

© Copyright 2011 Emma J. Rose



Investigating Resource-Constrained Populations: Developing Design Approaches to  
Support Agency and Reciprocity

Emma J. Rose

A dissertation submitted in partial fulfillment  
of the requirements for the degree of  
Doctor of Philosophy

University of Washington  
2011

Program Authorized to Offer Degree:  
Human Centered Design & Engineering

UMI Number: 3472269

All rights reserved

INFORMATION TO ALL USERS

The quality of this reproduction is dependent upon the quality of the copy submitted.

In the unlikely event that the author did not send a complete manuscript and there are missing pages, these will be noted. Also, if material had to be removed, a note will indicate the deletion.



UMI 3472269

Copyright 2011 by ProQuest LLC.

All rights reserved. This edition of the work is protected against unauthorized copying under Title 17, United States Code.



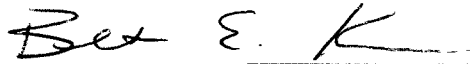
ProQuest LLC  
789 East Eisenhower Parkway  
P.O. Box 1346  
Ann Arbor, MI 48106-1346

University of Washington  
Graduate School

This is to certify that I have examined this copy of a doctoral dissertation by  
Emma J. Rose

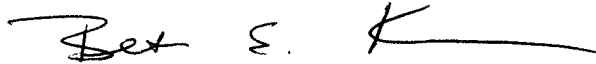
and have found that it is complete and satisfactory in all respects,  
and that any and all revisions required by the final  
examining committee have been made.

Chair of the Supervisory Committee:

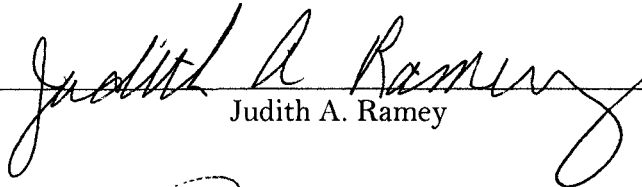


Beth E. Kolko

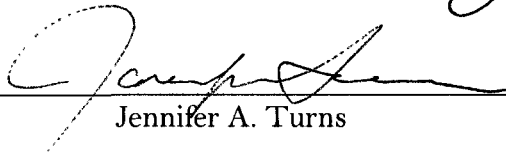
Reading Committee:



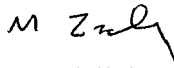
Beth E. Kolko



Judith A. Ramey



Jennifer A. Turns



Mark R. Zachry

Date: 6/1/11

In presenting this dissertation in partial fulfillment of the requirements for the doctoral degree at the University of Washington, I agree that the Library shall make its copies freely available for inspection. I further agree that extensive copying of the dissertation is allowable only for scholarly purposes, consistent with "fair use" as prescribed in the U.S. Copyright Law. Requests for copying or reproduction of this dissertation may be referred to ProQuest Information and Learning, 300 North Zeeb Road, Ann Arbor, MI 48106-1346, 1-800-521-0600, to whom the author has granted "the right to reproduce and sell (a) copies of the manuscript in microform and/or (b) printed copies of the manuscript made from microform."

Signature emma j rose

Date 6/1/11

University of Washington

**Abstract**

Investigating Resource-Constrained Populations: Developing Design Approaches to Support Agency and Reciprocity

Emma Rose

Chairs of the Supervisory Committee:  
Beth Kolko, Professor  
Department of Human Centered Design & Engineering

Designing for information and communication technologies (ICTs) in developing countries and for poor communities in developed countries presents unique challenges. In these settings, people have limited access to a variety of resources which result in challenges in daily life. Constraints in these settings include infrastructure, technology, and economics. Traditional inclusionary design approaches, such as user-centered design, have not adequately addressed the problem of resource constraints. The purpose of this qualitative study was to explore ways to investigate resource-constrained settings with a view to identifying design implications that are both specific and appropriate to the context and also instructive for other communities or settings.

This study presents the results of two design ethnographies from two resource-constrained environments: one in Bishkek, Kyrgyzstan and the other in Seattle, Washington, in the United States. Methods included ethnographic observations, semi-structured group interviews and participatory activities such as video diaries. The two

design ethnographies were analyzed to develop a set of considerations for researching and designing for resource-constrained environments.

Using Giddens' theory of structuration and the concept of social capital, developed by Bourdieu and Putnam, the resulting themes of agency and reciprocity emerged as findings. The theme of agency describes the potential to act and is both enabled and constrained by the structures of society. Across the case studies, three categories of agency were identified: resourcefulness, resiliency, and powerlessness. Resourcefulness refers to the ability of people to deploy their expert knowledge either to overcome or to exploit structural constraints in ways that are sanctioned and productive. Resiliency differs from resourcefulness in that the behaviors people deploy to bring about desired results are often unsanctioned or out of the bounds of existing structures. Powerlessness, captures the instances when people have little or no recourse to overcome constraints. Their agency is thwarted, intentionally or otherwise, by a system that removes the ability for action. The second theme from the design ethnographies was reciprocity, a component of social networks that represents the mutualistic exchange of tangible and abstract outcomes of social interactions.

Agency and reciprocity are used as an analytic lens to inform research and design of information and communication technologies that can lead to more appropriate design for resource-constrained environments.

# Table of Contents

---

<b>List of Tables.....</b>	<b>v</b>
<b>List of Figures .....</b>	<b>vi</b>
<b>Chapter 1: Introduction and Statement of Problem.....</b>	<b>1</b>
Introduction .....	1
Background and context .....	2
Problem, purpose, and research questions .....	5
Research approach .....	7
The researcher and her assumptions .....	9
Rationale and significance .....	10
How this work is organized .....	14
<b>Chapter 2: Review of the Literature.....</b>	<b>18</b>
Overview .....	18
Resource-constrained environments.....	20
Inclusionary design methods.....	37
Structuration .....	46
Social capital .....	53
Conceptual framework.....	59
Summary .....	61
<b>Chapter 3: Overview of Methodology .....</b>	<b>63</b>
Introduction .....	63
Rationale for the research approach.....	64
Methods of data collection.....	67
Ethical considerations .....	87
Issues of trustworthiness .....	88
Adapting traditional inclusionary methods .....	91
Summary .....	93
<b>Chapter 4: Kyrgyzstan Design Ethnography.....</b>	<b>95</b>
Going to Lake Issyk Kul.....	95
Going to the Dordoy bazaar .....	104
Introduction .....	112
Use of and access to technology .....	113
Challenges and constraints of everyday life.....	138
Private in Public: Parental control, mobile phones, and romance.....	149
Social networks.....	152
Summary and reflection .....	163
<b>Chapter 5: Seattle Design Ethnography .....</b>	<b>166</b>
Stories on the Bus: Route 22 .....	166
Introduction .....	174
Transit dependency.....	175
Technology use and access.....	182
Transportation use and information needs.....	190
Challenges and constraints of using transportation .....	195

The role of transportation and maintaining social connections .....	210
The opportunity for ride sharing .....	214
Summary and reflection .....	219
<b>Chapter 6: Analysis and Synthesis.....</b>	<b>221</b>
Introduction .....	221
Agency .....	221
Reciprocity .....	241
Design considerations .....	249
Summary .....	261
<b>Chapter 7: Findings.....</b>	<b>263</b>
Introduction .....	263
Challenges associated with researching and designing for resource-constrained populations .....	264
Understanding challenges to inform design.....	269
Adapting inclusionary methods.....	271
Design considerations and areas for inquiry .....	274
Summary .....	280
<b>Chapter 8: Conclusion .....</b>	<b>281</b>
Introduction .....	281
Motivations for embarking on this study.....	281
The research process: choosing a theory and the design ethnographies.....	283
Areas of uncertainty .....	286
Limitations .....	290
Further Research .....	292
Contributions .....	293
Final thoughts .....	295
<b>Appendices .....</b>	<b>297</b>
Appendix A: Recruitment Text for Interviews (Kg) .....	297
Appendix B: Interview Consent form (Kg).....	298
Appendix C: Photograph and Video Usage Informed Consent Form (Kg).....	301
Appendix D: Interview Script: (Kg) .....	303
Appendix E: Social network forms (Kg).....	307
Appendix F: Ethnography Photo Release (Seattle).....	312
Appendix G. Statement for third parties (Seattle) .....	314
Appendix H. Recruitment text for interviews (Seattle).....	315
Appendix I. Screening questions for interviews (Seattle) .....	316
Appendix J. Interview Consent Form (Seattle).....	318
Appendix K. Interview questions (Seattle).....	321
Appendix L. Consent form (Seattle) .....	325
Appendix M. Video Diary Prompts (Seattle) .....	327
Appendix N. Video diary debrief (Seattle) .....	328
Appendix O. Video release (Seattle).....	329
Appendix P. Video diary statement for third parties (Seattle) .....	331
<b>References .....</b>	<b>332</b>

# List of Tables

---

Table 1. Overview of research participants in Kyrgyzstan.....83  
Table 2. Overview of research participants in White Center/Seattle.....87  
Table 3. Summary of Mobile Phone Ownership and Features .....114  
Table 4. Summary of Mobile Phone Ownership and Features .....183  
Table 5. Research and design considerations by theme and category.....279

## List of Figures

---

Figure 1. How and when users are considered.....	46
Figure 2. Conceptual framework that incorporates the concepts of structuration, agency and constraints.....	59
Figure 3. Ala-Too Square in the day .....	96
Figure 4. Ala-Too Square at night.....	97
Figure 5. United Nations Map of Kyrgyzstan (UN Map #3370, Rev. 6 2004).....	98
Figure 6. Koshkol resort and beaches (Photo used through a creative commons license, Vmenkov) .....	99
Figure 7. Marshrutka depot on the outskirts of Bishkek.....	100
Figure 8. Urban family: Asan, Jyrgal, and Arif.....	101
Figure 9. Urban friends: Aselya, Nurbek and Cholpon .....	103
Figure 10. Dordoy bazaar (Photo used through a creative commons license, Vmenkov) .....	105
Figure 11. Dordoy bazaar and the shipping containers (Photo used through a creative commons license, Vmenkov) .....	106
Figure 12. Bakir, Damira and Adilet.....	107
Figure 13. Alexei and Kalima (Nazar, not pictured).....	110
Figure 14. Melons for sale on the side of the road. Photo courtesy of <a href="http://jyrichter.us/travel/Khanates/Kyrgyzstan/pictures.htm">http://jyrichter.us/travel/Khanates/Kyrgyzstan/pictures.htm</a> .....	111
Figure 15. Cholpon and her two phones .....	115
Figure 16. Example of a mobile phone that are ubiquitous in Bishkek.....	117
Figure 17. Tsum department store (left), mobile phones for sale (right) .....	118
Figure 18. Mobile phone for hire at a local vendor in downtown Bishkek.....	119
Figure 19. Mobile phone that has a Latin and Cyrillic keyboard .....	122
Figure 20. Screenshot of Hi5, a popular social networking site with some of the young people in the study .....	130
Figure 21. Image of a business offering IP telephony (or VOIP) and an Internet club	133
Figure 22. Alexei's gaming club in Kara Balta .....	134
Figure 23. Young people playing video games in a Gaming club in Bishkek .....	136
Figure 24. A printing kiosk in Bishkek .....	137
Figure 25. CD that contains a version of the official phone company directory for sale in a local shop .....	143
Figure 26. Picture of a marshrutka.....	147
Figure 27. Comparison of trustworthiness in traditional and informal institutions .....	153
Figure 28. Social network mapping exercise .....	154
Figure 29. Synthesis of the social network mapping .....	155
Figure 30. Ann and Brian at the bus stop, waiting for the 22 .....	167
Figure 31. Joey and Gabe in West Seattle.....	168
Figure 32. Ryan in downtown in Seattle.....	169
Figure 33. Adam and Rachel in West Seattle .....	170
Figure 34. Helen and Eleesha at a coffee shop in the Greenbridge neighborhood. ...	171

Figure 35. Eddy and Shawn outside at a Starbucks in the Des Moines neighborhood ..... 173

Figure 36 Top left: Louis, Cynthia, Tim, and Stephen ..... 174

Figure 37. Transit Dependent Riders ..... 179

Figure 38. Bus showing the unique four-digit code (in yellow) that participants used to coordinate location via text..... 187

Figure 39. Eddy talking about waiting for buses in Federal Way (still from video diary) ..... 197

Figure 40. Picture of a King Count Metro bus transfer (Photo by flickr user underdoug, used with permission) ..... 203

Figure 41. Video still from Helen and Eleesha's video diary talking about fares..... 206

## **Acknowledgments**

I wish to express my sincere appreciation to the Human Centered Design & Engineering Department, which has been a supportive and creative home every step of the way.

Thanks to my advisory and dissertation reading committee of Professors Judy Ramey, Jennifer Turns, and Mark Zachry who provided excellent guidance and mentoring throughout my studies. I appreciate your support and advice. You have each influenced and strengthened this work.

To my advisor, Dr. Beth Kolko, I would like to express my gratitude. You have been a mentor, confidant, and supporter of my work from the start. Whether we were traveling in Kara Balta, Kyrgyzstan, communing in Seattle coffee shops, or sequestered in your office, you have always been generous with your time and insights. At times you provided friendship and at other times candor, in both you helped me become a better scholar.

I would also like to thank my fellow researchers associated with the Design for Digital Inclusion Lab. It was rewarding to work alongside those are committed to the belief that technology should be designed for all. Specifically, I would like to thank those colleagues in the lab who helped with the research that lead to this dissertation, including Deidre Girard, Dr. Erica J. Johnson, Travis Martin, Dr. Cynthia Putnam, Robert Racadio, Joe Sullivan, Karen Saville, Dr. Rebecca Walton, and Judith Yaaqoubi.

During my studies, several people were instrumental in making the Human Centered Design & Engineering Department feel like a home. The faculty who have provided excellent instruction, intellectual support and have always asked the hard questions. Also, thanks to the dedicated staff members for their hard work. I specifically want to thank Jeff Babauta, Gian Bruno and Kate Long, I feel lucky to call you my friends. I also have the department to thank for bringing fellow students Matthew Tevenan and Karen Kasonic into my life. I am deeply thankful for our enduring friendship.

Funding for the work in the Kyrgyzstan ethnography was provided as part of the CAICT project supported by the National Science Foundation (NSF) under grants #0326101 and #0219350. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the NSF.

While working on the dissertation, I was also employed as a Senior Consultant at Anthro-Tech. I would like to thank all of my colleagues there for their support. I especially want to thank Suzanne Boyd, Scott Boyd and Lani Hathaway for your interest in my work and the sacrifices you made so I could pursue this research.

I would like to thank all of the participants who took part in the research in Kyrgyzstan and Seattle, without your participation and willingness to share your stories and insights, this work would not be possible. I hope I have represented your lives with the respect and honor that they deserve.

Finally, I would like to thank my family and friends who have supported this effort over the years. You each encouraged me in your own way. My parents, Steve and Rosaleen have always been my greatest advocates, thank you for all the strength, support and love. And to my sister Helen, your feedback and input on early drafts was invaluable, whenever I ask anything of you – your immediate response is always a resounding “Yes!”. I would also like to thank my extended family on both sides, including my in-laws, who helped me complete the dissertation in many ways from babysitting the grandkids to celebrating each milestone.

The person who deserves the most thanks is my husband Jeremy who has been my foundation throughout the course of this dissertation. There is no way I would be here without you. You always had time to listen to my ideas and provide input. You always had energy to encourage me to persevere when I felt like I couldn't finish. You played the single dad on the year of weekends I spent writing. With your love and support I believe all things are possible. This dissertation and our two amazing children are testament to that fact.

## **Dedication**

To Oliver and Elsie, the babies I had along the way

## Chapter 1: Introduction and Statement of Problem

---

### **Introduction**

As technologies continue to become more pervasive, the contexts and settings where those technologies are deployed are increasingly diverse. Over the past decade, there has been an increased focus on designing for information and communication technologies (ICTs) in developing countries and for poor communities in developed countries. This dissertation explores how design and design research is deployed in areas such as these, where resources are constrained. Resources can be considered constrained for a variety of reasons. Electricity can be a scarce resource due to poor infrastructure. Food can be a scarce resource due to poor farming conditions. Education can be a scarce resource due to lack of access to good schools. In this work, I use the term constraint as a way to describe a limitation or a lack and claim that impacts how design should be enacted for these settings. All design processes have constraints, such as time or budget. However, I use the term constraint in this work to talk about limitations on users and their contexts, rather than on the limitations that apply to designers. In communities that are poor, constraints impact people's ability to act. The people who live in environments where resources are constrained often make do or do without. The recent push in designing ICTs for these people and communities is often concerned with how to overcome the resource scarcity by means of innovative uses or adaptations of technology. One of the tenets of Human Computer Interaction (HCI) is that involvement of end users in the design of ICTs is crucial. However, designing for resource-constrained environments (RCEs) is a different design problem.

Simply porting technologies, or design methods, from a highly resourced context to a poorly resourced context and expecting them to work often results in failure. For this dissertation, I will investigate the challenges associated with researching and designing for resource-constrained environments. To do so, I will present the results of two design ethnographies that explore seemingly disparate contexts: one in Bishkek, Kyrgyzstan, in Central Asia and the other in Seattle, Washington, in the United States.

### **Background and context**

The people who use technology and the contexts in which they are using technology are becoming increasingly diverse for a variety of reasons. First, there is the continued trend of technology being moved out of the realm of expert use into everyday use. Historically, computers were the domain of the scientific and expert communities. With the advent of the Internet and the Web, the use of technology by non-expert audiences has continued to grow. The trend of using technology for entertainment or to support social relationships broadens its utility for many people. Second, there is the growing trend of ubiquitous computing (or ubicomp) where technology is becoming more embedded into everyday lives. Examples include mobile computing and wearable computing, which demonstrate the ways in which technology is being embedded into more contexts and situations that go beyond the traditional desktop computer paradigm (Weiser, 1999). There is also the growth of mobile devices in resource-constrained contexts. The mobile device, due to its affordability and portability, has made technology more accessible to a much broader audience and has become many people's first ICT experience (Gitau, Marsden, &

Donner, 2010). Finally, technology use is often not limited to those who own devices, but extends to those who experience it through intermediated use (Sambasivan, Cutrell, Toyama, & Nardi, 2010). Intermediated use of technology includes activities of use that go beyond the traditional one-device-used-by-one-owner model that is inherent in the tradition of Western personal technologies. An example of intermediated use is the sharing of devices, particularly of mobile devices, that occurs in developing contexts. Devices can be shared between family members or, in the case of the Grameen Village phone, the use of the device can be leased or bartered (Brewer, Demmer, Du, et al., 2006). Another example is that of the Multi Mouse design (Pawar, Pal, & Toyama, 2006), in which a standard desktop computer has been adapted to accommodate group usage for classrooms in India. Finally, intermediated use often comes about as a strategy to offset issues of lower literacy, both technical and traditional. Less literate users often consult more literate users to assist them with operating the devices. All of these new intermediated ways of using technology point to the realities of a growing diversity of users, usage, and contexts in which technology is being deployed.

This increase in diversity poses several challenges for technology designers and researchers. Ideally, the tools and technologies being built for a particular community would be created by those people who know that community best—its members. However, that is not always possible. Oftentimes, the people designing technologies for a community are outsiders who come with technical expertise, but lack contextual expertise. This challenge exists in contexts in developing countries, developed countries, and anywhere there is a gulf between the life experience of the designer and

that of the designer's audience. In my experience as an industry researcher, this distance between designer and audience is present more often than not. Moreover, the distance between the people who are doing the design and the people who will use that design tends to be large. The distance may be geographical, but it can also be something that is hard to bridge by means of travel alone. Designers often come from environments that are highly resourced; they are often accustomed to having access to technology, tools, and capital in its many forms. Because of the designer's own experience, as well as the lack of other information, the extent of this distance may or may not be immediately apparent to the designer; we tend to make decisions and adopt methods based on our assumptions. These assumptions often turn out to be incorrect.

Beyond the gap between the designer and the audience there is the additional challenge of risk. Systems that are designed for resource-constrained environments often include vulnerable populations. The risk of failure can be higher or more catastrophic in some of these situations. Unearthing assumptions about the audience and context is one way to mitigate this risk.

