Figure 5 focuses on respondents' trust in a range of official institutions, including local and national government. The police and courts are trusted at somewhat lower levels than the local and national government.

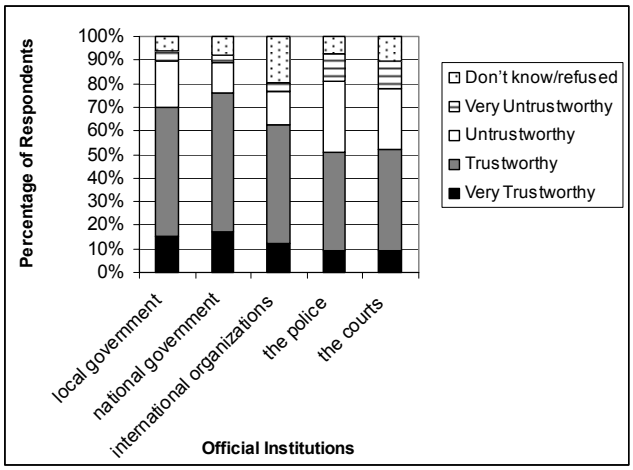

Figure 5. Trust in Official Institutions

In addition, the rating of "very untrustworthy" for police and courts is noticeable, particularly in contrast to the pattern of response for the national government. These results are reported with the caveat that survey work in post-Soviet contexts can be challenging, and there are generally difficulties with respondents' willingness to answer honestly.

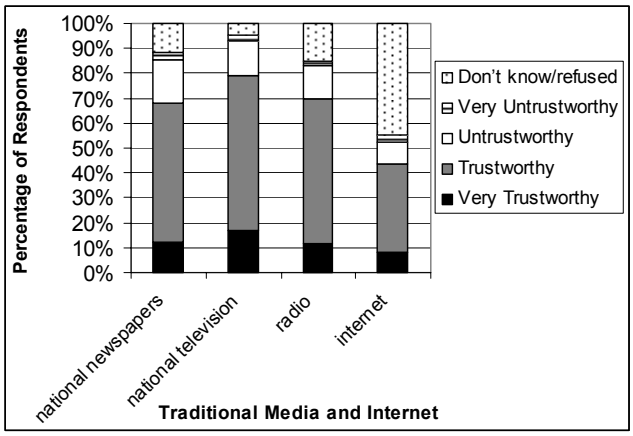

Figure 6. Trust in Traditional Media and Internet

Figure 6 repeats the trustworthy measures with respect to media sources. Respondents to the survey reported using the television as a primary source for information across multiple domains; however, as this question helps explicate, just because people use television to get information doesn't mean they trust the information they do get from that source.

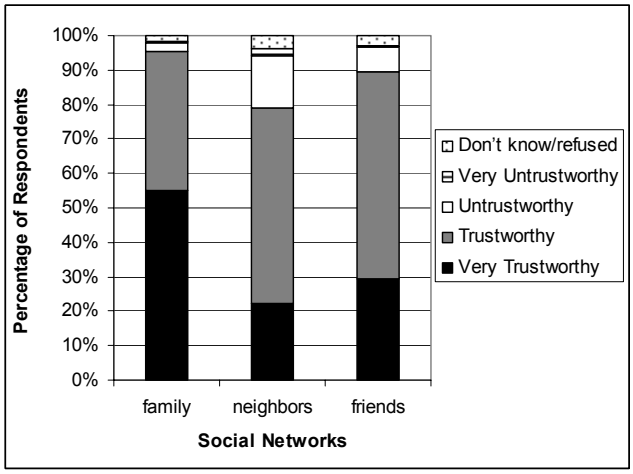

Figure 7. Trust in Social Networks

Figure 7 addresses the trustworthy measure with respect to respondents' social networks. When asked about their level of trust in family, friends, and neighbors, individuals trusted family most, followed by friends and neighbors.

Within the survey, respondents are asked a number of questions about what sources of information they turn to for various informational tasks. Results from those questions indicate that, overall, television and friends/neighbors and family are the sources used most often, with television edging out friends and family for information in areas such as news about government officials. However, when asked where they would turn for information on a health issue, official services, or something to buy, the social network was by far the most frequently used source [12].