Finally, while there are inevitable inequities in the research/subject relationship, these inequities are even starker when designing for resource-constrained environments. By taking a feminist research perspective, as I do in this work, it is important to acknowledge the issues of power that are brought to bear while engaging in research. We must take into consideration the intersecting nature of power relationships when we engage in research involving populations who have resource

constraints or are considered vulnerable. Researchers must adopt a research approach that acknowledges the power inequities, while maintaining, as engineers, an interventionist perspective. If our challenge is to create technology to solve problems, how do we do so with the utmost care?

The field of Human Centered Design (HCD) is accustomed to researching and designing for users. There are a variety of inclusionary design approaches that guide this process, including user-centered design, participatory design, and value sensitive design. Each of these three approaches comes from a Western perspective, typically highly resourced and traditionally focused on design for technology in workplace settings. Therefore, there is a gulf between the research and practices of the field of HCD and the reality of the new diversity of usage of technology. When it comes to designing for resource-constrained environments, the issues are different, and traditional HCD approaches have not adequately addressed how to account for this difference. The salient characteristics of the users and their contexts differ from what research methods traditionally investigate. Therefore, the methods themselves need to be re-conceptualized.

### **Problem, purpose, and research questions**

The people who use technology and the places where technology is used are growing increasingly diverse. In particular, the use of technology by people living in resource-constrained environments is on the rise. Resource-constrained environments include developing countries and poor communities in developed countries. Designing for these settings can be complex and poses challenges when a wide gap

exists between the experience of designers and end users. Much of the existing work addresses particular system designs in specific contexts. For example, much of the work in Information and Communication Technologies for Development (ICTD) focuses on addressing a problem faced by a specific community, such as agriculture or medicine. This can be a strength, because the solution focuses on addressing local problems, but it can also be a weakness, because each new community or setting brings about new challenges. There is little done to address the transferability of research and design across diverse and resource-constrained settings. In addition, the challenges we discover when researching resource-constrained environments can differ from those in resource-rich environments: The findings are not categorically unique, but often play out in different ways. Studying resource-constrained environments can help to introduce a new perspective or frame of reference that can extend to and inform all types of contexts, even those in which resources are abundant.

The purpose of this ethnographic study is to explore ways to investigate resource-constrained settings with a view to identifying design implications that are both specific and appropriate to the context and also instructive for other communities or settings.

The research questions for this study are:

1. What are the particular challenges when researching and designing for resource-constrained populations? What are the implications of these challenges for methods? What are the implications of these challenges for design?

2. How can traditional inclusionary research methods in HCI be adapted to better understand the contexts of resource-constrained environments and the needs of diverse audiences?
3. Given two particular resource-constrained contexts (one in Bishkek, Kyrgyzstan, in Central Asia and the other in Seattle, Washington, U.S.A.), how can understanding the ways in which people experience and overcome challenges in their daily lives inform design?
4. When researching with and designing for resource-constrained populations, what are some unique design considerations and areas for inquiry?

### **Research approach**

In this ethnographic study, I used a variety of qualitative research methods grouped under the broad methodology of design ethnography (Salvador, Bell, & Anderson, 1999). Using this methodology, researchers take a deep look at what people do and think and how they use tools in their lives. The purpose of design ethnography is to generate ideas and guidelines that could be used to inform the design of ICT solutions. In addition, design ethnography provides insight into the cultural and social context of everyday life to provide examples or rich descriptions to technology designers for the creation of technology products. Design ethnography differs from traditional ethnography in that the goal of the research is to create and improve the design of ICTs rather than to generate cultural theories.

With the approval of the University of Washington's Institutional Review Board, I conducted design ethnographies in two resource-constrained environments: Bishkek,

Kyrgyzstan, and Seattle, Washington. In both settings, I deployed a variety of qualitative methods to capture a variety of rich data. In both Bishkek and Seattle, I conducted semi-structured interviews with groups of socially connected people. In addition, I gathered images and sounds chronicling the rhythm of daily life. I also engaged in participant observation to experience resource constraints first hand. Both studies included a participatory activity as part of the protocol. In Bishkek, participants drew pictures to represent their social networks. In Seattle, a subset of participants was asked to keep video diaries. In addition to collecting a variety of qualitative data, I also reviewed related literature and quantitative data, which provided additional insights and allowed me to contextualize the findings from the two design ethnographies.

The interview data acted as the primary source data for the research study. Following standard qualitative research coding techniques (Coffey & Atkinson, 1996), I, along with a research team, coded the interview data with the web-based qualitative coding tool Saturate (Sillito, 2010). In order to establish consensus in coding the data, each transcript was reviewed and coded by multiple researchers, with a minimum of 2 and a maximum of 5 reviewers for each transcript. Codes were generated by the team and applied in a consistent manner. When there was disagreement, the team discussed the code as a group and negotiated in order to achieve consensus. The team also coded (as secondary data) the data resulting from the participatory activities of the social maps and the video diaries. Analyzed according to the emergent themes from the interview data, these sources helped to triangulate the research findings.

## **The researcher and her assumptions**

At the time I conducted this study, I was engaged both as a Ph.D. student in an academic setting and as a design researcher working in industry. This dual perspective benefits the research because it brings about both an applied and rigorous stance. As an engineer engaged in social science methods, I aim to understand specific communities and contexts, but with the goal of having the study results intervene in a thoughtful way that helps to alleviate undesired constraints. It is also important to note that in both contexts, I was an outsider to the community I was studying. In Kyrgyzstan, my research team was assisted in translation, both linguistic and cultural, by a team of local students who were studying social science research. In Seattle, while I do live in the region and am familiar with the language and the setting in general, talking to people who lived in poverty was outside of my immediate frame of reference.

Based on my experience and background, I made several assumptions at the outset of this study. First, inclusion of users in the design of the end product is desirable and necessary for the product to meet the needs of those users. This assumption is the premise for human-centered design approaches like participatory design, value-sensitive design, and user-centered design. Second, by overlooking certain types of users, designers may design systems in a way that can harm or neglect those people. This is especially true for vulnerable populations. For example, prior to the passing of the Americans with Disabilities Act (ADA) in the United States, the needs of people with disabilities were often overlooked. This resulted in designs that impeded access and led to the exclusion of those populations (Winner, 1980). Third,

people often use social networks to overcome resource constraints. This is especially true in poor or underserved communities (Kuehnast & Dudwick, 2002).

This study was designed to address the issues for designers and researchers who are working on systems that include broad swaths of the population, including those who are vulnerable or poor. The reason for this focus is that these groups are growing in size and they are typically overlooked by a field which tends to prioritize commercial products and therefore a consumer audience. However, even though the results of this research address the issues of designing for diverse and under resourced populations, they still hold value for researchers or designers engaged in inclusionary methods. First, we can claim that improving designs for resource-constrained populations can benefit all users. For example, let's say we are creating a web site that will be used by those who have low bandwidth. The choices in this design, to use low intensity graphics, can also serve people using mobile devices. Second, the idea that we are designing for poor populations is not just an issue of social justice. Designing for the poor can also make business sense – as extolled by Prahalad in his book *The fortune at the bottom of the pyramid: eradicating poverty through profits* (Prahalad, 2010).

## **Rationale and significance**

The rationale for this study stems from my desire to uncover strategies and tactics to contribute to design practices that consider the needs of a wider diversity of users of technology, particularly those who have been traditionally excluded from design. The research in this study contributes to the emerging design space of

resource-constrained environments (C. Putnam, 2010). Resource-constrained environments offer a way to conceptualize the practices of design that help to solve fundamental human problems and also help to focus on the needs of vulnerable or poor communities. A resource-constrained environment is a productive design space because it encapsulates a wide range of communities in different settings. It also avoids creating the limited dualism of developed versus developing country that is inherent in Information and Communication Technology for Development (ICTD).

The significance of this work is methodological, theoretical, and practical. From a methodological perspective, this dissertation makes several contributions to the field of Human Computer Interaction (HCI). In a broad sense, it demonstrates that designing for resource-constrained populations is different and therefore requires different strategies in order for it to be done well. The research in this study argues for the inclusion of a more diverse set of people within design research to reflect the broader contexts of use of technology. Including a broader audience requires a reconsideration of our design methods, particularly in cases where designers and researchers are outsiders. When designing for diverse audiences, we learn that people's lives are often very different from our own. Therefore, our approach to this research requires reflection. We need to reflect upon our own assumptions and aim to generate questions that yield unexpected results. If we were to conduct research in the traditional HCD paradigm, these findings would not be visible. Therefore, by looking for ways in which traditional inclusionary research methods in HCI can be adapted, we can better understand the contexts of resource-constrained environments and the

needs of diverse audiences. A better understanding of resource constraints can yield designs that are more appropriate and well suited to the audience, thereby making the technologies more able to help people overcome the challenges they face.

This work also offers several contributions related to specific methodologies. First, I provide an in-depth look at the practice of design ethnography. Design ethnography, a methodological approach from industry, can be perceived as contentious given the stricter interpretation of ethnography used within the field of anthropology. This research looks at design ethnography from both a rigorous and applied stance and generates guidelines and practices for conducting this method in a way that honors its epistemological foundations, while targeting actionable outcomes required in HCI. Second, I deployed several participatory methods as part of this research. One such method, video diaries, is inspired by the PhotoVoice technique, which is a common research approach in qualitative health and social service research. This technique has yet to be applied broadly in the HCI design space. Bringing this simple and powerful technique into the research toolkit of HCI researchers provides opportunities for our community of researchers to learn to listen in new ways.

In addition to the methodological contributions, this research also makes several theoretical contributions related to designing for resource-constrained environments. As a starting point, this research asks about constraints in order to understand the ways in which technology can be used to overcome challenges in daily life. An additional contribution of this work is not only understanding how people experience challenges, but also how the challenges they face are both enabled by and

embedded in their current context, choices, and technologies. One of the contributions of this work focuses on how people have innovative ways to manipulate resources and systems to better meet their needs. By using structuration as a lens, I examine the notion of agency and how the design of a system can both enable and constrain the agency of the users of that system. This theme of agency becomes even more crucial with populations in resource-constrained environments whose circumstances of use and values differ greatly from those of the designers. Looking specifically at agency as a research agenda can yield unexpected and productive outcomes. In addition to considering agency as a research category, the findings in this work point to broader questions about how we as designers and researchers embed not only our values, but the values of the predominant power structures around us, into the design of the technologies we create.

Finally, this dissertation also contributes to a variety of practical concerns related to designing for resource-constrained environments. First, I provide a set of considerations for the design of systems for resource-constrained environments and for the genre of transportation. By looking at how people experience and overcome challenges in their daily lives, I am able to offer some design considerations for systems and the design of these systems based on the two design ethnographies. The results offer some practical considerations for designers and policy makers interested in improving the design of transportation systems and the information and communication technologies designed to support them. There are many studies that look to solve a particular problem in a specific community. While a benefit is that

each design solution is local and appropriate to the context, the challenge is the inability to transfer the solution to other disparate settings. I argue for alleviating this challenge by focusing on the idea of constraints. By examining a category of constraints, such as transportation, this research provides a framework to look for commonality across diverse communities struggling with similar challenges. Using a category of constraints as a boundary mechanism, researchers, designers, and academics can see design problems in a way that allows more collaboration and transparency, which can help generate ideas for resource-constrained communities.

### **How this work is organized**

The remainder of the dissertation is organized as follows:

Chapter 2 is a review of the relevant literature. I start with an overview of the literature that is related to the issues associated with designing for resource-constrained environments. As the HCI community has increasingly grown interested in designing for more diverse audiences and contexts, a variety of work has been done in the emerging field of Information and Communication Technology for Development (ICTD). I review this literature in addition to work related to poor communities in developed countries. I look at the reach of this work by detailing some of the domains and the main studies in each of the domains. I then discuss the specific challenges involved in research and design in these contexts, including measuring success, sustainability, and cultural factors. Next, I review the inclusionary design methods of user-centered design, participatory design, and value-sensitive design to see how they account for challenges associated with designing for resource-constrained

environments. To provide theoretical and methodological guidance for the work, I review the interconnected issues of structure and agency as defined in Giddens' structuration theory. Finally, I also examine the role of social networks and social capital, particularly in settings where resources are constrained.

Chapter 3 presents an overview of the methodology used in the two design ethnographies. First, I will provide a detailed explanation of design ethnography, noting the salient characteristics of this technique and showing how it differs from traditional ethnography. Next, I will discuss the method of semi-structured group interviews with socially connected people. I will contrast this approach to traditional one-on-one interviews. Finally, I will discuss the two participatory activities used in the design ethnographies. The technique of social network mapping was used in the Kyrgyzstan design ethnography. In this activity, we asked participants to draw the people within their social networks (that is, their family and friends) and to discuss how information is distributed throughout the network and how relationships are maintained. I will discuss the video diary method deployed in the Seattle design ethnography. This technique, a variation of the method PhotoVoice, positions the participants as researchers: They collect videos and recordings of their daily experiences. These videos are used as artifacts to discuss the findings in greater detail.

Chapter 4 presents the findings of the first design ethnography in the country of Kyrgyzstan in Central Asia. In Kyrgyzstan, I spoke with four groups of socially connected people, either family or friends. Two of the groups were located in the capital city of Bishkek. The other two groups lived in the outlying smaller city of Kara

Balta. In the results of the design ethnography, I will present rich data from the descriptions of daily life, including stories and photographs of the participants and daily life in these two cities in Kyrgyzstan. The findings of this design ethnography focused on the general challenges of daily life in a post-Soviet, newly capitalistic society. Providing both a historical and political context, I will also share stories of the mundane to illustrate the role of social networks, technology, and living in a time of transition.

Chapter 5 presents the findings of the second design ethnography in the city of Seattle, Washington, in the USA. In Seattle, I spoke with five groups of socially connected people, either family or friends. The groups all lived within the urban boundaries of the city. The results of this design ethnography focus primarily on the particular challenges of transportation for people who do not have cars. I will present rich data from the descriptions of the transportation challenges described by the participants. This will include videos, stories, and photographs of these participants. Providing the context of the particular economic circumstances faced by the participants in the study, I will share stories of the participants overcoming constraints by being resourceful and resilient. I will also detail how these participants often experience moments of powerlessness in the face of their transportation constraints.

Chapter 6 is the analysis, interpretation, and synthesis of the two design ethnographies. In this synthesis, I will discuss two of the broad themes evident in the work, those of reciprocity and agency. These themes will be discussed to inform implications for design and research for other resource-constrained environments. In

addition, I will provide examples of opportunities or considerations for ICT systems being deployed in these settings.

Chapter 7 reports on the findings related to the research questions. I also conclude with a series of broader considerations for system design in general, particularly around the themes of agency and reciprocity.

Chapter 8 concludes with a summary of the dissertation. This section also outlines areas for future work related to research in resource-constrained environments.

## Chapter 2: Review of the Literature

---

### **Overview**

The purpose of this ethnographic study is to explore ways to investigate resource-constrained settings a view to identifying design implications that are specific and appropriate to the context and also instructive for other communities or settings. Specifically, I wanted to investigate challenges and constraints across two distinct resource-constrained communities. In order to position this research within the broader context, I consulted a variety of literature. The literature review has been ongoing throughout the project. It began as the research problem was conceptualized (prior to data collection) and continued during data collection and analysis. This literature review includes the following topics:

1. Designing for resource-constrained environments
2. Inclusionary design methodology
3. Structuration: The duality of agency and structure
4. Social networks and social capital

In this chapter, I will broadly define each topic and provide a rationale for its inclusion. I will then analyze each topic in more detail and summarize the literature to reveal the conceptual framework that guided the data analysis and conclusions of this study.

### **Topics and rationale**

Each topic of the literature review was chosen to provide context for the study.

1. Designing for resource-constrained environments

As the Human Computer Interaction (HCI) community has grown increasingly interested in designing for more diverse audiences and contexts, a variety of work has been done in the emerging field of Information and Communication Technology for Development (ICTD). I review this work to gather a set of guidelines or heuristics that can guide work done in resource-constrained contexts.

2. Inclusionary design methodology

A central tenet of Human Computer Interaction (HCI) is that end users must be included in the design process. I review three of the main inclusionary design approaches: Participatory Design, User Centered Design, and Value Sensitive Design. A comparison of these three design approaches reveals what the literature has to offer for designing in diverse and resource-constrained settings.

3. The theory of structuration

Agency, in its more simple form, can be thought of as the ability to act. Agency is a central theme in critical theory. In this literature review, I look specifically at how agency is conceptualized in relation to structure in Giddens' theory of structuration. Structures constrain and enable agency in a variety of ways, and looking at the interplay between constraint and agency allows for an examination of the ways a particular system does or does not meet a set of users' needs.

4. Social networks and social capital

Social networks—and the generation of social capital—are key components of social life. In the final section of the literature review, I will investigate the concepts of social networks and social capital and, more specifically, the ways in which these concepts play out in resource-constrained environments.

Finally, I will present a conceptual framework that unifies key concepts from the literature review and provides theoretical guidance for the remainder of the work.

### **Resource-constrained environments**

Over the past decade, there has been an increased focus in the Human Computer Interaction (HCI) community on designing products and services for people living in developing regions and resource-constrained contexts. Some terms used to describe this focus include *HCI for development*, *Information and Communication Technologies for Development (ICTD or ICT4D)*, and *design for inclusion*. I am using the broader term *resource-constrained environments* to include developing countries and vulnerable or underserved populations in developed countries. A resource-constrained environment, in this formulation, is any environment with limited access to or reduced availability of resources. Resources include physical as well as social infrastructure and range from robust bandwidth to electricity to literacy.

In this section, I provide a focused review of the literature related to resource-constrained environments. First, I will further define the goals and aims of research related to resource-constrained environments. Second, in order to illustrate the scope

of research in this area, I will identify the domains in which such work is being done. Third, I will identify a set of themes related to the challenges of working in this area.

### **Research agenda and goals**

The primary goal of designing information and communication technology for developing regions and for poor communities in developed regions is to help alleviate the challenges people face in everyday life. As Dias and Brewer stated, “the overarching goal of all such projects is the alleviation of the suffering caused by poverty and improvement of quality of life for the world’s poor” (Dias & Brewer). The authors asserted that the focus on this research agenda is underpinned by the fundamental belief that “technology can have a large and positive effect on billions of individuals” (Dias & Brewer)

Research in resource-constrained environments differs from other research in computer science in that it is “driven by the solving of a problem rather than by technological innovation” (Dias & Brewer). This is a key distinction, because the outcome of an ICT research project in a poor community can be about technical solutions, but is often not about the latest or most technically sophisticated solution. Instead, ICTD solutions, have similarities with the appropriate technology movement, an approach that gained popularity in the 1970s as a way to create sustainable solutions in developing countries. The philosophical tenants of appropriate technology were explained by the economist E. F. Schumacher in his book *Small is Beautiful*. The appropriate technology movement emphasized discovering the right solution for a problem: Such a solution was not based on the most cutting edge or newest

technology, but rather on what was available and sustainable in a particular community (Schumacher). Oftentimes, the solution for a resource-constrained environment can be a simpler, more appropriate technology—or in some cases, no technology at all. Consider, for instance, Sterling's project to empower women, improve their access to information, and address community problems in Sub-Saharan Africa (Sterling, O'Brien, & Bennett). Her choice of technology to address this aim was radio; specifically, interactive radio that gave the women the opportunity both to receive and to send information via radio waves. The choice of radio as the technology in this project was about privileging the best local solution over the newest technology.

The Warana unwired project likewise demonstrated the importance of choosing the most appropriate technology (Veeraraghavan, Yasodhar, & Toyama). The focus of this project was to help a sugar cane cooperative in rural India improve access to information. The technology that was initially implemented in this project was computer kiosks; but seven years after the beginning of the project, the kiosks and PCs sat dusty and unused, some in disrepair. The PCs were replaced with cell phones, and instead of using Internet access, the system relied on SMS (text messages). This change turned the project into a success, which shows once again that a simpler technology can be a more effective solution.

## **Domains**

While technology is often the unifying factor in the field of resource-constrained environments, the domains that are part of this area of research are quite diverse. In this section, I will touch on the main domains and highlight some of the studies related

to them. These domains include computer, mobile phone, and Internet access; health and healthcare; education; economic improvement; homelessness; and designing for oral or illiterate populations. In many of the studies in the literature, the domains overlap (for example, using mobile phones in the delivery of health care or information). My aim here is to use these categories to show the breadth of domains and research in the field.