It is particularly interesting to address the *frequency* with which respondents turn to a specific source with respect to the level of *trust* that respondents place in that source. As mentioned above, the two patterns do not completely overlap.

The patterns of trust in social networks, and the reliance on social networks as information sources is a key finding of this project. Compared against the backdrop of the information-poor environment of the region, the social network ties are absolutely crucial to an individual's ability to complete the tasks of everyday life. These social networks are maintained largely through face-to-face contact, informal visits, and ceremonial occasions. While maintaining those social networks absorbs a considerable amount of time and resources, it is an investment that has a tangible result since without those strong social ties, people would find it increasingly challenging to navigate their community [14].

3.4 Cultural Meaning and Uses of Mobiles

Interviews with mobile users conducted in July and August 2006 indicate that text messaging is a significant component of people's use of mobile phones. In addition, initial findings from these interviews indicate that WAP (Wireless Application Protocol) services are not heavily used. Users in Kyrgyzstan and a mobile provider in Tajikistan all reported that usage tends towards SMS rather than WAP. In Kyrgyzstan, the largest mobile provider introduced WAP as a free service, but once they began charging for its use, all of the respondents who reported using WAP ceased because of the cost.

Like mobile users in other developing regions, users in Kyrgyzstan carefully measure their call and text messages, deciding when to use a land line and when to use a mobile, when to engage in "beeping" behavior, [3][4] and when to send a text message based on financial considerations. Different tariff plans encourage different patterns of use.

Qualitative research conducted in Uzbekistan in 2004 characterized relatively early mobile adopters.[18] This research demonstrated the value of researching mobile phone adoption within the parameters of a specific cultural context in order to better understand the meaning of mobile technologies to a particular population. That study also demonstrated that the uptake of mobile phones in Uzbekistan both mirrored and diverged from the adoption patterns seen in more technologically replete environments. What that research further demonstrated is that the phone is also an accessory and that youth culture in Uzbekistan embraced mobile phones as a status symbol just as had been demonstrated elsewhere.

A CAICT interview study conducted in 2005 regarding the use of mobile phones during the Kyrgyz revolution in March 2005 addressed the importance of mobiles and SMS during a time of societal upheaval. Findings from that study uncovered some early attempts by youth in Bishkek to organize flash mobs, experimentation that affected some young political organizers' use of mobile technology during the protests and the rioting and looting that occurred in the aftermath of the revolution. The attempts at organizing flash mobs were an early indication of fertile ground for mobile social software in the region, a theme that is further addressed later in this paper.

3.5 Technology and Everyday Life

Since 2000, ethnographic observation in the region has provided a series of findings. One of the first theme that emerged from the ethnographic work and was pursued in more detail as part of an interview protocol was the realization that Internet access points are difficult to find and generally unlicensed. In addition, in some countries there is significant overlap between game cafes and

Internet cafes, a distinction that is meaningful to potential users, but not always reflected in signage or public discourse about Internet facilities in a city.

Observations in Tashkent in autumn 2003, for example, demonstrated that Internet access was obtained through public access sites that were neither listed in a central directory, nor officially licensed. Even the businesses that were licensed, however, often had public displays of their business that were at variance with the actual conditions available to a customer. For example, some Internet cafés didn't actually have Internet. Other Internet cafés had so many computers sharing a dial-up connection that the Internet was essentially unusable when trying to visit webmail sites or portals that were designed for contexts of use in more resourced and developed regions.

The effect of connection speed can perhaps be best understood through a discussion of a common Internet application – using a free web-based email service. The dial-up speeds in many cities in Central Asia generally mean that it can take anywhere from one to three minutes for a page to load. In a typical webmail client like Yahoo mail, sending one email requires six page loads to log in, check the inbox, compose one email message, and sign out. With slow connection speeds, then, using webmail becomes a slow, cumbersome, and expensive endeavor.

Ethnographic observation has also been key to uncovering some of the gaps between the appearance and the reality of a city's "wired" nature. In each capital city, billboards and advertisements about the Internet abound (see Figure 8). Signs advertise Internet services and Internet cafes, but closer examination demonstrates that the signage often indicates a vaporware version of high technology. CAICT researchers have visited Internet cafes that offer only LAN-based gaming despite streetside signage to the contrary, Internet access points that lack a full complement of working computers, and Internet cafes that have sporadic Internet access that drops out at certain (unscheduled) times of day. Although the quality and number of facilities has grown significantly over the course of this project, gaps remain between presentation and lived experience.

Figure 8. A large billboard in Bishkek advertises high speed Internet

The ethnographic observation remains a key component of this project in order to provide an understanding of what the experience of attempting to gain access to the Internet is like for people in their everyday life. As the next section discusses, people in this region tend to use the Internet outside of their home.

3.6 Internet Access Outside the Home

The survey findings also demonstrate that the primary means by which people in the region gain access to the Internet is through some sort of public access site, or through work or school. Home access is rare, and that access tends to be at dialup speeds.

Use of the Internet in public versus private space carries with it different meanings and tends to result in different kinds of usage patterns. As shown in Figure 9, 59 respondents (n=182) reported using the Internet most frequently at an Internet café or computer club. Work was the next most common access site, with 34 respondents primarily gaining access through their place of employment, and 27 reported using the Internet at school. Use at home was reported by 25 respondents. Section 4.2 discusses some of the implications of most people gaining access to the Internet outside the home, and how this pattern of access is likely to affect patterns of usage.

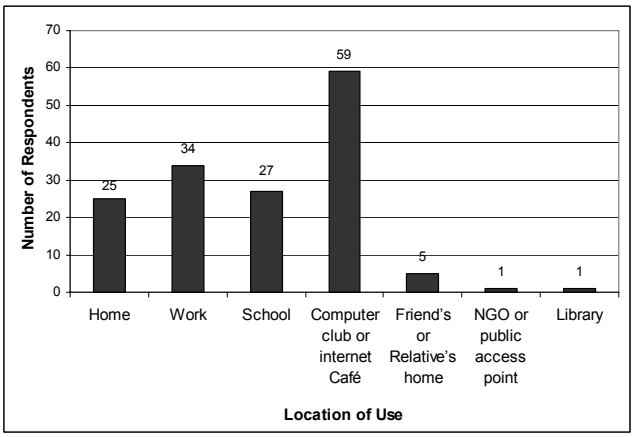

Figure 9. Location of Internet Use (N=152)

4. DISCUSSION

4.1 Substantial Barriers to Internet Use

In section 3.6, we presented findings that demonstrate that people primarily gain access to the Internet in places outside of the home – sites that have some component of public access, whether through a literal public access site or through a work or school environment.

Accessing the Internet in a public or semi-public site carries with it particular issues. Sitting in an Internet café, for example, highlights the fact that one is being surveilled in one's usage. Central Asia as a region has some relatively authoritarian governments with some problematic human rights records. Laws have been passed that characterize certain vague activities as treasonous; while what constitutes a treasonous activity is left somewhat open-ended, the penalty for treason is not. Within this political environment, it is common for a public Internet access site to have signs posted warning against downloading "illegal" content. Rarely is the kind of content that is deemed illegal explicitly named. Pornography is usually banned, but more insidious to open-ended browsing habits is the more amorphous labeling of particular kinds of political discourse as dangerous. Regimes will waver on how much criticism they will tolerate, and what is allowed one week might be banned the next. Certain sites go in and out of availability from within each country, and what might draw the attention of the café operator as he (used advisedly) monitors the traffic in the café similarly wavers over time. And café operators know that the Internet traffic out of their

places of business is also being monitored upstream, giving them particular incentive to monitor their clients in order to ensure that the business doesn't receive a visit from the police.

Place an early adopter of technology within this usage environment, and suddenly the barriers to entry multiply. Lack of technological skill becomes an ancillary issue to the very real notion of risk associated with experimenting with the technology and the information it can potentially drop onto the desktop.