### **Computer, mobile phone, and Internet access**

One focus of the research in resource-constrained environments is improving access to technology, specifically the use of affordable or low cost technologies. Telecenters and kiosks have been developed as a way to provide access to computers and the Internet. Telecenters are referred to by a variety of terms: “tele-cottages, public information access points, public internet access points or multi-purpose communications centers” (Best, Thakur, & Kolko, 2009). A related concept is that of the kiosk: a single computer, sometimes providing Internet access. For studies related to telecenters and kiosks, see (Antin), (Best, et al.), (Kuriyan, Toyama, & Ray), (Kendall & Singh), (Guo et al.), (R. Kumar, 2004), and (Pal). Related to telecenters, several projects have investigated how to bring Internet access to remote or rural areas. Often, this access has to be designed to be intermittent to address the challenges of infrastructure, geography, or climate. For studies related to remote or intermittent Internet access, see (Pentland, Fletcher, & Hasson), (Mathee, G. Mweemba, & Stam), (Saif, Chudhary, Butt, Butt, & Murtaza), (Ojo), and (Raman & Chebrolu).

Due to its high levels of adoption in many parts of the world, much attention in the field has been given to the mobile phone. Mobile phones are used as shared devices in some communities. In developing countries, they also function as many people's first experience of information and communication technology. For work related to mobile phones, see (Abraham), (Donner), and (Kolko, Rose, & Johnson). Second after mobile phones is interest in low-cost computers. The One Laptop Per Child project, formerly known as the hundred dollar laptop, is the most high profile of the projects that attempt to bring low-cost computers to people in the developing world (Kraemer, Dedrick, & Sharma).

### **Health**

Another domain in the field is healthcare: specifically, the potential use of information and communication technology to improve health and healthcare in poor and developing regions. Investigations in this area include telemedicine, which is the use of technology to help mediate communication between patients and healthcare workers when they are not co-located. Projects include asynchronous medical consultation in Ghana (Luk, Ho, & Aoki) and the use of email to facilitate consultation between health centers and health posts in the Amazon in Peru (Martínez, Villarroel, Seoane, & Pozo). Another project looks at the potential of using a speech based system to allow low-literate people to access health information (J. Sherwani et al.). In addition to telemedicine projects that provide healthcare information to support diffuse populations, there are also projects that look at how mobile devices can help support healthcare workers during diagnosis and treatment of patients. For example, Tanzanian

health workers use the Integrated Management of Childhood Illness (IMCI) protocol to screen for a host of childhood diseases. The protocol was shown to help health staff quickly diagnose a disease, but it was not always administered correctly. To help increase its rate of success, DeRenzi et al. created a version of the tool that could run on a mobile device (DeRenzi et al.). This project, known as e-IMCI, aims to help make the protocol easier to administer correctly and therefore improve its efficacy.

### **Education**

Improving education to improve lives is a common goal of development. There are several ways in which technology is being used to support the goal of improving education. As mentioned earlier, the One Laptop Per Child initiative is focusing on providing students in developing countries with their own laptops (Kraemer, et al.). Other projects look at how technology can be shared in the classroom in order to increase access for more children. For example, the Multi-Mouse project implements a brilliantly simple idea: a group of school children uses more than one mouse so the computer can be shared (Pawar, et al.). Also, there is the concept, similar to telemedicine, of bringing about higher quality teaching and education through the use of video, as in the Digital Study Hall project (Sahni et al.). Digital Study Hall aims to improve education in India by making recordings of the best teachers and sending DVDs of these recordings to the poorer schools, where the lessons are presented to students by a local teacher who helps to moderate the lessons. Another focus of the work being done in education is combatting illiteracy and improving language. For projects related to combatting illiteracy, see (Kalra, Lauwers, Dewey, Stepleton, & Dias),

(Kam, Ramachandran, Devanathan, Tewari, & Canny), (Kam, Kumar, Jain, Mathur, & Canny), and (Mills-Tettey et al.).

### **Economic improvement**

A question for scholars working in the area of ICTD is, How can technologies be used to help improve economic outcomes and alleviate poverty? As mentioned earlier, the Warana Unwired project seeks to help a sugar cane cooperative gain more access to market information through the use of mobile phones. The theory behind this is that more access to information about prices could help the farmers get more money for their crops (Veeraraghavan, et al.). The Digital Green project is a participatory video project aimed at helping local farmers learn about better practices in agriculture so that the farmers can improve their crop yields (Gandhi, Veeraraghavan, Toyama, & Ramprasad). Another project, which was focused on improving economic outcomes for micro-business in India, investigated how ICTs could be used to improve efficiencies and alleviate pain points (A. Kumar, Rajput, Agarwal, Chakraborty, & Nanavati).

### **Homelessness**

Most of the domains discussed so far primarily encompass projects in developing regions. Another domain that can be categorized under resource-constrained environments is homelessness. Studies in this domain tend to focus on the needs of under-resourced people living in urban environments in developed countries. Le Dantec et al. investigated the needs of a group of homeless people in order to identify appropriate technology solutions (C. Le Dantec, A. & Edwards). Their research highlighted the ways in which homeless people needed and accessed information,

identifying the mobile phone as a crucial means of accessing social connections like family and friends. Another study by Woelfer and Hendry looked specifically at homeless young people in a large urban city in the United States. By looking at how these people characterized their interactions with technology and maintained their online identities, the authors generated a list of design considerations for this group of people (Woelfer & Hendry).

### **Designing for oral or illiterate populations**

The final domain in the literature is focused on designing for oral, or illiterate, people. This focus is different from the theme identified previously in the education section, which was concerned with helping people improve their literacy. In designing for illiterate users, researchers investigate how to create interfaces that can be used without requiring people to read. One project focused on the use of videos to teach non-literate audiences how to use an interface (Indrani Medhi & Toyama). Plauche examined the possibility of using speech interfaces to improve access to information technology (Plauché & Nallasamy). Sherwani proposed a new way to think about designing for people who do not read. Instead of using the term illiterate, he instead advocated for using the term “oral.” He also proposed rethinking the ways in which the HCI community designs for these populations. As he stated, “terms like ‘illiterate’ devalue the identity and knowledge of oral cultures by implicitly suggesting that lack of literacy is equivalent to backwardness” (J Sherwani, Ali, Rose, & Rosenfeld, 2009). Taking up this orally focused interaction between human and computer, Gorman et al. investigated how the method of usability testing could be adapted when evaluating the

Talking Book, a device designed to provide educational and agricultural information to oral users in Ghana (Gorman, Rose, Yaaqoubi, Bayor, & Kolko).

### **Challenges of designing for resource-constrained environments**

As shown in the previous section, a variety of domains and problems have been investigated and numerous solutions have been designed to address those problems. What many of these projects and domains have in common is that they have encountered a variety of challenges along the way. In this section, I will draw examples from the literature to demonstrate a selection of challenges that designers face when working in resource-constrained environments.

There are a variety of reasons that creating ICT solutions for resource-constrained environments is challenging. As Antin acknowledged, there is an inherent contradiction when working in the field of development. On the one hand, it is necessary that researchers move more towards a local perspective—understanding local conditions and proposing solutions that match local needs. On the other hand, “whatever researchers do they will always be outsiders to some degree, and our designs and decisions will reflect that” (Antin). Scholars working in this field often acknowledge the difficulties of creating ICTs for developing contexts. There are a variety of articles, both empirical and reflective, on why the work is difficult and why particular projects failed. The challenging nature of the work, coupled with a reflective stance, provides the opportunity to discuss in more depth the variety of challenges specific to researching and designing for resource-constrained environments. Based on a review of the literature, I have created five categories of challenges for ICT projects

in developing contexts. The five categories are *technical, methodological, cultural factors, measuring success, and sustainability*.

### **Technical and infrastructural challenges**

The technical and infrastructural challenges of this work often reflect gaps between researchers and designers' expectations and the realities on the ground. Brewer et al. reported on technical challenges that include equipment failures due to dirt, dust, and direct sunlight (Brewer, Demmer, Ho, et al.). Another technical challenge is finding enough power, be it electrical or battery power, to run the necessary equipment (Brewer, Demmer, Ho, et al.). Additionally, lack of reliable connections was a recurring theme in the CHI Workshop on designing for the developing world (Dearden). This lack of reliability extends to power sources and Internet connections.

A lack of infrastructural support also contributes to other challenges, including the difficulty of travelling to remote study locations (Anokwa). Moreover, projects for development often emphasize the importance of working with local partners, but in the case of many technology projects, it is difficult to find local staff who have the required or desired skill levels to help implement the technology (Brewer, Demmer, Ho, et al.). Technology developers also face challenges when trying to test a system. Consider, for example, a project to design an early warning flood detection system in Honduras. Basha reported on the struggle to test a large-scale system:

Every system needs testing at many different levels—most people agree on the obviousness of that statement. However, in our experience, a large-scale system such as ours that heavily relies on in-country infrastructure usually follows a test strategy whereby component testing occurs in the lab and complete system testing occurs in the field as an installation of the system in its

planned location. This strategy has repeatedly failed us. On one hand, we need the components in the U.S. for component improvements and debugging. On the other side, we need the entire system in Honduras for complete testing and we cannot be in Honduras all the time (Basha & Rus).

Technical and infrastructural challenges are often due to assumptions that designers have about the ways in which the contexts in resource-constrained environments do or do not match their own.

### **Methodological**

Methodologically, ICTD projects pose a variety of challenges. As I will discuss in more detail in the next section, inclusionary methods were developed in highly resourced and Western contexts. As a result, these methods do not account for the diversity of users and the settings encountered in resource-constrained environments. It is often assumed that end users and local people will be involved in the ICT project. Participation is also typically an assumption of traditional development projects—even ones that do not explicitly involve ICTs. Bailur referred to the concept of participation as being a top-down effort: Instead of being a response to a community's needs, the ideas for technology and the impetus for engaging the community come from the designer, researcher, or non-governmental organization (NGO). Therefore, this idea of participation may be superficial.

*"An NGO respondent in southern India commented 'participation is just a box we tick. We look for gender, ICT for development, participation—they are just the buzz words to get funding'" (Bailur).*

Even when the desire to include local people in the evaluation and development of the technology is sincere, certain methodological challenges arise, often resulting from logistical challenges. I have already mentioned the technical

challenges that arise in developing contexts. These technical challenges often overlap with methodological challenges: specifically, working with local people during the study. When conducting studies with users, there are a host of challenges related to literacy and culture; I will discuss these challenges in more detail in the next section. The logistical issues include the challenges of elicitation—having local people provide feedback or participate in studies in a way that helps designers and developers make changes. Sherwani wondered if it is at all helpful to conduct traditional usability testing in these situations (J Sherwani, et al.). Winschiers et al. reported on how the concept of usability is locally and culturally constructed and varies across context (Winschiers). In a study looking at the concept of Namibia, Winschiers reported:

Terms that were named most often were: easy, safe, comfortable, specific, reliable, right pace, goal-oriented, and conducive. Interestingly none of the groups mentioned terms commonly associated with usability such as speed, learnability, memorability, or error rates. However a diversified understanding of satisfiability was expressed such as: beneficial, transparent, stress-free and flexible.” (Winschiers, 2007).

A variety of studies have addressed the challenges of eliciting responses from local people in resource-constrained environments. Several authors acknowledged that studies in developing countries bear little resemblance to studies conducted in Western settings. For example, it can be helpful to conduct studies with groups of people rather than individuals (Anokwa) (Gorman, et al.). The same research showed that lab studies are unrealistic; studies are therefore conducted in locations that are familiar to participants, and often these locations are in public (Anokwa) (Gorman, et al.).

An additional challenge is determining which local groups to work with. This is especially difficult when their involvement could put them or the researchers at risk. Examples of this type of challenge can be found in stories of collecting data in the favelas, or slums, of Brazil while rival drug gangs were fighting over territory (Brewer, Demmer, Ho, et al.) or instances when technology unearthed illicit practices that could have resulted in the participants being punished (Anokwa).

### **Cultural**

Cultural gaps and challenges are mentioned by a variety of authors: (Brewer, Demmer, Ho, et al.) (Gorman, et al., 2011), (Anokwa), and (Dearden), to name a few. Most reflective ICTD papers acknowledge the difficult task of designing for and researching with illiterate users (Donner), (Dearden), (Anokwa), and (Gorman, et al.). The reason I am listing illiteracy as a cultural factor, rather than as a methodological or logistical one, is because it demonstrates not a lack of skill, but rather a different way of viewing the world and processing information. For example, Medhi et al. designed an interface for illiterate users in India, and based it on a variety of contextual ethnographic fieldwork (I Medhi, Sagar, & Toyama) (Donner et al.). During initial studies, the system performed poorly. Target users experienced very low success rates during the evaluation. The design modification Medhi made was not about changing the interface, but rather contextualizing it in a way that resonated with the target users. She created a series of full-context videos filmed in a Bollywood style. The introduction of these videos greatly improved the level of success, because it provided

the full context for users who had little experience or reference for interacting with ICTs.

Additional cultural challenges of working in developing and diverse contexts include negotiating the differences of culture in all its nuances, including cultural issues of hierarchy, such as the caste system in India (Smith & Madon) and issues of gender (Anokwa). Hierarchy and social inequality in a project that aims to be participatory in nature can inhibit participation by those who have a lesser position in the culture or community (Byrne & Sahay). How the target communities or users feel about technology is also an important factor. As Antin said, "If community members feel that the presence or use of ICTs is in conflict with other deeply held beliefs, even the most appropriate intervention will likely fail" (Antin). Cultural factors can cause a significant disconnect between researchers and the communities for whom they hope to create solutions.

### **Measuring success and sustainability**

The last challenge identified in the literature is how to measure success and sustainability. These two factors are tightly coupled because sustainability is often a measure of success, as demonstrated by Dias:

*"Long-term impact requires that ICTD projects be self-sustaining. First, after the researchers leave and the money stops flowing, does the project continue? Second, can it be replicated in other contexts?" (Dias & Brewer)*

The field is full of stories of pilot projects that were either abandoned or just slowly faded away. In projects where the technology is being used, there are still important considerations related to measurement, such as "what a particular

technology intervention is being used for, who is using it, or how it is helping to build a more robust livelihood strategy” (Garside). One of the largest challenges for ICT projects in resource-constrained contexts is the ability to sustain a project in a particular location, transfer it to another context, or scale it to larger context. There are few examples in the literature of projects that have met these milestones.

### **Heuristics and guidelines**

Reflecting on the challenges of designing ICT is helpful for the field. Several writers have also provided guidelines or heuristics for how to approach these challenges.

Hosman et al. proposed five characteristics of successful ICT projects:

1. Establishing a public-private partnership and ensuring that those in the partnership are involved from an early stage and are committed to the goals of poverty reduction and sustainability.
2. Including a proof-of-concept pilot project early on and focus on rectifying problems in ways that are inline with local realities and local socio-economic conditions.
3. Selecting appropriate technology and recognizing that simpler is often better.
4. Ensuring that the necessary infrastructure is present (in Hosman’s case, it was the sign of a liberalized telecom sector).
5. Involving local communities and citizens from the beginning of the project.

Dearden et al. synthesized a set of heuristics related to ICT success from the 2007 CHI Workshop on UCD for developing countries (Dearden). These recommendations included:

1. Identifying a local partner who is already working directly within a target community.
2. Gathering necessary background information prior to entering the field (demonstrating an understanding of the local community helps build credibility).
3. Seeking a relationship that is engaged in mutual learning with others in the same domain (whether the domain is information technology or development), because the work is interdisciplinary in nature.
4. Anticipating and addressing sustainability from the beginning of the project

Donner et al. provided a framework for thinking about ICT for developing contexts. This framework was built from an analysis of a variety of projects from Microsoft Research India. Within their framework, they included the following stages:

1. Wonder: Recognition of the size or severity of a particular challenge in development and wonder that the problem persists.
2. Exuberance: Excitement at devising an initial technical solution.
3. Realization: Discovery of ground realities when the initial solution doesn't quite work and realization that the real problem is elsewhere.
4. Adaptation: Creation of a new solution that solves the real problem.
5. Identification: An identification with the user that often explains the gap between exuberance and realization. (Donner, et al.)

The key stage in this framework is the middle stage, *realization*, because it puts the notion of course correction or redirection at the center of the design process. It acknowledges that, due to the complexities of ICTD, it is rare that we will get the solution right, even when we follow iterative and user-focused processes. In addition to the framework, Donner et al. also proposed three guiding principles for work in this area. First, they saw that sustained and prolonged time in the field is essential. Second, they referred to “honesty about what works,” which means designers should not focus only on whether something technically works, but should consider in addition whether it makes sense for the community. Also falling into this category is asking if the stakeholders are happy with the solution. Finally, their third principle is the acceptance of simple solutions. This echoes the recommendation of Hosman’s characteristic number 3, which pointed to an appropriate technological solution, rather than the most cutting edge or advanced technology.

In this section, I have provided an overview of the literature related to resource-constrained environments, focusing primarily on the work that has been done in the field of ICTD. This review shows the scope of the work being done in the field across a variety of domains. I also provided an overview of the myriad challenges of working in the field and, by reviewing the reflective literature, outlined some of the guidance for overcoming these challenges.

## **Inclusionary design methods**

A central premise of Human Computer Interaction (HCI) is that the design process should consider the needs of end users and evaluate how well systems meet their needs. When designing for resource-constrained environments, it is possible that that context of users and their experience of the world are quite different from the designers' or the researchers' context. Differences can include geography, economic resources, societal context, cognitive abilities, and so on. Some differences are larger and more obvious than others, such as limited access to electricity; others may be subtle and thus more challenging to identify, such as multi-literate populations. When designing for users within a resource-constrained environment, characteristics of context and usage patterns that are often peripheral become increasingly important. This means that a design process must adopt modes of inquiry that prioritize such factors. However, methodologies that emphasize including people within the design process were born from a Western context that is highly resourced and typically focused on the workplace. These methods make assumptions about the homogeneity of end users and their contexts. When such methods are applied to new contexts, things do not always go as planned. In other words, it is complicated to design products or services for people whose daily lives look very little like the designer's own. It is additionally challenging to design for diverse populations when they are far away—geographically, culturally, or cognitively. Methods and toolkits that serve us well in familiar contexts and with familiar audiences do not seamlessly translate. In this section, I review three of the main inclusionary design approaches: Participatory

Design, User Centered Design, and Value Sensitive Design. The purpose of reviewing the three approaches is to reveal what the literature has to offer for designing in diverse and resource-constrained settings.

### **Participatory Design**

Participatory Design (PD) advocates for the full and direct participation of end users within the design process (Muller). Torpel stated that PD "is about the direct participation of those who will be affected by the development of a particular computer application in the decision-making, design and/or development process" (Torpel). PD originated in Scandinavia in the 1970s as part of a movement to preserve and promote democracy in the workplace, or as Ehn called it, a "commitment to the idea of industrial democracy" (Ehn). The roots of PD are in Marxist critique; as technologies were introduced into the workplace, the concerns over Tayloristic philosophies that would deskill workers motivated the PD movement. Strong labor unions in Scandinavia emphasized a democratic workplace and secured the involvement of workers in the design of the technologies they would use in their jobs. Partnering with academics, the unions provided both leverage for the technique of participatory design and representation for the workers.

The full participation of users is a key component of PD. The participants in the design process are the individuals who will be using the end design. Their participation lasts throughout the entire span of the design of the project. Participants are given a seat at the table and a full voice in the design process. The individual's or group's involvement is motivated by personal investment in the outcome. Based on the

traditions of PD, these users have a high stake in the process and are motivated because they are the ones who will be using the system as part of their jobs.

PD is distinguished from other approaches in several ways. In PD, the line between design and research is blurred. As Spinuzzi pointed out, the results of research are “co-interpreted by the designer-researchers and the participants who will use the design” (Spinuzzi, 2005). Since PD’s commitment to involving individuals and communities is a political one, it both acknowledges and aims to decrease inequities of power. The initial concern about power was associated with the relationship between workers and management: Involving workers in the creation of the design was intended to bring about a more democratic work environment. Another power differential disrupted by PD, however, is the one between designer and user. When a user has a seat at the design table, he or she is able to advocate, perhaps more forcefully than would be possible with other methods that include users in a more representational fashion (such as User Centered Design). For example, a PD participant can resist a designer’s idea; a persona, on the other hand, cannot.