Other issues associated with a region primarily having access to the Internet via public sites relates to issues of gender and women gaining equal access to technological resources. Generally speaking, women have a separate set of domestic responsibilities and separate rules that govern acceptable behavior in public space. The conditions under which women will feel comfortable and free from social stigma can be at variance with public Internet access sites, especially those that have a significant contingent of gaming activity which tends to attract large groups of mostly male computer users.

Furthermore, public Internet access carries with it cost, and, in this case, not inconsiderable cost. Aside from the expense of the technology affecting who will be able to afford to use the Internet, the metered use model also affects what people are likely to do once they get online. Exploration for the sake of following a URL breadcrumb trail is a less likely activity when each minute of access is measured and charged. Minute by minute charges create a barrier to use that impacts use in the context of an Internet café; additionally, expensive, metered services have a similar effect in terms of how mobile phones with WAP capabilities are adopted.

Together, then, these and other characteristics of public Internet access create some substantial barriers to entry. And even once the barrier to entry is overcome, there remain obstacles to certain kinds of technology usage.

The privacy issue seems especially important in the Central Asian political and social context, and it seems reasonable to conclude that part of the appeal of the mobile phone is the less overt sense of surveillance associated with it, its ability to be used in private space, and, indeed, its ability to accord privacy to conduct and conversation in public via the use of SMS.

4.2 Crucial Role of Personal Social Networks

As discussed earlier, the survey findings presented in Section 3.3 demonstrate that certain state-associated institutions suffer from low rates of trust and confidence and that people reply on friends and family as sources of trusted information. Barriers to Internet use, then, are not simply a matter of economics or spatialization.

The Internet as an information resource is predicated on a pattern of information seeking that prioritizes external resources, one that depends on data collections that reside outside of – and perhaps independent of – one's social network. The very early stages of Internet diffusion observed in Uzbekistan in 2000 illustrated the gap between what the technology seemed designed to efficiently perform and the activities that people were used to performing [10]. But as the desktop Internet continues to diffuse throughout the region, it still remains largely an information resource. People tend to have thin social networks with whom they exchange email; checking email generally involves a trip outside of the home and so it has not replaced the telephone as a method by which people maintain their social networks. This emphasis on informational tasks associated with the Internet can serve to hamstring its growth.

The face-to-face network is a key component of daily life in Central Asia, an element that has arisen repeatedly in the surveys, interviews, and ethnographic observation that have been conducted as part of the CAICT project. In light of this, it is not surprising that mobile phones have diffused more rapidly through the population than the Internet. Although the financial considerations are significant and mobiles are much more affordable than personal computers and monthly Internet access, the fact is that the mobile phone – with its emphasis on communication and its ability to turn public space private – meshes more seamlessly with the patterns of everyday life and how people move through the world, especially with respect to how they utilize the information that flows through social networks.

4.3 Communication *Is* Information Seeking

One of the primary themes that has emerged across the research conducted as part of this project is the conflation of what are often seen as the separate activities of information seeking versus communication. Indeed, the discussion of separate information technologies and communication technologies helps to frame this debate by establishing a certain set of expectations for these different categories.

The survey findings regarding information gathering habits, however, establish quite clearly that friends and family are among the primary sources of information for people across multiple domains—that communicating is, in effect, information retrieval. And the patterns of trust and confidence in institutions establish these social networks as not just *habitual* sources of information, but *trusted* sources. We would argue, then, that the pattern of mobile phone use seen in Central Asia (and in other developing regions) is in part a reflection of the importance of person-to-person communication within everyday life, particularly when externalized information sources such as media or government institutions are considered less trustworthy by citizens.

For the respondents to the CAICT survey and for participants in the various interview components of the study, the act of collecting information is intimately entwined with communicating with friends and family. Looking for information necessarily involves communicating with someone, and so the mobile phone in many ways compliments and supports people's everyday routines more so than the Internet.

The use of text messaging, or SMS, is another component of ICT activity that has emerged from the CAICT study. SMS is often used as an inexpensive way to maintain contact with friends and family, but it is also a mode of information exchange within a social network.

What has become increasingly clear through this project, though, is that people interact with technology in such a way that they do not distinguish separate acts of information gathering and communication. While to some extent this conflation is not necessarily confined to developing regions, it is particularly acute in areas where people live in significantly impoverished information environments. Within these information-resource constrained settings, individuals' social networks are the means through which they obtain information across various domains.