Another distinguishing characteristic of PD is its focus on tacit knowledge; that is, the knowledge that is deeply embedded in practice and not easily captured or expressed. This focus drives PD to the setting where the technology will be used. In other words, PD emphasizes the need for immersion in the contextualized complexity of practice. Finally, this participatory approach to design has several methodological counterparts in other domains and disciplines. In social science, intellectual cousins of PD include action research and participatory action research (Greenwood & Levin,

2006). In the development literature, it resonates with participatory rural appraisal and participatory technology development (Chambers, 2005).

In accordance with the original definition of Participatory Design, those participating in the earliest PD projects were from the same community. Among the particulars of the Scandinavian context, Ehn noted that the workforce tended to be “highly educated and relatively homogenous” (Ehn, 1993). Therefore, the original practice of PD did not have to account for a great variety of cultural difference between designers and those they were designing for. As PD has moved out of a Scandinavian context and has become concerned with more diverse design problems, the homogeneity that once characterized it has disappeared. Some argue that PD has not been adequately adapted for contexts outside of a Western business setting (Byrne & Sahay, 2007).

Another concern associated with PD projects is scalability. Since the main research and design question is bound so narrowly to a particular context and involves local users to solve a specific design problem, adjusting the scale of a design idea to suit a context other than the original can be challenging. Also, there is little in the literature about how to evaluate the success of PD projects. The assumption behind PD is that if users are involved in the design, the design will be successful. It is rare, however, to find studies or papers that document success after the technology has been deployed, and the impact of a design on those not directly involved with the PD is not always clear.

## **User Centered Design**

User Centered Design (UCD), also known as Human Centered Design, advocates placing the user at the center of the design process. Karat and Karat defined UCD as “a process that sets users or user data as the criteria by which a design is evaluated or as a generative source of design ideas” (Karat & Karat). The two points in this definition are to (a) include users in the design process and (b) evaluate the design. UCD is said to have roots in the PD movement (Sawin, Yamazaki, & Kumaki) and to stem from human-factors practices that date to World War II, when the focus was on cognitive ergonomics. Traditionally, the focus of UCD has been on including users in the design process in order to fulfill the principles of effectiveness, efficiency, and satisfaction (ISO 9241-11). This concentration emerged from the traditional focus of software development in a Western context, which was to create tools to be used as part of the workplace. Norman has argued that the term ‘user’ is too narrow, because it concentrates attention on Western notions of efficiency (Norman). However, developments in UCD have broadened the concept of user experience to include aspects beyond efficiency, including level of engagement (Whitney Quesenbery). This broadening of the concepts of UCD is reflected in the changing of the label from User Centered Design to Human Centered Design (HCD) (Hanington).

In a paper that is considered seminal among UCD advocates, Gould and Lewis made the claim that UCD requires three central characteristics: early focus on users (Gorman, et al., 2011) and tasks, empirical measurement, and iterative design (Gould & Lewis). In their initial simple definition, we see the central departure from PD: The

user is the focus of the design, but not necessarily the full participant. The user, instead, is an early object of study. Additionally, the other two pieces of this definition—empirical measurement and iterative design—demonstrate the importance of capturing and measuring results. Gould and Lewis stated that understanding users “is arrived at in part by directly studying their cognitive, behavioral, anthropometric, and attitudinal characteristics.” So, whereas PD advocates would argue that their user focus is primarily on tacit knowledge, the foundational focus of UCD is primarily on user cognition and performance, and how those factors are measured and evaluated.

Users who participate in UCD activities do so as chosen representatives of a larger audience. UCD researchers often create user profiles or personas (see (Cooper, 2007), (Mulder, 2007), and (Pruitt, 2006)) that distill the salient characteristics of a particular user group into segments. For example, Courage and Baxter recommended grouping users across categories based on similarities such as age, experience, attitudes, or primary tasks (Courage & Baxter). Mulder and Yaar recommended a user segmentation that begins with user goals, followed by behaviors and attitudes surrounding a product or service (Mulder). It is often recommended that profiles/personas be accompanied by scenarios, which describe important user activities in relation to a targeted product or service (W. Quesenbery).

In contrast with PD, representative users are included at selected times, but they are not incorporated as an integral part of the design team. To paraphrase Spinuzzi, whereas UCD design is done on behalf of users, PD design is done with the users (Spinuzzi). When designing new products, representative users are often consulted as

part of an early ideation stage. They are consulted again later as evaluators of prototypes or more finished products. This evaluation, referred to as usability testing, is the most common activity in UCD.

Much of the literature in UCD focuses on building better designs to improve customer satisfaction, which in turn anticipates selling more products (Beyer & Holtzblatt). Because of this, some critics have argued that, while UCD does have a philosophical commitment to involving users, the motivations behind this commitment are often related to profit/sell-ability and adoption (Bias & Mayhew). Finally, other critics have posited that UCD's concern with the user as an individual does not facilitate an expanded community focus, which can be essential when designing in the context of a resource-constrained environment (Dearden).

### **Value Sensitive Design**

Value Sensitive Design (VSD), a relatively young method compared to PD and UCD, acknowledges that the design of technology can have a profound impact on human values (Batya Friedman). VSD is defined as a "theoretically grounded approach to the design of technology that accounts for human values in a principled and comprehensive manner throughout the design process"(B. Friedman, Kahn, & Borning). VSD focuses on the human values of direct and indirect stakeholders in order to bring about a design that is sensitive to and accounts for those values. VSD is said to have connections to literature on human values and related HCI design approaches (Computer Ethics, Social Informatics, Computer Supported Cooperative Work, and Participatory Design).

VSD consists of a tripartite methodology that is intended to investigate conceptual, empirical, and technical angles. The conceptual phase asks, who are the direct and indirect stakeholders, how will they be affected by the design, and what values are implicated? The empirical stage investigates the human context in which the technical artifact is situated. It applies to any activity that can be observed or measured and uses a range of quantitative and qualitative methodologies. The technical phase investigates the technologies in the face of identified values; as Friedman et al. stated, a "given technology is more suitable for certain activities and more readily supports certain values while rendering other activities and values more difficult to realize" (B. Friedman, et al.).

A differentiating characteristic of VSD is its focus on both direct and indirect stakeholders in the design process. This focus is a departure from PD and UCD, which concern themselves primarily with end users of a system. Direct stakeholders interact and use the design. Indirect stakeholders may not actually use the design, but may be impacted by its use in some way. For example, the design of an electronic medical system would have direct stakeholders, including doctors, nurses, hospitals, and insurance companies; the indirect stakeholders would be the patients (B. Friedman, et al.).

In VSD, the concern about stakeholders is manifested in an effort to discover what human values are impacted by design. The values that must be considered involve broader issues, such as "fairness, justice, human welfare and virtue" (B. Friedman, et al.). The consequence of this expansion is that VSD helps to push design

approaches outside of narrowly constituted contexts, such as the workplace (like PD), and beyond a focus on software primarily for the purpose of efficiency (like UCD).

Some potential limitations of VSD for an ICTD context include the fact that the methodology itself, while rich, does not account for a smaller engagement. A number of other criticisms have been leveled against VSD. These range from a claim that the method privileges 12 known values as a heuristic (rather than the values discovered during a contextual engagement) (C. A. Le Dantec, Poole, & Wyche) to the suggestion that the lack of prescription around VSD methods is a barrier for designers and researchers who try to incorporate VSD into their design processes. While I do not agree with all of the criticisms presented in (C. A. Le Dantec, et al.), I do concur that the lack of methodological prescription makes it difficult to apply VSD in the field.

### **Comparing the three inclusionary design methods**

While all three methods—PD, UCD, and VSD—involve users in the design process, the methods differ in key ways. Two of the major distinctions concern how the “user” or user community is integrated into the design process and how long that involvement persists. It seems particularly useful to think about how these three approaches position the user with respect to the designer, and how those perspectives can help clarify field approaches.

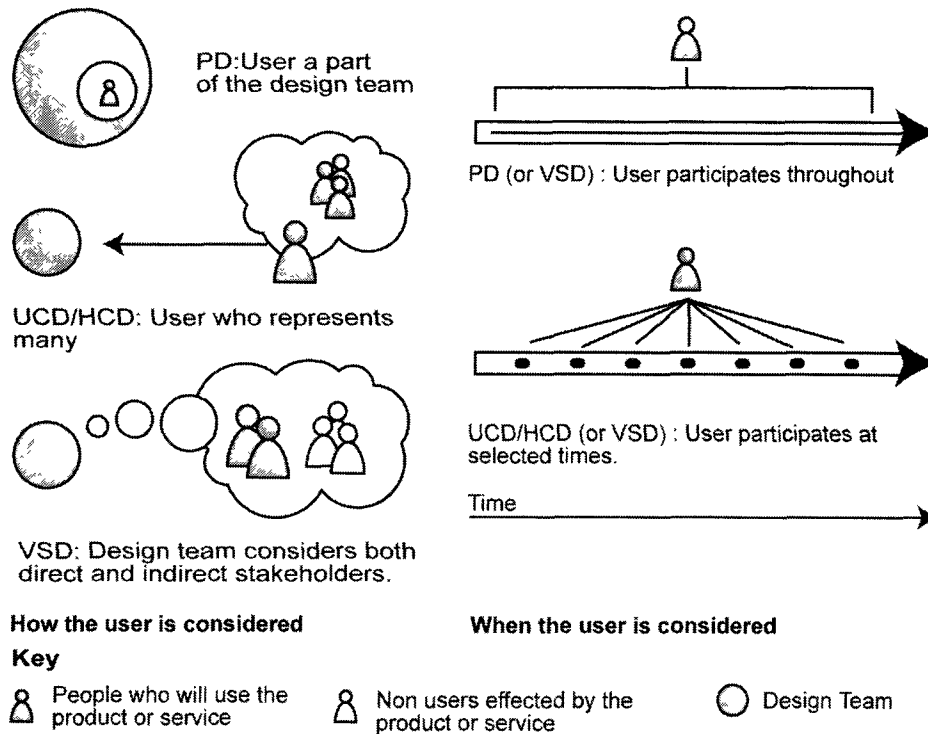


Figure 1. How and when users are considered

As Figure 1 shows, PD emphasizes consistent involvement of a representative user as a member of the design team, VSD involves direct and indirect participants over variable time frames, and UCD integrates a representative user at particular intervals. The question of how to involve users in a design process becomes especially complex when those users are far away geographically or culturally; it also becomes challenging when power dynamics or trust relationships are an issue, as is often the case when working with resource-constrained environments.

## Structuration

Structuration is a theory that provides an explanation of the social order through the interplay of human actors and the conditions of society that they encounter. This theory works to explain why society is constituted as it is and how it repeats and

sometimes changes over space and time. At the heart of structuration is the concept of the duality of structure. It is a critique of previous theoretical approaches, which explained social order as either an outcome of a set of objective structures or as a completely subjective response to the will and actions of individuals. Structuration resolves this debate by saying that social order is established by the interplay between the two. Agents and structures are not two entities that are independently acting upon one another; rather, “the structural properties of social systems are both medium and outcome of the practices they recursively organize” (Giddens, 1984)—meaning that agents are bound within structures as their actions create and recreate those structures. This is a more discursive view in comparison to some structuralist or poststructuralist theories that obscure the agent and collective practices that occur.

To explain structuration, I will provide a summary of the key points of the theory: the actors and the structures and the duality that exists between the two. For Giddens, the human actor is a reflexive, knowledgeable being with extensive understanding of his/her social activities. When it comes to everyday life, competent members of society are “expert ‘sociologists’” (Giddens, 1984). These knowledgeable agents demonstrate their reflexivity by acting purposefully within the ongoing flow of social life—meaning that actors make choices constantly about how to act in the world. Their acts are not discrete events, but rather, a continuous process that makes up an “aggregate of intentions.”

Agents’ knowledgeability is what allows them to go on in the social world. Giddens characterized knowledgeability in two ways. First, discursive consciousness

refers to individuals' ability to attend to and convey their intentions and reasons. Practical consciousness is what someone might know or practice as the conditions of their actions, even though he/she is unable to express this discursively. Giddens referred to this as "what is simply done." What is essential to this idea of knowledgeability is that humans are purposeful, reflective actors in the world. While humans know and therefore explain on the level of discursive consciousness what it is they are doing, they may "know little of the ramified consequences of the activities in which they engage" (Giddens, 1984). For Giddens, agency and intentionality are not the same thing. Agency is about the possibility of doing something in the first place, which implies a notion of power. In this context, this ability to act or 'act otherwise' means "being able to intervene in the world, or to refrain from such intervention, with the effect of influencing a specific process or state of affairs". Although agency, or the ability to act, is possible within structuration, agency is not unbridled and not to be conflated, as Ahearn said, with free will (Ahearn).

Within the theory of structuration, the concept of structure refers to the organizing aspects of society. These can include norms, language, culture, and institutions—the aspects of the social order that act as structures (or have "structuring properties") that tend to stabilize and repeat over time. Giddens conceptualized structure as being made up of rules and resources. Rules can be further divided into normative elements and codes of signification. Normative elements are those that dictate the standards of social conduct, including what is expected and what the consequences are for not following the standards. The codes of signification refer to

meaning, which is produced and constituted in agreement with others. Resources can be categorized in two ways: authoritative and allocative. Authoritative resources are ones that influence people. Allocative resources are ones that influence objects or materials. According to Giddens, structural properties are always both enabling and constraining. To illustrate this, he provided the example of a person's first language: An individual does not choose his/her first language, but that language enables certain possibilities, while simultaneously constraining others. The choice of first language, which was not an individual choice, was brought about by a variety of factors over space and time, including historical ones.

The duality of structure in structuration is the discursive relationship between structures and actors. This relationship is a reciprocal one. Structures enable and constrain actors, meaning structures dictate what should or can be done. At the same time, however, actors have the ability to act and can act according to or against the structural constraints within which they live. These actions in turn inform structures, which often change over time. While structures enable and constrain actors, actors inform and modify structure through everyday practice. Consider, for example, the use of Global Positioning System (GPS) devices, which are becoming ubiquitous in the United States. By providing additional information, a GPS device can help individual agents make decisions and change their actions (such as where to drive). The individual driver may take a shortcut to avoid a particular place that is prone to traffic congestion. But say that over time, this new routing becomes habit for this driver and perhaps for others. As a consequence, a previously quiet residential street may now

become heavily trafficked and more dangerous for those who live there. It is an eventual outcome, which, while not formally intended, came about over time due to a series of repeated recursive acts. Even though the outcome may not have been intended or desired, it is as if it were simultaneously everyone's doing and no one's.

### **Structuration and technology**

Structuration has already proven fruitful in a variety of investigations related to technology and human computer interaction. Perhaps most notable is Orlikowski's use of structuration to reconceptualize technology within an organizational context (Yates & Orlikowski, 1992). This idea of the duality of technology demonstrates how structuration can be used as a theoretical frame. Perhaps more importantly, however, Orlikowski complicated the notion that technology is a static entity:

Technology is the product of human action, while it also assumes structural properties. That is, technology is physically constructed by actors working in a given social context, and technology is socially constructed by actors through the different meanings they attach to it and the various features they emphasize and use. However, it is also the case that once developed and deployed, technology tends to become reified and institutionalized, losing its connection with the human agents that constructed it or gave it meaning, and it appears to be part of the objective, structural properties of the organization. (Yates & Orlikowski)

Lamb and Kling used structuration to call for a reconceptualization of users in ICT research. Moving from a static concept of users to a richer definition of a user as an "active agent in information system use" (Lamb & Kling), they found the balance of structure and agency useful, "regarding each as one side of the same coin, each constituting the other in critical ways" (Lamb & Kling, 2003). In addition, Herndl and Licona investigated the concept of agency and defined it not as an attribute of the individual, but rather as a set of "social and subjective relations that constitute the

possibility of action” (133). They reframed the issue of agency as a rhetorical one. So, their question is not just about who gets to speak, but also about what “are the conditions and opportunities that allow subjects to act to change or reproduce social, institutional and discursive practices” (134). In particular, they used the rhetorical notion of *kairos*, which refers to the power of the opportune moment.

To demonstrate how the theory of structuration can be applied as a framework, I present two examples that show why structuration is a productive theory for the examination and consideration of technology. Both of these stories revolve around the ways in which a design was modified in response to the ways in which agents took up the technology.

### **Fakesters and Friendsters**

The web site Friendster was a popular social networking software. Friendster was initially designed and intended as a dating web site. The premise of that site was that leveraging users’ social networks would help them find suitable dating partners—the assumption being that friends of friends might be more suitable dating partners than strangers. As a result, the system was inclusive of wide social circles of people who were not looking for dating partners, but who simply wanted to socialize more broadly.

In her ethnographic study of the site, Danah Boyd noted several ways that people were using the site for their own purposes (boyd, 2004). As the popularity of the site took off, individual users began to use the site in ways it was not intentionally designed for. Users created fake profiles, known as *fakesters*, that were fictional

characters that represented a community group or a make-believe entity. While these fakesters were instantiations of individuals' agency and were done in a creative and playful way, they violated the institutional rules and original purpose of the site. As a result, "a tension formed between the company and the users" (np). The company deleted fakesters, which angered the community. According to Boyd, users found the site less interesting once the fakesters had been removed. It is not possible to say if this particular collapsing of the individuals' and the community's intentionality negatively impacted the site overall, but Friendster has declined in popularity amongst its early adopters, who may have moved on to other social network sites (such as Facebook).

### **Beeping**

The practice of beeping, or intentionally missing calls on mobile phones, is a popular practice employed in a variety of developing countries. A study by Donner looked at this phenomenon of beeping to gather a broader understanding of how the practice worked (Donner). Beeping is the practice of calling another person and intentionally hanging up before that person answers. The purpose of beeping is to communicate a particular message, whether to negotiate a call-back (so the other person pays) or to send a particular code or relational (in other words, to communicate that "I'm thinking of you"). Donner found that "the most important point of commonality is the desire to lower telecommunications expenses in the face of economic constraint "(np). He also noted how this practice was communal and taught to others within a community. By using adaptive structuration theory, Donner theorized about the practice of beeping and how it was manifested as a daily practice

in a variety of contexts. Donner also identified several services that have recently added a free SMS or free “call me” message that is provided by the telecomm company as a service.

Looking at these two simple examples shows the possibility of using structuration as a theoretical approach for researching technology. Friendster enforced institutional rules that went against the practices or preferences of the knowledgeable agents in the system. As a result, one could speculate, it lost the participation of those individuals. On the other hand, by leveraging the practices of its customers, the telecom company is now able to provide a service that may result in mutual beneficence, meaning both parties benefit. Users get more control over their spending related to the mobile service, which fulfills a crucial need for poor populations. The telecom company can attract more customers who are seeking this service, increasing overall revenue. The interesting point in these cases of technology is that structuration can be used both for studying social phenomenon like technology and for helping open the possibilities of the design of technology so that it more appropriately supports the actions and needs of its users.

## **Social capital**

Social networks and the generation of social capital are key components of social life. In this section, I will discuss the concepts of social networks and social capital.

Social networks are collections of individuals and groups that are related through sustained (at times intermittent) interactions that leave discernible traces over time. The social network—or the relationships or connections between individuals—is required for the generation of social capital. According to Williams, "Establishing the presence of networks is important because it is the causal mechanism in the formation of social capital" (Williams).

Social capital is a substantive concept, and a variety of scholars have used the term in overlapping, yet slightly different, ways. I will provide an overview of some of the definitions of social capital that I have found productive. I will also develop a coherent definition for my own research.

Pierre Bourdieu characterized social capital as one of several forms of capital that people could access; other examples include economic capital or cultural capital. According to Bourdieu, all types of capital have similar characteristics: it takes time to accumulate, it has the potential to reproduce itself, and it has the tendency to persist (Bourdieu). However, the existence and accumulation of capital is context dependent. In particular, focusing on social capital, Bourdieu defined it as resources that are linked to a "durable network of more or less institutionalized relationships of mutual acquaintance and recognition ... which provides each of its members with the backing of the collectively owned capital, a 'credential' which entitles them to credit, in the various senses of the word" (Bourdieu). Social relationships that net social capital, according to Bourdieu, can be practical, material, or symbolic. They can be socially

instituted and identified by a common name: family, class, tribe, school, party, and so on. Bourdieu insisted that a characteristic of the social relationship be opportunistic proximity: people must therefore be related in physical, economic, or social space.

According to Bourdieu, the volume of social capital that a single person possesses is dependent on several factors. One factor is the size of the network that an individual can effectively mobilize. While individuals do not necessarily consciously pursue social capital, according to Bourdieu, the existence of the network itself is the product of intentional investment strategies that are “aimed at establishing or reproducing social relationships that are directly usable in the short or long term” (249). For Bourdieu, the aspect of transforming contingent relationships into something more durable is key. Relationships in the form of acquaintances may be present, but the ability to formalize them is both “necessary and elective.” This transition is marked by a continuous series of exchanges, wherein “recognition is endlessly affirmed and reaffirmed.” This notion of reaffirming is also called reciprocity, which “creates an expectation that an individual who receives a favor will feel obliged to pass it on, either back to the original source or to someone else” (Resnick, 2002).

Robert Putnam popularized the concept of social capital in his work *Bowling Alone*. The book addressed the phenomenon of how civic engagement and participation in the United States steadily declined in the second half of the 20<sup>th</sup> century. According to Putnam, this lack of engagement in American life led was due to this decline in civic engagement and the trend of the “individualizing” force of technologies like television and the Internet. These forces in turn lead to an erosion of

the accumulation of social capital. Putnam defined social capital as the “features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit” (R. Putnam). In his research, he found that participation in community events and civic engagement helped “foster sturdy norms of generalized reciprocity and encourage the emergence of social trust. Such networks facilitate coordination and communication, amplify reputations, and thus allow dilemmas of collective action to be resolved” (R. Putnam). Warschauer provided an additional attribute of social capital: it “accrues both to individuals and to communities” (Warschauer). This recursive relationship leads to social capital being generated between individuals and groups and in turn improves the social network of a community as a whole.

Putnam defined two types of social capital: bonding and bridging. Bonding social capital, also referred to as strong ties, occurs within densely connected social networks, such as families or groups of close-knit friends. These groups provide strong and essential support, including emotional support, or come to the aid of an individual when that individual is in dire need. These types of ties tend to be insular and at times can be homogenous in terms of belief structures.

Bridging social capital, also referred to as weak ties, connects individuals in looser ways: for example, to acquaintances or to friends of friends. These types of ties tend to be more diffuse and are able to link individuals and groups to a wider variety of individuals and groups (Warschauer). These sorts of connections offer information or links to support rather than the deeper connections that strong ties offer.

Granovetter provided insight into the importance of bridging social capital in his theory of the strength of weak ties (SWT). According to this theory, weak ties are important due to the connections that link members of different small groups.

Granovetter saw weak ties as “indispensable to individuals’ opportunities and to their integration into communities” (Granovetter). Related to this is the concept of homophily in social networks, which refers to the principle that people have more contact with other people who are similar to them than with those who are dissimilar (McPherson, Smith-Lovin, & Cook). For example, similarities can be related to socio-economic status, race, and education, but each of these categories tends also to be localized, meaning that people who share similarities tend to be located near one another or come into contact with one another more often.

In later work, Granovetter went on to explore how strong and weak ties impact groups differently. In particular, due to economic pressures, people contending with poverty rely more on strong ties. Strong ties are an essential way that people “get by” during hard times. Conversely, people contending with poverty are less likely to cultivate weak ties. Weak ties are often how people “get ahead,” in that they use such ties to find out new opportunities (for example, to find a job). Because of the nature of reciprocity that occurs particularly in relationships with strong ties, over reliance on strong ties impacts the entire community. As Granovetter stated:

I would suggest that the heavy concentration of social energy in strong ties has the impact of fragmenting communities of the poor into encapsulated networks with poor connections between these units; individuals so encapsulated may then lose some of the advantages associated with the outreach of weak ties. This may be one more reason why poverty is self-perpetuating (Granovetter).

The reliance on strong ties and the lack of weak ties, according to Granovetter, leads to an insularity, which results in recurring cycles of poverty.

Finally, social capital is temporal, and it occupies a unique point in terms of the continuum of social action. On a simplistic level, social capital may seem like a “favor bank” into which individuals make deposits so they can draw on them later when necessary. This, however, implies an intentionality that is not always present (as mentioned by Bourdieu). Again, in the everyday practice of social relations, transactions of social capital are often subconscious and part of the milieu of interactions. Nevertheless, social capital is often discernible over time in traces (although those traces are not always apparent in the present). Resnick summed up this temporality of social capital by stating that it is “both a residual of previous interactions and an enabler of future interactions” (Resnick).

In summary, social capital is generated by individuals and groups during their day-to-day interactions. It is a productive resource that allows people to get by or get ahead. The poor often have more strong ties than weak, because people tend to rely on the former when times are difficult. However, weak ties are essential for getting ahead, because they broaden the network and bring more people from more diverse groups into contact. Generating social capital requires reciprocity, which refers to the mutualistic outcomes of social interactions; it is not a one-way resource. Social capital is generated in the present moment, but is built and persists over time.

## Conceptual framework

To synthesize the literature review, I present a conceptual framework that incorporates the theory of structuration and the concepts of agency, constraints, and social capital (see Figure 2 for an illustration of this framework). This framework helped to inform my approach to the research, including the research questions, the methodology and the analysis.

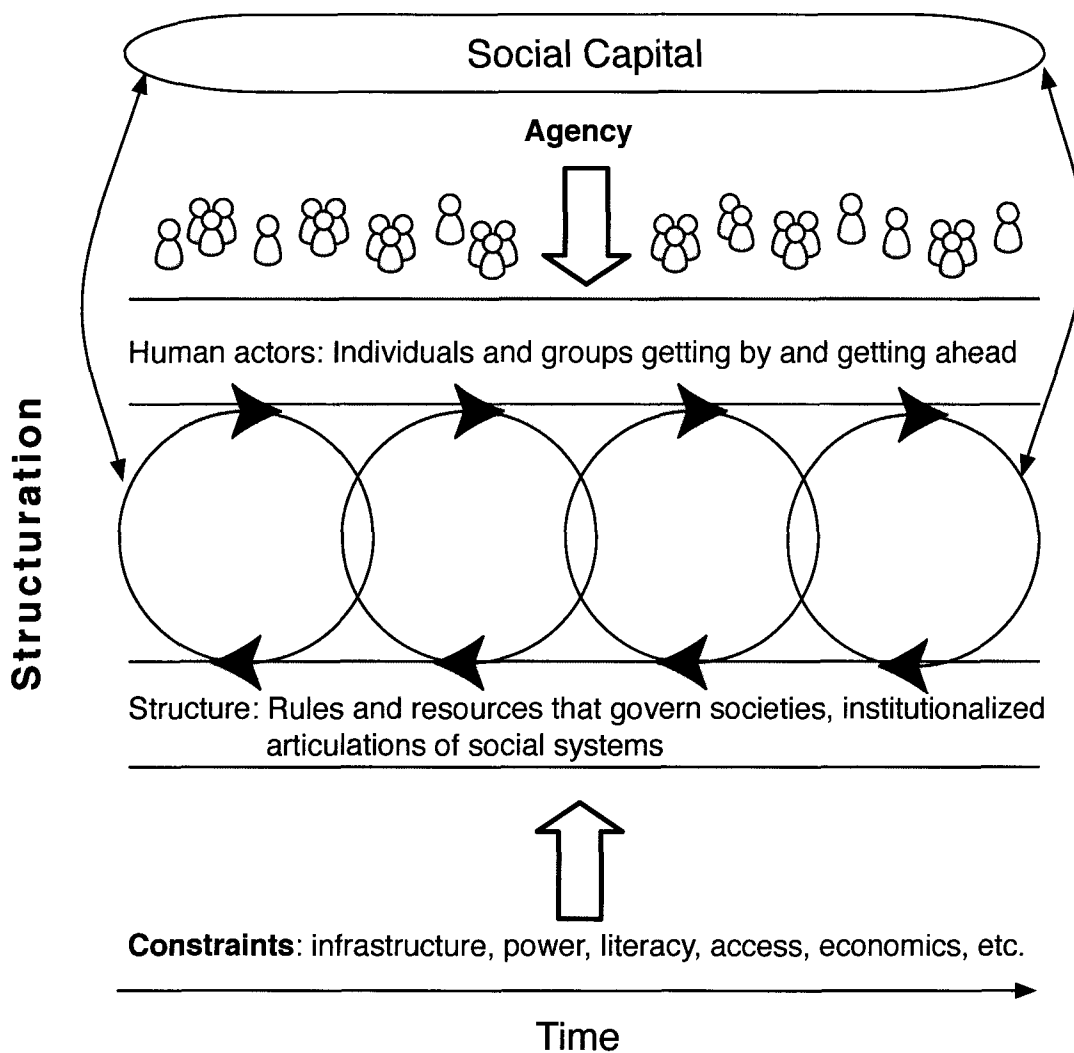


Figure 2. Conceptual framework that incorporates the concepts of structuration, agency and constraints.

The core component of structuration is the duality of structure and actors, which is the recursive interplay of human actors and the structures they encounter. Human actors are knowledgeable agents that are reflective and aware of their actions. Simultaneously, many of these actions are of a practical nature and represent people doing what is simply done. Broadly speaking, structures are the rules and resources that govern social systems. Enduring structures become institutions that continue to exist over time. Beyond the dualistic interplay of actors and structures are additional forces that bear upon social interactions. The concept of agency, or the ability to act, is the impetus for human actors to engage with structures. It is the characteristic that enables human actors to act. When agency is enacted by individuals and groups in a way where they are interacting with each other, there is the possibility for the generation of social capital. When individuals and groups are engaged in communication and corporation, social capital is the offshoot of this interaction. Human actors can use their agency to draw on social capital and make choices that bring about a desired result. The corresponding resource for structures is that of constraints. Constraints are the limitations placed on resources by the material conditions of the context. Examples of constraints include the domains that I discussed in the literature related to resource-constrained environments, things like infrastructure, power and literacy.

This slightly expanded view of structuration helps to position the focus of my research. In this dissertation I focus on human actors and agency, understanding their motivations for action and how agency plays out when interacting with systems and

structures. This focus points to the methodological reasons for understanding situated experience of individuals and groups. The other focus of the research is that of constraints and how the existence of scarce resource impacts how the systems and structures function. This interplay of understanding constraints and agency can bring about ways in which information and communication technologies can be designed to foster agency and support the creation of social capital.

## **Summary**

This chapter reviewed the relevant literature in four areas: resource-constrained environments, inclusionary design methods, structuration, and social capital. The literature related to resourced-constrained environments, which primarily reflects findings from the ICTD field, points to the many challenges of developing technical solutions for developing regions. In this section, I detailed the domains where the work is taking place, the specific challenges, and some of the guidelines or heuristics that have been generated by reflective scholars in the field. The section on inclusionary methods investigated three of the influential methodologies related to design: User Centered Design, Participatory Design, and Value Sensitive Design. The contrast of the three approaches highlights their differences in relation to how the user is involved in the design and when they are involved. The section on structuration detailed the dualistic relationship between actors and structures, specifically focusing on agency - or the ability to act. Finally, I reviewed the literature on social capital to show how it can be a resource for people to get by and get ahead. I concluded this section with a

conceptual framework that synthesized some of the key concepts in this chapter. This framework acted as a guide for the rest of the work. In the next chapter, I will discuss the methodology for the study in more detail.

<sup>1</sup>Personas are a UCD method in which the user is represented by data from a particular user segmentation.

<sup>2</sup>However, we argue that all of these inclusionary methods could be considered 'human-centered'.

<sup>3</sup>Later, the authors added 'integrated design', which has received less attention and therefore is omitted here.

## Chapter 3: Overview of Methodology

---

### **Introduction**

The purpose of this ethnographic study is to explore ways to investigate resource-constrained settings a view to identifying design implications that are specific and appropriate to the context and also instructive for other communities or settings. In seeking to understand this issue, the study addresses four research questions:

1. What are the particular challenges when researching and designing for resource-constrained populations? What are the implications of these challenges for methods? What are the implications of these challenges for design?
2. How can traditional inclusionary research methods in HCI be adapted to better understand the contexts of resource-constrained environments and the needs of diverse audiences?
3. Given two particular resource-constrained contexts (one in Bishkek, Kyrgyzstan, in Central Asia and the other in Seattle, Washington, U.S.A.), how can understanding the ways in which people experience and overcome challenges in their daily lives inform design?
4. When researching with and designing for resource-constrained populations, what are some unique design considerations and areas for inquiry?

*This chapter provides more detail about this study's research methodology. I start by providing the rationale for taking a constructivist and advocacy-based research*

approach. I then detail the three methods of data collection: design ethnography, semi-structured group interviews, and video diaries. For each method, I discuss how the method was conducted, the rationale, and, where appropriate, how the study instruments were developed. I also address the ethical considerations involved in conducting the research, including details of the procedures of informed consent. For each of the two design ethnographies, I provide details of the setting, sampling, and participants. Finally, I address the rigor of these methods by examining the issues of trustworthiness associated with qualitative research: credibility, dependability, and transferability.

### **Rationale for the research approach**

For this research study, I chose to use a qualitative approach due to the nature of the research questions. As Denzin and Lincoln state, qualitative research is a “situated activity that locates the observer in the world. It consists of a set of interpretive, material practices that make the world visible” (Denzin & Lincoln, 2003). My approach to this research is derived from a constructivist and advocacy perspective. From the constructivist perspective, the knowledge claims that arise from this research are informed by a belief that “individuals seek understanding of the world in which they live and work. They develop subjective meanings of their experiences” (Cresswell, 2003). The aim of the research is to understand how participants’ position in and interpretation of the world both shape and are shaped by their experience, history,

culture, and a variety of other factors. Accordingly, I have not attempted to exclude these factors in the research.

This research is informed by an advocacy perspective in two ways. First, the focus and outcomes of the research are concerned with creating technologies that place people at the center of the design process; this is known as Human-Centered (or user-centered) Design (HCD). HCD strives to understand people and their practices in order to create better technologies and interfaces. While this technique and these practices are highly participatory in nature, I chose to use the term *advocacy* rather than *participatory* because this work specifically focuses on groups and populations that are often overlooked within design. As Creswell notes, an advocacy perspective often starts with a position of inequality or alienation and attempts to address the inequities.

The constructivist and advocacy perspectives impact the ways in which I am addressing research questions. To recap, the research questions for this study are:

1. What are the particular challenges when researching and designing for resource-constrained populations? What are the implications of these challenges for methods? What are the implications of these challenges for design?
2. How can traditional inclusionary research methods in HCI be adapted to better understand the contexts of resource-constrained environments and the needs of diverse audiences?

3. Given two particular resource-constrained contexts (one in Bishkek, Kyrgyzstan, in Central Asia and the other in Seattle, Washington, U.S.A.), how can understanding the ways in which people experience and overcome challenges in their daily lives inform design?
4. When researching with and designing for resource-constrained populations, what are some unique design considerations and areas for inquiry?

To address the first question, I have reviewed literature about designing for resource-constrained populations and the methodology related to inclusionary design methods (see Chapter 2). The second research question is a reflection on how inclusionary methods are traditionally practice and their limitations. I address this question in the literature review in Chapter 2 and the methodology presented in Chapter 3. The third research question is concerned with the material conditions of people's lives and their experience of the world. Qualitative methods are necessary if we are to understand the lived experiences and practices of people's everyday lives. I will present the data used to answer this question in the design ethnographies in Chapters 4 & 5 and the analysis in Chapter 6. The final research question asked about unique considerations for design and research. These considerations are presented in the analysis in Chapter 6 and summarized for broader implications in Chapter 7.

The research conducted as part of this dissertation falls into the larger design category know as Human-Centered or User-Centered Design (HCD). The approach of user-centered design (UCD) advocates placing the user at the center or as the focal point of the design process. An inclusive definition of UCD is provided by Dennis

Wixon: UCD is "a process that sets users or user data as the criteria by which a design is evaluated or as a generative source of design ideas." (Karat & Karat, 2003).

According to Gould and Lewis, characteristics of a UCD process include early focus on users and tasks, empirical measurement, and iterative design (Gould & Lewis). In addition, while UCD is concerned with the users, it traditionally has focused on users in terms of fulfilling usability principles, such as effectiveness, efficiency, and satisfaction (IS 9241-11 International Organization for Standardization).

## **Methods of data collection**

In this section, I will detail the family of connected qualitative methods deployed in this study. Some of these methods were deployed in both design ethnographies, some were deployed in one only. I will discuss the following methods: design ethnography, semi-structured group interviews, and video diaries. I will also address the ethical considerations involved in the research conducted.

### **Design ethnography**

For the predominant research strategy in both locations, I chose the method of design ethnography (Salvador, et al., 1999). Design ethnography is a method that allows researchers to gain a deeper understanding of what people do and how they live. The focus of this observation is to generate ideas and guidelines that could be used to create design solutions. Design ethnography creates the opportunity to understand the cultural and social context of everyday life to provide examples and rich descriptions to technology designers for the creation of technology products.

Finally, design ethnography is an appropriate technique for the constrained time frames of technology design; it provides a way to gather contextual data even when the time of study is constrained.

### **Design versus traditional ethnography**

As Atkinson points out, design ethnography shares some fundamental features with traditional ethnography (Atkinson & Hammersley, 1994). First, both are interested in exploring a phenomenon rather than testing a hypothesis. Second, ethnography results in relatively unstructured data. Third, both look at a small set of data points or cases, but in great detail. Finally, both require analysis that requires interpretation of human actions. This analysis can yield a variety of outcomes to communicate the interpretation. Furthermore, the results of the analysis are often one and the same. Geertz advocates for, what he calls “thick description” of the resulting data; such a description attempts to uncover and interrogate what is observed instead of reduce it (Geertz, 2002). Both traditional and design ethnography emphasize the practice of participatory observation, which Salvador, et al., defines as “learning by doing” (Salvador, et al.).

On the other hand, design ethnography differs from traditional ethnography in several important ways. Traditional ethnography emerged as a key method of the field of Anthropology within the context of academia. Design ethnography was born from applied and corporate anthropology. These roots point to the ways in which the two diverge. While traditional ethnography focuses on understanding context in order to generate contributions for larger cultural theory, design ethnography is interested in

context in order to apply it to specific design or policy problems. In addition, traditional ethnography requires extensive field work: The researcher spends several years in the field in order to collect a volume of data that would permit analysis for the generation of cultural theory. At its roots, with Malinowski in the Trobriand Islands, is the idea that the researcher must spend time living within another culture in order to truly understand and be able to interpret the practices of that culture. While some of the methods of traditional ethnography have undergone a post-colonial critique, the method of ethnography that is still practiced in anthropology requires this long-term engagement within the field. Design ethnography, with its corporate and applied roots, acknowledges that while sustained presence in the field can be beneficial, it may not always be possible. Therefore design ethnography is typically focused on a shorter duration in the field, which could be days and weeks, instead of the months and years of traditional ethnography.

**Rationale: Why design ethnography?**

I chose design ethnography as a method in this study for several reasons. First, the research questions required an observational and contextual approach. Trying to understand the particular challenges of resource-constrained contexts requires seeing those constraints in action. While the research approach also contained an interview portion (see next section), seeing and experiencing the constraints first hand provided me with a nuanced understanding of the challenges participants face. Secondly, the focus of this research was to generate design opportunities for ICTs and reflect on design challenges in general. Therefore, it made sense to choose design ethnography

as a method to help explicitly focus on those opportunities. Finally, due to my own time constraints, the focused timed commitment required by the method of design ethnography made the methodology a compelling choice.

Design ethnography was the primary methodology for the design ethnographies. In order to collect relevant data for the study, I took photographs, made observations, and took part in participant observation. This played out in different ways in each context, which will be explored more in the section below. The design ethnography was also complemented and informed by the others methods: semi-structured group interviews and participatory data collection techniques, such as social mapping and video diaries.