In Central Asia, for example, this conflation is due in part to the

social context and the lack of external information resources available to citizens. In the post-Soviet area, what limited information resources existed have largely faded from local memory, and directories of local business or residential phone lines are not a part of everyday life. People are habituated, then, to discovering information by asking other people, and the act of communicating with others is the primary mode by which someone gathers information [9]. The implication of such social practices, however, is that a technology that facilitates communication potentially stands to become, additionally, the primary information technology within that community.

5. FUTURE DIRECTIONS: SOCIAL NETWORKING MEETS SOFTWARE

Given this pattern of findings, it has gradually become clear that mobile devices and non-Internet applications are a promising combination in this developing region. We would also argue that our findings are relevant more widely since the patterns we have observed such as the prevalence of mobile devices and the lack of strong public institutions are seen in other parts of the world where a variety of factors constrain informational resources.

The research to date presents an opportunity to consider the design of information and communication technologies from a perspective that does not attempt to create a new market segment, but instead scaffolds and supports existing practices. The prevalence and importance of traditional social networks suggests an opportunity to consider how social networking software could be used in this emerging market context.

5.1 Growth of Social Networking Software

Concurrent with mobile technologies outpacing the growth of the Internet in places like Central Asia, we have also seen the growth of social networking software (SNS) in other parts of the world. Sites such as Orkut, My Space, and Friendster have been at the media forefront of Web 2.0 technologies, and their widespread adoption among certain demographics has generated significant research and commercial interest in SNS [1].

SNS, however, is not confined to entertainment or narrowly defined 'social' purposes. A growing number of sites are utilizing SNS applications for non-entertainment purposes such as employment recruitment (Jobster.com), facilitating loaning and borrowing outside of the conventional banking system in the US (Prosper.com), and sites that provide for alternative social formations such as meetup.com. Additionally, blogs provide a socially connected publication forum for people in politically challenging or censored environments.

SNS has also branched into mobile devices, with applications such as Dodgeball and Slam. In addition, there are an increasing number of games designed for mobile devices that incorporate an SNS component (particularly in Asia).

Increasingly, then, incarnations of SNS are not constrained to "merely" entertainment purposes, and the social networking functions of ICTs seem to hold particular promise in areas where social networks already hold a prominent position for how people accomplish the tasks of everyday life. Consequently, we were interested in exploring the possibilities of mobile social software (MoSoSo) for developing regions.

5.2 Design Ethnography for MoSoSo

In July 2006, we traveled to Kyrgyzstan to perform a design ethnography [16] to begin focused consideration of MoSoSo as a potential application in the developing region of Central Asia. The results of this design ethnography will be reported in detail in a separate paper, but our goal here is to discuss the value of such *in situ* work after a variety of other multi-method data has been collected and analyzed. Indeed, it is the longitudinal project of the past several years that has provided the larger picture of ICT usage in the region.

Previous findings from this research project (see sections 3.3, 4.1 and 4.3) revealed the importance of face-to-face social networks in the countries of Central Asia for a variety of reasons, including offsetting the lack of reliable and trustworthy traditional institutions. Additionally, previous research conducted on behalf of the World Bank [14] focused on the social and cultural importance of informal family and friend networks in the country of Kyrgyzstan. Taken together, this work pointed to opportunities to develop a technical intervention that could rest on previously existing and culturally embedded values of the importance of informal family and friend networks, the expectation of reciprocity built into these networks, and the potential for creating a solution that could be deployed via an existing and appropriate technology, in this case the mobile phone.

We chose the methodology of the design ethnography to gain a deeper understanding of how people in Kyrgyzstan use mobile phones, and to more broadly learn how these existing social networks functioned in daily life. The purpose of this "deep hanging out" [16] was to generate ideas and guidelines that could be used to design prototypes and possible solutions. The design ethnography allowed us to collect data aimed at understanding the cultural and social context of everyday life in order to provide examples and rich descriptions for technology design.