### **Semi-structured group interviews**

For both design ethnographies, I conducted semi-structured group interviews with socially connected groups of people. By “semi-structured,” I mean that the questions were open-ended in nature, but followed a list of topics of interest (Bernard). I conducted the interviews with groups of people instead of individuals. The groups of people were socially connected either as friends or family and consisted of “interacting individuals having a community of interests” (Goldman, 1962). Along the spectrum of types of group interviews, the interviews for this study are considered formal group interviews, according to Frey (Frey & Fontana). They match the definition of formal interviews because they took place in the field, but were scheduled in advance rather than convened spontaneously. Also, the purpose of the interviews was driven by phenomenological concerns, with the goal of understanding a multiplicity of

perspectives on the topics posed during the interviews. Finally, formal interviews typically deploy semi-structured questions, and the role of the interviewer is somewhat directive, in contrast with other formal interviews, where the interviewer is either more directive or non-directive. Each interview took one to two hours and was held in a public setting, such as a coffee shop or community center, or at private locations, primarily people's homes. The specifics of the interviews differed between the two design ethnographies. For more detail, see the section that discusses each research setting.

It is important to point out that although focus groups are group interviews, they are not one and the same. A focus group strives to gain consensus around a particular topic. In most focus groups, participants do not typically know each other but instead are selected due to specific demographic criteria. For this research, the groups of people being interviewed ranged in size from two to five. Group interviewing, or group depth interviewing, is a method that provides a variety of benefits and is deployed in a variety of social sciences, including sociology, health research, and marketing. In this section, I will discuss the benefits and drawbacks of group interviews and provide a rationale for why I chose this method for the dissertation.

### **Benefits and limitations of group interviews**

Group interviews yield many benefits, including participation, candor, efficiency, rigor, scope, and the researcher's role. As Goldman states, group interviews provide the opportunity for "greater spontaneity and candor" (Goldman). This means that when people are discussing topics together, they may be more open and share

more information with the researcher. Participants are often more comfortable—and therefore more willing to take part in an interview—when they are interviewed in a group or with a close friend, as Highet discovered when conducting research with youth about sensitive topics like drug and tobacco use (Highet). While Highet's research applied to paired interviews, the lessons are applicable to small group interviews with those who are socially connected. Highet found that a benefit was that paired interviews provided “glimpses into more personal territory. This is significant given that other studies have reported that neither focus groups nor one-to-one interviews have been able to access these kinds of account, particularly from low status young men”. In my research, particularly in the Seattle design ethnography, I will provide examples of this type of disclosure that is attributed to the method of group interviews.

Group interviews are also efficient. According to Frey, they allow the researcher to interact and speak with more participants in a shorter amount of time. They are less costly and yield more data. Group interviews can increase rigor by allowing for the triangulation of more data points or, when paired with other diverse methods, lending “methodological rigor to the one-on-one interpretive nature of field interviews and ethnographic reports”(Frey & Fontana, 1991).

While group interviews would not eliminate the subjective, interpretive nature of the data, it would help reduce it. Group interviews would be helpful on the two points suggested above. Accounts would be more “polyphonic,” as in a collective interview situation, more subjects would participate and thus a broader spectrum of respondents' opinions would be reported. The interviewers influence on the interviewee, while not eliminated, would be diffused by the very fact of being in a group rather than in a one-on-one situation. (Frey & Fontana, 1991)

Group interviews elicit different types of data from one-on-one interviews and therefore increases the scope of what is available for investigation. For example, group interviews provide first hand data on group interactions and can gather interpretations of particular events (Frey & Fontana, 1991). The group context and discussion often helps participants to recall information they may have omitted or elaborate in more detail to clarify each other's key points. In addition, the presence of group dynamics in and of itself helps to produce new data, a phenomenon that I call "benefiting from banter." In addition to putting participants more at ease due to the social nature of the exchange, group interviews can also "reduce distance between researcher and the social context" (Frey & Fontana). The interviews take place in a location that is often familiar to the participants, which can help to put participants at ease. Participants often outnumber the researchers, which can also help participants feel more at ease or in control and, therefore, more empowered to share their particular expertise. As Highet found, group interviews "facilitated a better balance in the relationship between interviewer and participants. This facilitated the process of developing trust and rapport, and helped to generate high quality data, (p111) (Highet).

In addition to the benefits, there are some challenges involved in doing research with groups. These challenges are similar to those associated with other methods of collecting data from groups. First, group dynamics can heavily impact the atmosphere and potentially impact the willingness to disclose. Similarly, there may be the tendency or pressure to conform to a strong opinion. One way to mitigate these challenges is to interview participants as a group and also to interview them separately.

This is what I did in the Kyrgyzstan design ethnography. In one case from this study, a group consisted of a father and two sons. The sons confided details in the individual interviews that they had omitted in the group setting.

**Rationale: Why group interviews?**

The reason for conducting group interviews was twofold. As outlined above, group interviews provide a variety of benefits. When coupled with the broader design ethnography, group interviews were a complimentary match because they permitted rich contextual data to be gathered from a variety of perspectives in a short amount of time. The purpose of the research was to gain a deeper understanding of the particular challenges of daily lives, a phenomenological concern. The other motivation was to learn more about the role of the social network in overcoming the challenges of everyday life. Since social networks were the focus of the inquiry, it made sense to bring together people in the social network to illuminate the dynamics of the relationships and also reveal how these people strived to overcome challenges.

**How the interview questions were developed**

For both settings, the interview questions were developed to gather an understanding of the social context within the group of people, but also, more broadly, to encompass cultural and social norms and practices. In addition, questions were designed to get at a deeper understanding of the specific challenges participants face in their daily lives. The focus of the research questions in the two studies differed slightly. In Kyrgyzstan, the questions focused broadly on challenges to daily life. For example, we asked, "What in your life is hard or difficult and how do you overcome

those challenges?” In the Seattle study, the questions were similar in spirit, but concentrated in more detail on the topic of transportation. In both cases, questions were developed and captured in an interview guide, which was vetted with a broader research group and then refined. Also, some aspects of the questions were refined while in the field. The first interview in each design ethnography acted as a pilot; then, small details of the questions were refined, such as language and order.

### **Analysis**

The interviews were recorded during the sessions and later transcribed. Each transcript was analyzed for codes and themes using the web-based tool Saturate (Sillito, 2010). The analysis was done by means of a team approach. Using Saturate, each team member coded multiple interviews. Coding is a way both to organize and analyze the data (Coffey & Atkinson). The codes were generated from the text using an “in vivo” approach, which is a bottom-up approach to coding that uses the participants’ words and concepts to assign labels to the data (Strauss). In addition, the team wrote memos during coding to capture specific emergent trends or themes or to pose a question to discuss about the data. Memos, according to Glaser, are an essential practice to help capture ideas during the coding process (Glaser, 1998.). After coding, the team met and revised some of the codes to combine redundant terms. The team also used the existing codes to develop related categories. The categories came from theoretical and practical considerations.

**Video diaries**

In the second design ethnography, in Seattle, we added an additional method to gather data. We asked a subset of individuals who had taken part in the group interviews to keep video diaries of their transportation experiences. The method was inspired by the technique known as Photovoice or Videovoice. Photovoice is a participatory photo elicitation method. The technique, pioneered by Wang and Burris (C Wang, Yi, Tao, & Carovano, 1998), involves giving the research participants cameras (still or video) and asking them to document their lives. The direction for this reflection can be broad, such as having participants reflect on life in general, or narrow, such as asking participants to respond to specific questions or to document a particular issue. The goals of this method, according to Wang and Burris, are threefold. The first goal is to empower participants to actively reflect—from their own perspective—on their lives and needs. The second goal is to increase knowledge about a particular phenomenon in general. The third goal is to inform policymakers and, more broadly, the rest of society, about a particular issue of concern to a community. Photovoice has been deployed extensively in health research (CC Wang, 1998), (CC Wang, 1999), (CC Wang & Pies, 2004), (Oliffe & Bottorff, 2007). It has also been used in other social sciences, such as studying identity and immigration with Latino youth (Streng et al., 2004). A related methodology in human centered design is the practice of using cultural probes to help develop designs for unfamiliar groups (Gaver, Dunne, & Pacenti). Cultural probes can include a variety of media, such as pictures and postcards, and often include cameras for participants to take pictures of their lives.

Prabhu and Frohlich used cultural probes for a study that aimed to look at future technology needs in developing countries (Prabhu & Frohlich, 2005).

**Rationale: Why video diaries?**

I chose to use video diaries in the Seattle design ethnography for several reasons.

First, the goal was to gain a deep understanding of how being dependent on public transportation impacted people's lives. While the other methods of ethnographic observation and interviews helped me to meet this goal, I thought that video diaries could offer an even more revealing perspective into the phenomenon. This technique helped me to triangulate other findings collected in the study through the other methods. The videos provided context, richness, and personal revelations that other methods alone did not reveal. For example, in the interviews, participants told us about practices related to fare evasion—that is, not paying the fare or the full fare while riding transit. These practices were demonstrated on the videos, but in subtle ways. Without the context of the interviews, we, as researchers, may have overlooked this practice.

Another reason for using video diaries in this study was to gain a more visual understanding of constraints. When working with populations whose lives are very different from those of the researchers, visually showing constraints can bring them to life. For example, the videos brought to life the very real challenges of traveling with children and waiting for long stretches of time at deteriorating bus stops that offer little protection from the weather. These details can provide a richness that other methods alone cannot.

### **Details of the video diaries**

For the Seattle design ethnography, we interviewed six groups of socially connected people. At the end of four out of the six interviews, we asked if any of the participants would want to take part in a follow-up video diary study. In each of these instances, a person volunteered. We were limited to four video diaries due to the time constraints of the study and the limited number of cameras. The participants who volunteered to participate in the video diaries were given the video camera as an honorarium for taking part in the study.

The video diaries consisted of three additional steps: an orientation meeting, collecting the videos, and a debriefing meeting. First, I held an orientation meeting with each of the four participants who had volunteered to keep a diary. These meetings occurred in coffee shops or in people's homes. During these meetings, I provided participants with an overview of the activity and explained the reason we were asking them to take videos: that we were interested in their experience of transportation from their perspective. Next, I explained *informed consent* for the diaries. The consent process consisted of explaining their participation in the study as well as some guidelines for capturing video in public. I also provided the participants with a printed statement to pass out to other people in public who might have questions about the research. After the consent process, I provided the participants with a list of prompts and questions for the video diary activity. Participants were directed to take videos at three times: prior to taking transportation, during the ride, and after the use of transportation. The questions ranged from specific (such as, "How

do you determine what mode of transportation you will take? Is it about the weather, time of year, what you need to take with you?") to general (such as, "Take video of your time waiting for the bus and what you are thinking at that time."). The next step in the orientation meeting was to show participants how to use the video camera. I demonstrated the buttons and features of how to take videos and how to play them back. I also left the participants with the technical manual for the video camera. Participants were told to take as much video as they wanted and to try to capture at least two transit trips. I then scheduled a follow up meeting with each of the participants to review the videos they had captured. These meetings occurred from a few days to a week after the orientation meeting. During this time, each of the four participants collected video data. At the debriefing meeting, I again met with each participant in a location of his/her choice, which tended to be a coffee shop or in the participant's home. During the debriefing, I asked participants a series of questions about the video diary exercise, starting with questions about the experience itself: what was difficult or easy. I then asked if they wanted to share the videos with me. For each video segment, I asked participants to comment on the videos they captured: why they captured that particular clip, what the clip said about their experience, if it was a typical or unique event. At the end of the debriefing, I asked participants if they cared to share copies of the videos with me. Participants kept the video cameras and the videos they took. I also gave them the option to share the videos further (with the community, online, etc).

**Analysis**

The videos were recorded using Flip Video cameras. I downloaded onto my laptop only the videos that the participants were comfortable sharing and later transferred these videos to the web-based tool GuapoVideo.com. Each video was viewed and analyzed for themes. As the principal researcher, I analyzed each of the videos in tandem with reviewing the transcripts from the interview debriefing sessions. In addition to my coding, each video set was analyzed by a member of the research team to identify themes found in the group interviews.

**Kyrgyzstan, Central Asia**

Kyrgyzstan is a small Central Asian country located to the south of Kazakhstan and to the west of China. Like other countries in Central Asia, Kyrgyzstan is a multi-ethnic and multi-lingual society. A former Soviet Republic, Kyrgyzstan declared independence in 1991, but has seen several changes in power since that time. First, in 2005, was the Tulip Revolution, an overthrow of the government due to anger about corruption. More recently, in 2010, another regime was ousted amid ethnic tensions and accusations of corruption. The 2010 coup was a more violent overthrow causing bloodshed both in the capital city of Bishkek and the southern city of Osh, which borders Uzbekistan. Today, the political situation in Kyrgyzstan continues to be delicate.

Kyrgyzstan was one of the five countries that were the focus of the Central Asia + Information and Communication Technology project (CAICT), a longitudinal study of information and communication technologies (ICTs) and their usage within Central

Asia. Started in 2000 and funded by the National Science Foundation (awards #0219350 and #0326101), the CAICT study has included a multi-method approach that incorporates broad social surveys, interviews, ethnographic observation, policy monitoring, web archiving, monitoring and analysis of chat sites, and focus groups. Central Asia in general, and Kyrgyzstan in particular, is a unique and rich site for ICT research for a variety of reasons. Over the ten-year study, we have learned that while the adoption and use of ICTs continues to grow, it does so at a modest pace. The use of the Internet and mobile phones continues to grow; however, the use of mobile phones is growing at a rate almost twice as fast as the use of the Internet (Kolko, et al., 2007). The design ethnography presented in this dissertation is part of the CAICT longitudinal study, drawing primarily from a design ethnography conducted in 2006, but also informed by a host of qualitative and quantitative data collected during the study.

### **Setting**

The research for this study was conducted in two cities in Kyrgyzstan: the capital city of Bishkek (population 5,431,747) and the smaller town of Kara Balta (population, approximately 70,000), which is close to the border of Kazakhstan. These locations were chosen to represent both urban and rural perspectives. At both locations, our team collected a variety of ethnographic data, which included observations of daily life and participant observation. We also conducted interviews with socially connected groups of people. The specifics of the methods are described below in *Methods of data collection*.

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

### **Sampling**

To select participants for the interviews, we engaged in purposeful sampling (Patton 1990). We identified several characteristics of the types of participants we hoped to interview: socially connected, living in rural or urban settings, some familiarity with technology. Our sampling strategy was a combination of typical case and snowball sampling. The sampling can be considered typical because we were looking for groups that exemplified typical Kyrgyz family and friends. Based on previous research, we chose groups of family and friends who had close social ties (Kuehnast & Dudwick, 2002). We also selected individuals who owned or had access to mobile phones, since the focus of the study was the use of technology, and previous research had shown that the use of mobile phones in the region was continuing to grow (Kolko, et al., 2007). We employed snowball sampling, which meant we asked local research partners and existing participants to help identify other people who might be qualified and interested in taking part in the research. The rationale for this combination was derived from our desire to talk to families and friends that exemplified patterns identified in previous research and literature reviews: people who were exposed to technology, while not being expert, and who possessed strong social

bonds. We chose snowball sampling as a strategy due to the challenges of approaching research participants in the region. Based on previous experience of recruiting participants in the region, our team had learned that it was helpful to have local researchers be the intermediaries in order to establish trust. Therefore, we asked local researchers to distribute the information about the research project and the recruitment text to people they knew in their social networks.

### Participants

For the interviews, we recruited four groups of socially connected people: two groups in Bishkek and two groups in Kara Balta. In each location, we interviewed a group of young people and a multi-generational family. Each group consisted of three people for a total of 12 participants. The details of the participants are listed in Table 1 below.

Table 1. Overview of research participants in Kyrgyzstan

Location	Participant Group & Code	Participants: Roles, Codes	Pseudonyms
Bishkek	Urban Family (KG_UF1)	Father (KG_UF1_F1)	Asan
		Older son (KG_UF1_S1), Arif	Arif
		Youngest son (KG_UF1_S2)	Jyrgal
Bishkek	Urban Youth (KG_UY1)	Female Friend (KG_UY1_F1)	Aselya
		Female Friend (KG_UY1_F2)	Cholpon
		Male Friend 1 (KG_UY1_F3)	Nurbek
Kara Balta	Rural Family (KG_RF1)	Father (KG_RF1_1)	Bakir
		Mother (KG_RF1_2)	Damira
		Younger brother (KG_RF1_3)	Adilet
	Rural Youth (KG_RY1)	Male Friend 1 (KG_RY1_1)	Alexei
		Male Friend 2 (KG_RY1_2)	Nazar
	Female Friend (KG_RY1_3)	Kalima	

**Seattle, Washington, U.S.A.**

The second design ethnography took place in Seattle, Washington, in the United States. Seattle is the 23rd largest city in the U.S., with a population of 616,627. The second study focused more specifically on transportation challenges. Seattle was chosen for several reasons. First, while Seattle has a variety of public transportation options, including buses and light rail, it does not have the same level of service or infrastructure as some other large U.S. cities. Second, Seattle faces some unique challenges to transportation due to its geography, which includes lots of hills and bodies of water.

**Setting**

The target area for the research study was the neighborhood of White Center (population 20,975), an urban area southwest of greater Seattle in King County. Not officially a city, White Center is a census-designated place, which means it is not incorporated, but is instead a geographic area that acts as a statistical entity for the purpose of the census. White Center is also a close knit community. I chose this neighborhood based on its demographics and geography. First, White Center is diverse. According to the 2000 U.S. Census, – 27% of the population is foreign-born. The three largest countries of origin are Vietnam, Mexico, and Cambodia. Second, a large portion of the population in White Center lives in poverty: 36% of the residents live below 200% of the poverty line, in comparison to 20% for all of King County (liu, 2005). Geographically, White Center is approximately seven miles outside of Seattle; therefore, the people who live in this neighborhood rely on some form of

transportation to get to the main downtown area. It is also a transit hub where a variety of bus lines and services cross and connect. For these reasons, White Center appeared to be a promising place to research the needs of transit-dependent riders. As in the Kyrgyzstan design ethnography, a research team collected a variety of ethnographic data and also conducted interviews with socially connected groups of people. In addition, a subset of the interview participants took part in a follow-up research activity to create and produce video diaries. The specifics of the methods are described below in *Methods of data collection*.

### **Sampling**

To select participants for the interviews in Seattle, we engaged in purposeful sampling (Patton). Based on specific criteria, we identified several characteristics of the types of participants we hoped to interview. Participants were screened to establish transit dependence, meaning they did not own cars, nor did anyone in their households own cars. They also needed to be frequent users of public transportation (four days a week or more) in order to qualify. In addition, we planned to include participants that lived or worked in the neighborhood of White Center. To recruit participants for our study, we posted flyers around the neighborhood. These flyers included a description of the study, contact information, and details about the honorarium. Each participant was asked to bring one or two friends or family members who would also take part in the interviews. We chose to talk to groups of people who were interconnected rather than to individuals, because we wanted to understand the use of transit within the social context. Each participant received a \$20 honorarium for

taking part in the interviews. The participants chose where we would meet, and the meeting places ranged from coffee shops to community centers to participants' homes. A limitation of our sampling strategy is that while some participants lived in White Center, not all did. Because the neighborhood of White Center is a transportation hub, we recruited individuals who lived north and south of the neighborhood, though still within the area that is geographically to the west and south of the city.

**Participants**

For the interviews, we recruited six groups of socially connected people. Groups ranged in size from two to five people for a total of 15 participants. I spoke with each group at least once and with some groups up to four times. The details of the participants are listed in Table 2 below.

Table 2. Overview of research participants in White Center/Seattle

<b>Group &amp; Code</b>	<b>Participants Codes</b>	<b>Description</b>	<b>Pseudonyms</b>
SG1 - Housemates	SG1_P1*	Two middle-aged men living in a recovery facility	Eddy
	SG1_P2		Shawn
SG2 – Couple	SG2_P1*	Younger couple with school-aged children	Ann
	SG2_P2		Brian
SG3 – Couple	SG3_P1*	Married middle-aged couple	Adam
	SG3_P2		Rachel
SG4 - Intergenerational family	SG4_P1	Older woman and her niece who lived together	Helen
	SG4_P2*		Monica
SG5 - Group of friends	SG5_P1	Group of middle-aged and older friends; all were homeless	Louis
	SG5_P2		Ryan
	SG5_P3		Cynthia
	SG5_P4		Stephen
	SG5_P5		Timothy
SG6 - Roommates/ Couple	SG6_P1	Couple in their early 20s, living together	Joey
	SG6_P2		Gabe

### **Ethical considerations**

For all the methods described in this section, all study materials were vetted and approved by the University of Washington’s institutional review board, known as the Human Subjects Division. This included the instruments for the study and the informed consent procedures. Both the Kyrgyzstan and Seattle research studies went through similar rigorous review processes. Only after obtaining the division’s approval was the research conducted.

A crucial part of any research is the process of informed consent used to inform participants about the purpose of the research, how the research will be conducted, and how the results will be used. Informed consent is especially important with the populations involved in the research in this study. While the participants did not fit the official definition of a vulnerable population, each group was vulnerable in its own way. In the case of Kyrgyzstan, participants lived in a developing country facing a great deal of political and economic change. In the case of Seattle, many of the participants were economically disadvantaged. Informed consent was explained and obtained in both design ethnographies. In the Kyrgyzstan study, the informed consent process was administered in the preferred language of the participant (whether that was Russian or Kyrgyz). In the Seattle study, consent was administered during the interviews and during each step of the video diary exercise.

### **Issues of trustworthiness**

In qualitative research, rigor is defined by the characteristics of credibility, dependability, and transferability (Denzin & Lincoln). In this section, I will discuss each characteristic in relation to this research.

#### **Credibility**

The characteristic of credibility refers to the researcher accurately representing what participants think, feel, and do. In this research project, I aimed to ensure credibility by following best practices in qualitative research: reflexivity, triangulation, and peer debriefing.

Reflexivity, according to Nightingale and Cromby, refers to the role of the researcher in the meaning-making process: the researcher is not just as an objective observer, but is an active participant in the process.

"Reflexivity requires an awareness of the researcher's contribution to the construction of meanings throughout the research process, and an acknowledgment of the impossibility of remaining 'outside of' one's subject matter while conducting research. Reflexivity then, urges us "to explore the ways in which a researcher's involvement with a particular study influences, acts upon and informs such research." (Nightingale & Cromby, 1999)

This ability to place the researcher in the frame of the research helps to add to the credibility of the study by presenting the research in its complexity. I have demonstrated reflexivity in this research in several ways. I clarify my position as a researcher and my assumptions in Chapter 1. Each design ethnography presents a reflexive ethnography, which is a type of ethnography that focuses on a particular culture or group and set of research questions, but does so in a way that reveals, instead of obscures, my presence as the researcher (Ellis & Bochner, 2003). To add reflexivity to the research process, I kept detailed field notes and a journal during the research process.

Triangulation refers to the practice of using numerous methods to investigate the same set of research questions. I strengthened the credibility of this research by triangulating multiple data sources: the multiple methods of both interviews and ethnographies to collect data and, in the Seattle design ethnography, the video diaries. Additionally, I reviewed the academic literature related to the issues and settings of the two design ethnographies; and I read more conventional sources, such as newspapers and blogs.

The third technique I employed to ensure credibility was the use of peer debriefing. Typically, peer debriefing is described as allowing other researchers to read and review your field notes and analysis in order to help check and vet your assumptions. In both of the design ethnographies, the research was conducted by a team of researchers. In addition, the membership of the team that conducted the analysis differed from that of the team that collected the data. I believe this strengthens the research, because my assumptions as the lead researcher were checked and challenged along the way. The process of data analysis in particular helped to unearth the assumptions I had made in the field, as other researchers often asked questions or requested more evidence to support particular findings. I encouraged other researchers to evaluate the data and to challenge my assumptions and findings. This interrogative style helped to further strengthen the study's findings.

### **Dependability**

Dependability refers to the characteristic of transparency related to data collection and analysis. During the interviews and ethnography, data were collected digitally by recording the audio, taking digital notes, and taking photographs. All data were stored on a password-protected computer. The raw interview notes, coded data, photographs, and field notes have been collected and stored digitally and are available for review by others. Each transcript from the interviews was coded by several researchers, with a minimum of two and a maximum of five members of the research team. When there was disagreement between researchers, the team discussed the codes as a group in order to establish consensus.

## **Transferability**

For this research, transferability works on two levels. First, the characteristic of transferability related to the trustworthiness of the study refers to how it would be possible to replicate the study in another community or setting. For this study, I have provided all of the instruments and protocols in the appendices (see, xxx). I encourage other researchers to replicate these methods in other settings to add to the broader picture of constraints and issues of access in diverse communities that have tended to be overlooked in the design of technologies. The second issue of transferability for this research is how applicable the findings are to other settings. For a full discussion of this issue, see Chapter 7.

## **Adapting traditional inclusionary methods**

The design of this study was adapted from traditional inclusionary methods to yield results that are appropriate for resource-constrained contexts. In developing the methodology, I made deliberate choices that at times diverge from traditional HCI methods. In this section, I will discuss some of the elements of the methodology that were selected due to the unique aspects of studying resource-constrained contexts. I will first discuss the importance of contextual research. Next, I will discuss how the unit of analysis moved beyond a particular technological intervention to a broader notion of challenges of daily life and how technology could be used to bring about an appropriate solution. Related to the unit of analysis, I will discuss not only how the scope of inquiry in this study changed, but also how it was necessary to talk to

connected social groups, rather than individuals. Finally, I will talk about the decision to deploy methods that aim to give participants more voice.

While contextual research is not entirely new to HCI methods, it is not always seen as crucial. In resource-constrained environments, where the context can be very different from the researcher's or designer's own frame of reference, contextual research is a necessity. The technique of design ethnography opens up the possibility of spending time embedded in context while triangulating with other data sources. In addition, the deployment of local experts as partners is required for success.

Design ethnography provides the researcher with the opportunity to experience the circumstances of the participants' lives, even if only for a short time. In traditional HCI research, the unit of analysis, or focus of the research, is often the technology or system that designers are attempting to design or improve. There tends to be an existing idea or artifact that drives the research methodology. In the case of this research, the focus was broader: understanding people's experiences of daily challenges and how they overcame these challenges. Furthermore, we honed in on how people made decisions about overcoming challenges and what techniques they used to alleviate their constraints. We also privileged the perceptions of local problems over external concerns and Western values, such as computing complexity or notions of efficiency.

Traditional HCI research tends to focus on the individual. After all, we typically call it user-centered design (not users- or community-centered design). This research did not look at the individual as the design target, but instead looked at a group of

socially connected people, whether family or friends. Because the social network was a crucial area of inquiry for the study, it made sense to examine the social network in action and to develop an understanding of the social relationships involved. This is why we studied people as family groups or sets of friends.

The methods that I selected for this study were chosen in part to give the participant a greater voice in the research relationship. Traditional HCI research is heavily weighted toward the perspective, voice, and focus of the researcher. In this study, there were several ways that the research was designed to give participants greater voice and power than in traditional research contexts. This included simple logistical decisions, such as allowing participants to choose where the interviews would be conducted. Also, interviewing participants in groups of people with whom they had social connections helped make participants feel more comfortable. Finally, participatory design activities, such as the video diaries in Seattle, gave participants more control over what the research agenda highlighted. They made decisions about what aspects of their lives to share and comment on.

## **Summary**

In this section, I provided details of the study methodology. The study falls under the broad category of human centered design. The research is qualitative in nature, and I provided a rationale for choosing a constructivist and advocacy approach. I detailed the methods deployed in each design ethnography and a rationale for each. For each design ethnography, I provided details about the setting, recruitment

strategies, and participants. In addition, I discussed the issues of trustworthiness for the research, including credibility, dependability, and transferability. Finally, I related how the choices of methodology for this study diverge from traditional HCI methodology.

## Chapter 4: Kyrgyzstan Design Ethnography

---

### Going to Lake Issyk Kul

This section is fictional, although based on observations and interviews with participants in the study. All the names used here are pseudonyms. This section is meant to introduce you to some of the participants from the study and to contextualize the research findings within an ethnographic description of the setting. A marshrutka is a minibus, which provides transportation to travelers for a fee; marshrutkas are like public buses in the west, but are privately owned and operated. The two places described in this section, Lake Issyk Kul and Dordoy bazaar, are popular destinations for people living in Kyrgyzstan. In addition, this section often refers to prices in the local currency, which is the som (KGS). At the time of the interviews, the exchange rate was approximately 40 som = 1 USD.

It is summer, and it seems like the entire city of Bishkek is talking about going to Lake Issyk Kul. On the streets and in the bazaars, you hear people whisper the name *Issyk Kul*. People talk about when they are going, where they will stay, and isn't it hot and won't the Lake be nice? They talk about who just got back and who they will meet there next week. Although I am a visitor here and cannot speak the local language, I can still hear the words Issyk Kul float above the conversations on the street. Even the word sounds cool and refreshing, and when people in our interviews bring it up, they do so with reverence. It is August, and the heat is unrelenting. It is always hot in August, but this year a heat wave has brought day after day of heat that tops 100 degrees.

In the city of Bishkek, summer is slowing everything down. During the day, you hear the occasional yells of children, but generally the streets are silent. People move slowly, carrying their bags down the street at a leisurely pace; but at night, it is a different story. In the city center, the Ala-Too Square comes alive with activity (see Figure 3 and Figure 4). Crowds of families walk across the square, looking at the

trinkets and gifts for sale from the vendors. For a small fee, young men with cameras offer to take your picture in front of one of the well-lit fountains. Young couples walk through the city's overgrown parks, some hand-in-hand, able to sneak away from the protective eyes of older relatives for a few moments of privacy. Music, ranging from traditional Kyrgyz music to warbling Karaoke acts at deafening volumes, pulses from the surrounding restaurants. The city at night is safe and bustling, but during the day, the heat returns, as does the quiet.

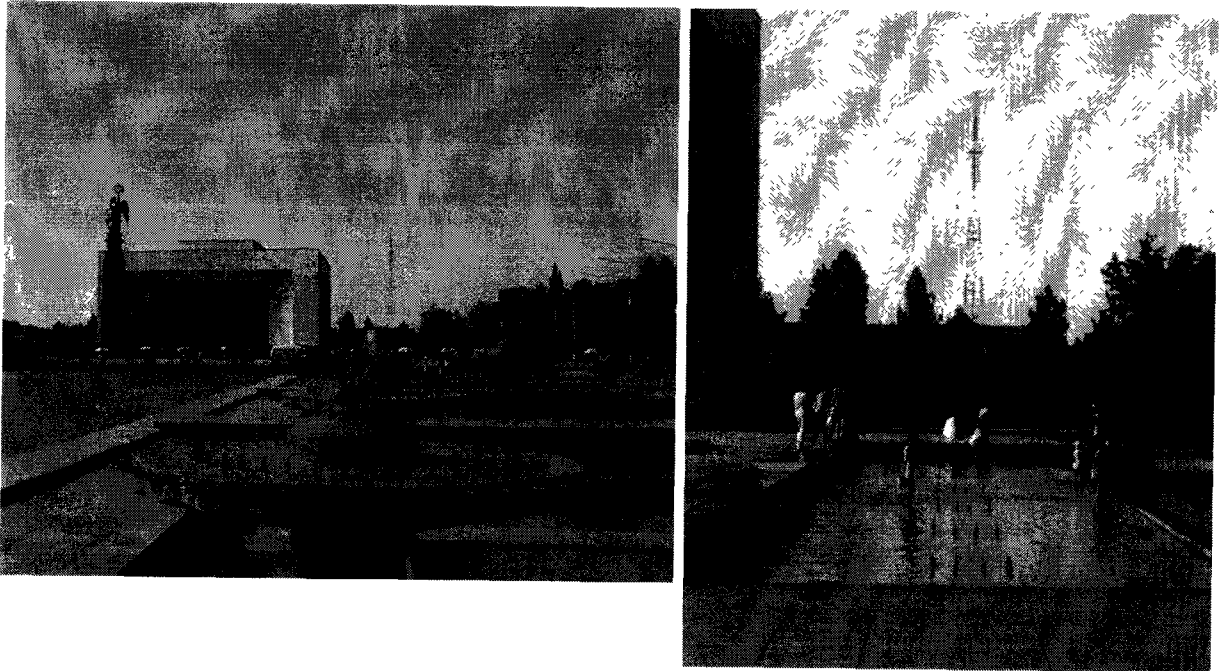


Figure 3. Ala-Too Square in the day



Figure 4. Ala-Too Square at night

Photo copyrighted by Calvin N. Preece (2008). Used with the permission of the copyright holder.

For the people of Kyrgyzstan, Lake Issyk Kul is the top tourist destination, especially in the summer. Located in the northwest of the country, nestled in the majestic Tian Shan mountain range, Lake Issyk Kul is one of the world's largest mountain lakes, second only to Lake Titicaca in South America. It is 113 miles in length and 37 miles across (see Figure 5).



Figure 5. United Nations Map of Kyrgyzstan (UN Map #3370, Rev. 6 2004)

The surrounding landscape is dotted with tourist towns and along the shores of the lake you can find small hotels and larger resorts (see . These date back to Soviet times, when the lake was an attraction for Russian tourists.

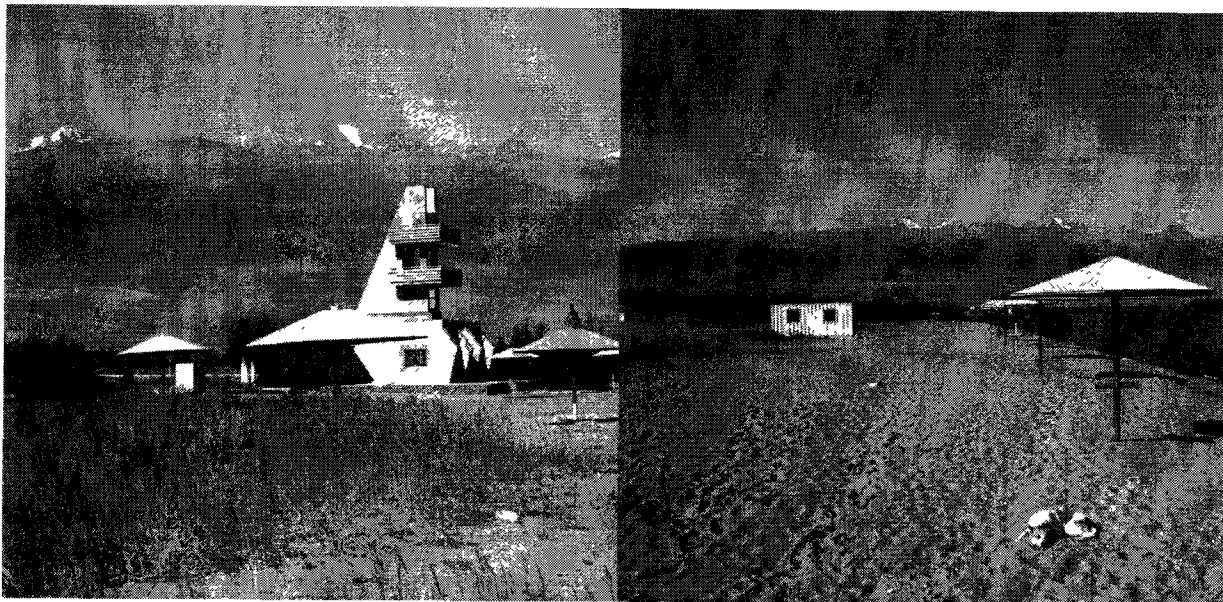


Figure 6. Koshkol resort and beaches (Photo used through a creative commons license, Vmenkov)

From Bishkek, it takes anywhere from four to six hours to drive to the western edge of Lake Issyk Kul. Most people get there by driving or taking a taxi or marshrutka (a local minibus). I am told that to get a marshrutka, I need to go to the outskirts of town, where you can find one that will go directly to the town of Cholpon-Ata. When I arrive at the marshrutka station, I walk down the lines to find one going to Lake Issyk Kul (see Figure 7). It is 9:00 a.m. in the morning and already getting hot. The station is a dry, dusty place, filled with many minibuses, some idling and expelling diesel exhaust into the air. Others are waiting for passengers, and still others look like they might be ready for the junk heap. Overhead, a crackly loudspeaker calls out the names of destinations that sound familiar, but I'm not sure where the various marshrutkas are going. I ask around. People point me to the last row of marshrutkas; these are all going to Lake Issyk Kul. I choose the one closest to what looks like the front of the line.

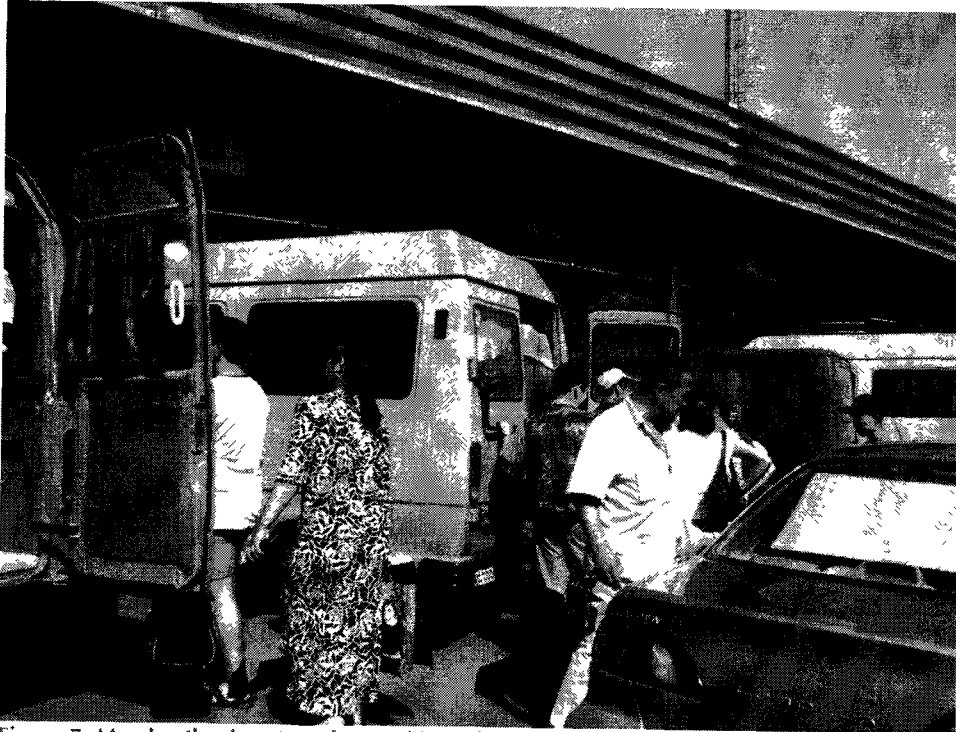


Figure 7. Marshrutka depot on the outskirts of Bishkek

The driver is leaning against the hood of his car, smoking and chatting with other drivers. He tells me yes, he can take me—but he has a few more seats to fill before we leave. I look inside the marshrutka and see several people looking back at me. I push my bag to one side and climb on board. I am in the last row. We sit and we wait. As I have learned, the marshrutka will not go until the seats are full or the driver is happy enough with the money he has collected from the passengers. The driver seems to be hoping for more riders, so for now, we sit and wait.

### **Urban family**

An older man with two sons sits in the row in front of me (see Figure 8). They are also going to Lake Issyk Kul. The father's name is Asan. He is reading the newspaper; as he turns from one page to the next, he snaps the paper to smooth out the page. Next to him is his older son, Arif, aged 22, who is immersed in his mobile

phone. His fingers fly over the keypad, and he chuckles as he types and reads. On the other side of Arif is his younger brother, Jyrgal, who is 19. Jyrgal stares out the window. His father, done with the paper, rolls it up, reaches over and playfully swats Jyrgal on the head to get his attention.



Figure 8. Urban family: Asan, Jyrgal, and Arif

“What do you think?”, he asks Jyrgal, gesturing to a headline on the front page of the paper. The story is about the Manas air base and how the Kyrgyzstan government has just extended the lease to America, which uses the base to refuel planes heading to and from nearby Afghanistan.<sup>1</sup>

Jyrgal shrugs and says, “I don’t know; I’m not surprised. I think everyone knew the Americans would offer lots of money, and that’s what the government cares about.... So, do you think we’re leaving soon?”