The design ethnography was conducted in conjunction with three local researchers who provided cultural and linguistic interpretation (see Figure 10). The research occurred at two sites: the capital city of Bishkek, and a smaller outlying city, Kara Balta, close to the Kazakhstan border. At both sites we conducted two sessions, each with a group of three individuals. The groups were (a) a multigenerational family, and (b) a group of young people, at least two of whom were friends.

Figure 10. An interpreter asks a family about their daily life

Each session consisted of a variety of data collection activities. We conducted semi-structured interviews with participants individually and then together as a group. Each group of participants was asked about their social networks, daily lives, and technology use. In addition, we asked individuals to rank preference and frequency of social interactions to help us gain a wider understanding of the relationships between members of a given social network. We also asked each individual to visually map the members of their social network, who they interacted with, why and by what means (see Figure 10). The instructions for these maps were open-ended, and participants were encouraged to represent both strong and weak social ties as well as the range of modes (whether technological or not) they used to maintain those social networks.

The goal of this work was to identify regular patterns of communication within individuals' social networks, to uncover pain points associated with everyday activities that a technological solution might help to address, and to better understand pre-existing technology usage patterns so that a potential solution would build upon patterns already in place for users.

In addition to the interview activities we conducted on site with research participants, we also gathered images and sounds from the rhythm of daily life on the streets of our two sites.

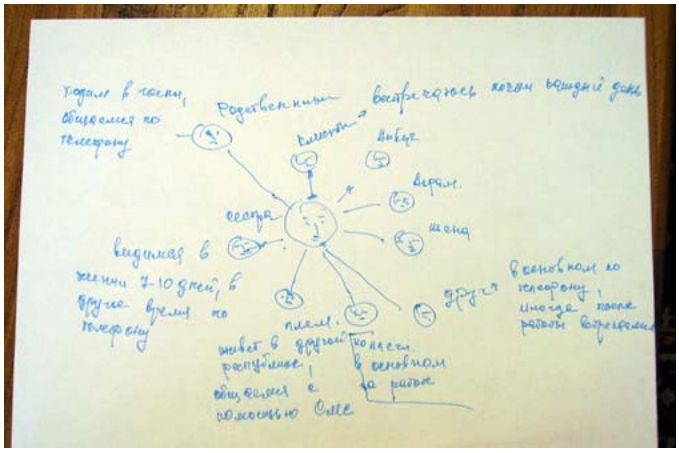

Figure 11. A participant's social network visualization

The design ethnography yielded a great deal of rich data that brings the concerns, pain points and barriers to information retrieval to light. The results of this research will provide designers a rich and contextually situated view of everyday life. Our goal is for the results of the design ethnography to provide a new imagining of possibilities for the types of applications that can be developed for people in Kyrgyzstan and other countries in Central Asia, and for other developing regions -- applications that leverage the strength of social networks and the technology usage patterns in place.

6. CONCLUSION

The goal of developing MoSoSo comes about in response to several years of research on technology implementation projects and larger societal patterns regarding technology use and information seeking generally. Although social networking software has been traditionally seen as having a relatively narrow applicability, it is our belief that the strong reliance on social networks in developing regions make them exemplary sites for social networking applications that work with the technologies currently in place.

That last point is particularly crucial. This research is not predicated on the introduction of smart phones into Central Asia. Indeed, WAP services have been tried and mobile users have gone back to their reliance on text messaging. However, based on projects developed in the Philippines, India and elsewhere that use SMS to deliver small but crucial bits of (usually market-related) information to users, it seems viable to develop services that rely on text messaging rather than resource-intensive web-delivered content over phones.

The multi-method approach that contained ethnographic and "in situ" research gathering gave the team a rich understanding of the context of use and the conflation of information and communication strategies. Research to date has provided rich detail on several crucial factors for design, such as the ways in which resource constrained groups leverage communication strategies, the importance of traditional social networks, and the prevalence of mobile phones as the pervasive technology.

The next stages of this research will be to move from the design ethnography findings to a prototype, but it is our goal with this paper to begin the discussion of how social networking software can provide a creative and fruitful base for discussing innovative applications to meet the needs of users in developing regions.

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