As if on cue, the driver climbs up into the seat and announces that we are leaving. The windows are open, or as open as they can get. The driver points to an

---

<sup>1</sup> <http://news.bbc.co.uk/2/hi/asia-pacific/5180818.stm>

additional vent on the roof of the marshrutka. Jyrgal stands up and leans over the other passengers to open it. This is about as much relief as we will get from the morning heat, but as we pull out of the marshrutka depot, the crosswind picks up, and a mild breeze moves throughout the bus.

Arif looks up from his phone to ask, "How long do you think it'll take?"

His father shrugs, "Five hours...maybe six?" Arif goes back to texting. His father tries to see the screen, "Who are you texting?"

Arif says, "Just some friends who are also going to Lake Issyk Kul. I'm trying to see if we will be there at the same time."

Jyrgal says, "When we get back, will Mom be home?" It turns out their mother is on a trip to Germany and has been gone a month.

Arif says, "I'm sure we can email her from the hotel if the hotel has the Internet."

### **Urban friends**

Up in front of the family of three is a group of friends, all in their twenties. The two women and one man have been talking since they got on the marshrutka. They are all college students in Bishkek and are going to Lake Issyk Kul to meet up with other friends (see Figure 9).



Figure 9. Urban friends: Aselya, Nurbek and Cholpon

A woman named Aselya says, “I’m worried we won’t find a place to stay. It seems like everyone is going to be in Issyk Kul.”

Cholpon, the other woman in the group, replies, “Relax, it’ll be fine. The fact that everyone is going to be there is a good thing. If we can’t find a room, then we can just stay with someone else. You know, sleep on the couch or on the floor. And besides, my Uncle knows someone who owns a guest house in the town of Cholpon-Ata, so we can always stay there.”

Nurbek, their traveling companion, says, “I don’t care where we stay; I’m just so happy we are going! I don’t have to work at the cafe for a whole week. School starts again in a few weeks, and it’s like this summer just went so fast. “

“It has gone by quickly,” Aselya says. “I think we’ve been talking about this trip since the beginning of summer—I can’t believe it’s here.”

Nurbek continues wistfully, "I'm planning on swimming every morning and maybe finding a football game to play in the afternoon. It's so nice just to be going."

Cholpon agrees. "It was nice of you to lend Bakst the money to come," she says.

Nurbek shrugs. "Yes, I know he'll pay me back, and it wouldn't be the same if he couldn't be there. I think he said he's going to arrive tomorrow night. We'll have to text him tomorrow." They continue to chatter about who will be there and who won't and what they will do with the week at the lake.

I look out the window. As we drive, we leave the buzzing streets of Bishkek behind. The bus quiets. My fellow marshrutka passengers and I gaze out the windows at the countryside and settle in for the journey.

### **Going to the Dordoy bazaar**

The Dordoy bazaar is one of the largest bazaars in Central Asia (see Figure 10). It attracts individuals and families from across the region; everyone travels here to look for good deals on products ranging from mobile phones to clothing. The products come from many places, but lately, a lot of the goods are from China. A sizable contingent of wholesale buyers from Russia and other Central Asian countries also comes here to purchase large amounts of goods to take back home for resale.



Figure 10. Dordoy bazaar (Photo used through a creative commons license, Vmenkov)

The bazaar is a sprawling complex that stretches over 100 hectares. One of the unique characteristics of the bazaar is that it is made up of storefronts that are built of two stories of old shipping containers (see Figure 11). The bottom story houses the storefronts, where merchants hang their wares and bargain with customers; up above, the second story of containers is used for storage.

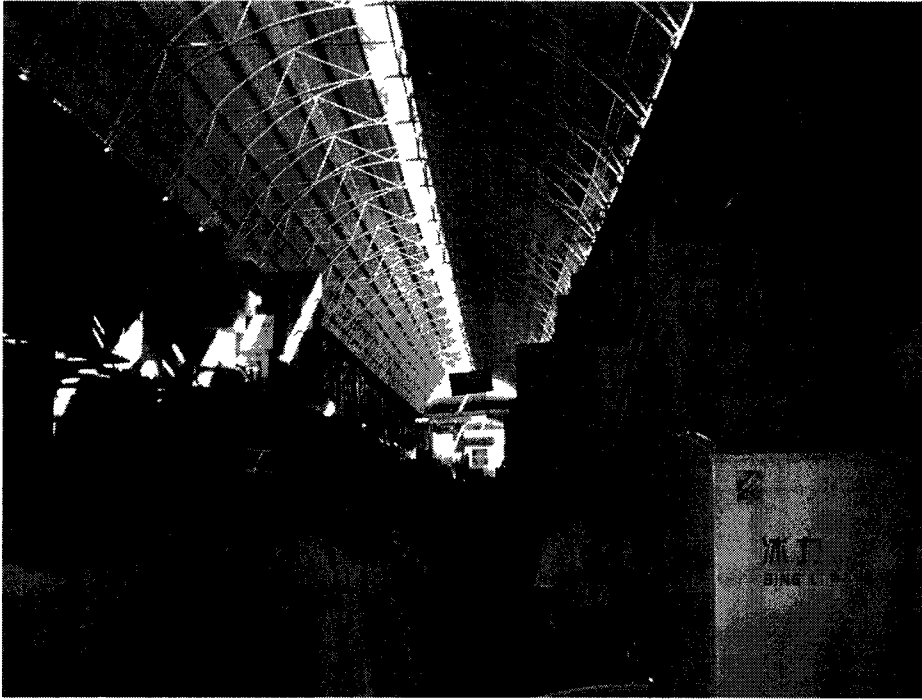


Figure 11. Dordoy bazaar and the shipping containers (Photo used through a creative commons license, Vmenkov)

The summer is coming to an end and school will be starting soon. We are taking a trip from the town of Kara Balta, which is on the border with Kazakhstan, to the Dordoy bazaar to do some shopping. We are traveling to Dordoy on a day trip to do some shopping. As I climb onto the marshrutka, I see a bus full of people who are waiting to get on the road.

### **Rural family**

I slide into the last row of seats next to a middle aged man and his wife. They are chatting with a younger man, who is the man's younger brother (see Figure 12). Sitting in front of them are two younger girls who giggle together as they read a book. These girls are their children. The man, named Bakir, tells his wife Damira that the goal today is to get everything on their list. They hope to get the girls some new clothes

for school. The two girls turn around and start chatting away about what types of dresses they will buy.

The younger brother, Adilet, says, I want to look at the mobile phones to see if I can get a good deal. I need one for work so they can find me in the fields.

Bakir asks, "Will work help you pay for this phone? It might be too expensive."

"No," Adilet replies. "I will have to pay for it, but a colleague has offered me a loan." Bakir looks skeptical.

Damira says, "Well, we have many things to buy. I just hope we can get it all today." She looks back at the list they have written and jots down a few more items.

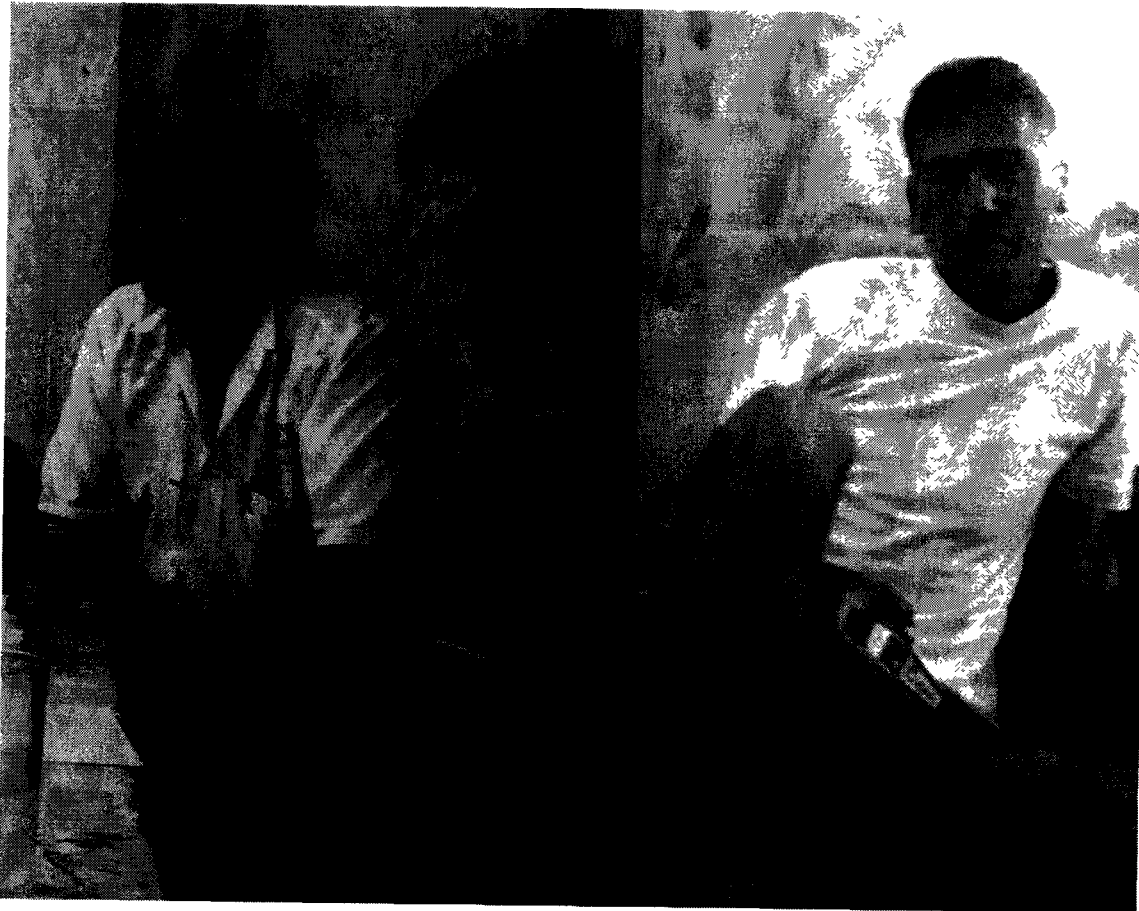


Figure 12. Bakir, Damira and Adilet

**Rural friends**

Up at the front of the marshrutka sit three people in their early twenties: two men and a woman (see Figure 13). The first man is named Alexei; he tells the other two about his plans for the day. He says, "I'm hoping to find some good prices on video game controllers." He owns a gaming club where people come to play video games. "I've asked my friends in Russia to look for some of the newer models, but they are too expensive. I hope I can find something at Dordoy that I can afford or perhaps broken ones that I can fix."

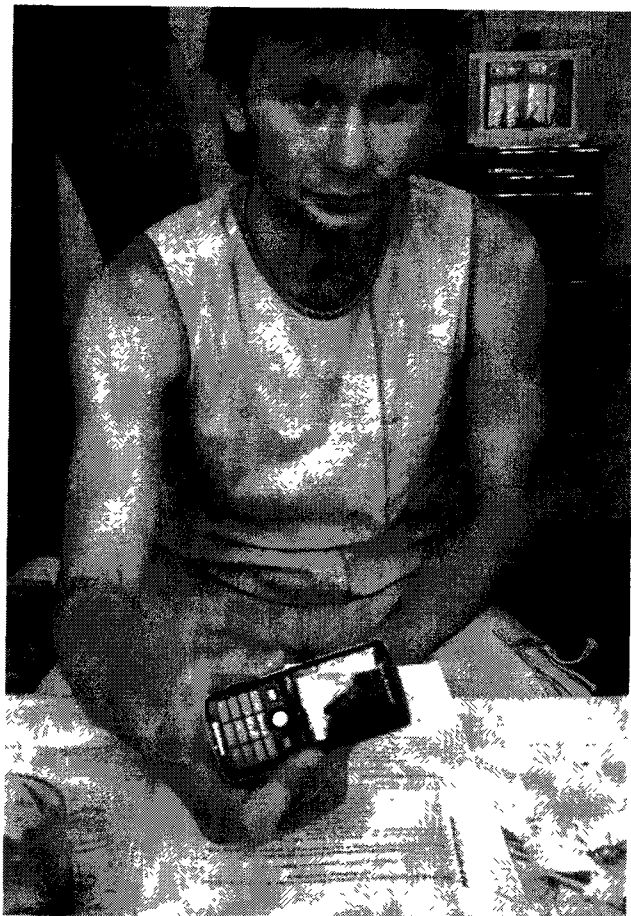




Figure 13. Alexei and Kalima (Nazar, not pictured)

The second man, Nazar, says, "I've heard you can get some good deals if you can bargain, and I've seen you bargain in our market. I bet you'll do fine."

The woman, Kalima, says, "I have to shop for work too. I'm looking to find some of the new clothes for fall for our stall at the market. Kalima works at the local Kara Balta market. This is the first time they've sent me to Dordoy. I'm a little nervous about what to get. It's such a big place, and there is so much to choose from." The three continue to talk about what they hope for out of their shopping trip.

We all settle back for the ride into Bishkek. Outside, the vendors on the street are giving way to the countryside, where there is little to see besides the occasional

farmer tending to his livestock. As we get closer to Bishkek, the traffic increases: more cars, more marshrutkas, and more people. Along the side of the road, some people try to flag the driver down for a ride to Dordoy, but the bus is full, and he does not slow down. On the side of the road, there are people selling all kinds of food and drink. It is late summer, so everywhere you look, a pyramid of a variety of melons is for sale.

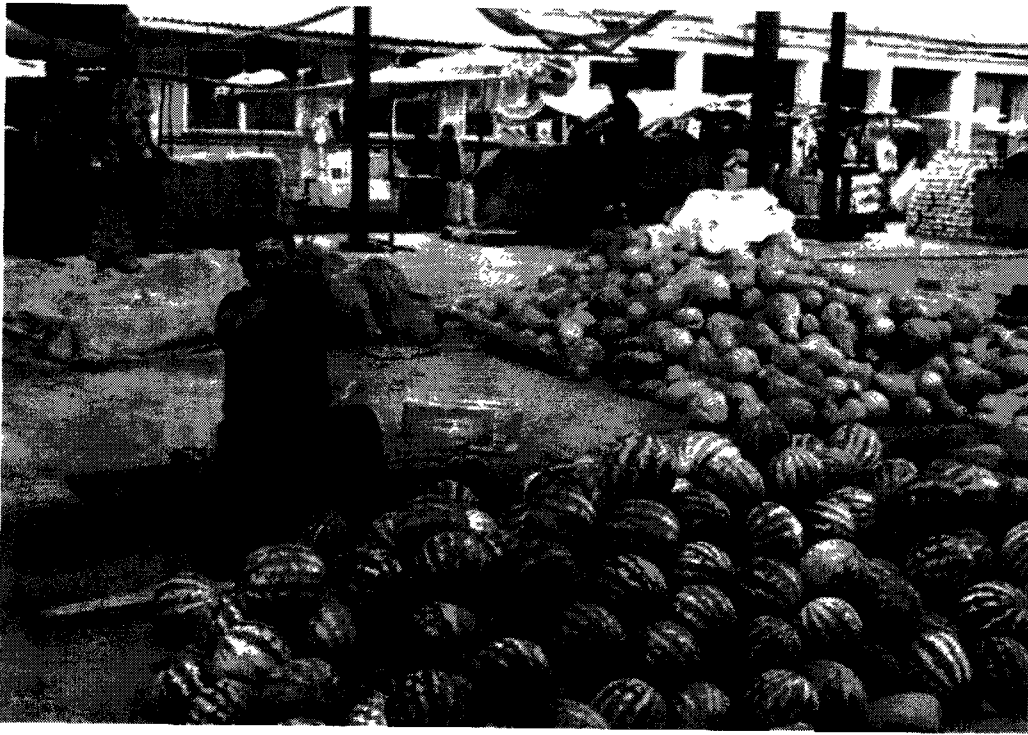


Figure 14. Melons for sale on the side of the road. Photo courtesy of <http://jyrichter.us/travel/Khanates/Kyrgyzstan/pictures.htm>

As we get closer to the market, the traffic converges: many marshrutkas, cars, taxis, and people riding bikes or hauling goods towards the bustling bazaar. We slowly inch our way along the main street in front of the bazaar. As we get off the bus, everyone politely nods and thanks the driver. Then, our little group fans out and is quickly lost amidst the crowds.

## **Introduction**

In this chapter, I will present the themes distilled from the synthesis of the data collected from the design ethnography conducted in Kyrgyzstan. In Kyrgyzstan, I spoke with four groups of socially connected people, either family or friends. Two of the groups were located in the capital city of Bishkek. The other two groups lived in the outlying smaller city of Kara Balta. In the results of the design ethnography, I will present rich data from the descriptions of daily life, including stories and photographs of the participants and daily life in these two cities in Kyrgyzstan. First, I will provide details of the availability and use of technology and of people's access to it. Note that the data in this study was collected in 2006, so it reflects the conditions that existed at that time, including details about available technology. Understanding how people access and make choices about technology is a helpful reference point when thinking about possible ways that technology can be deployed to solve problems. Second, I will detail the challenges and constraints that the people faced in everyday life. Focusing on challenges can help generate ideas for opportunities to alleviate the problems people face. It brings to the fore a design problem rather than a technical solution. Third, I will discuss the theme of private in public, which shows the innovative ways in which young people create their own private spaces within the public space. The last and most pervasive themes from the study relate to the importance of social networks in Kyrgyz society.

## **Use of and access to technology**

The research focus of the Kyrgyzstan study was to understand the challenges of everyday life in order to design appropriate ICT solutions. Given this focus, it was helpful to understand how people in this region accessed and used technology. Previous research from the Central Asia Information and Communications Technology (CAICT) project yielded a variety of findings about the use of technology in the region. CAICT is a multi-year, multi-method study of how the growth of ICTs affects society across multiple domains, including education, health, business, and everyday life. The CAICT research team conducted a longitudinal study of ICTs and their usage within Central Asia from 2000 to 2010. This research incorporates broad social surveys, interviews, ethnographic observation, policy monitoring, web archiving, monitoring and analysis of chat sites, and focus groups. Results from a 2006 broad social survey (n=4000) showed that in all countries in Central Asia, including Kyrgyzstan, use of the mobile phone was outpacing use of the Internet (Kolko, et al.). At that time, mobile phone use was twice that of Internet use (19% vs. 9%). In addition, computers were the most used type of technology at 25%, but this did not automatically translate into Internet use.

Part of the motivation for conducting the design ethnography in Kyrgyzstan was to understand why the use of mobile phones was more popular than the use of the Internet or the computer. Generally speaking the usual pattern in the developing world is for mobile phone usage outpace Internet usage. There are many explanations for this phenomenon, but analyses focus primarily on two factors: economic and

infrastructural. The economic factor focuses on the fact that mobile phones have a lower price point than computers and are therefore more affordable to people living in developing countries. The infrastructural factor focuses on how mobile phones do not require an outlay of investment in the infrastructure; mobile phones therefore leapfrog over other technologies, such as landline phones. While these considerations offer part of the explanation for many developing regions, they did not match the situation in Kyrgyzstan. For instance, in Kyrgyzstan, computer use was actually higher than mobile phone use, although the use of mobile phones continues to increase. In addition, because landlines are quite common in Kyrgyzstan, the leapfrogging argument was not applicable here. Therefore, the goal of this study was, first, to identify what motivates people to use mobiles and second, to articulate, from a design perspective, how these motivations could fuel appropriate technological solutions for diverse contexts.

In the group interviews, I asked participants what types of technologies they used and why. I also took field notes of the use and appearance of technology in public settings. I will now discuss the main areas of technology use that were prevalent at that time—including mobile phones, computers, and the Internet—and the primary means of access, including the use of public access sites.

### **Mobile phones**

Almost all the people we interviewed for the study owned mobile phones.

Table 3 summarizes mobile phone ownership and features.

Table 3. Summary of Mobile Phone Ownership and Features

	Owned	%
Mobile phones	10/12	83%

Smart phones (w/ data plans)	0/0	0%
Landlines	6/8	75%

Ten out of 12 participants (83%) had at least one mobile phone. One participant from the urban group of friends (Cholpon) actually owned two mobile phones. Her explanation for having two phones was related to service providers. Several of the service providers in the region have a within network model, meaning that calls made to other people in the network were either cheaper or free. In the interview, Cholpon shared with us that her second phone was a gift from her boyfriend so that he could call her for free (see Figure 15).



Figure 15. Cholpon and her two phones

The companies she mentions below are all mobile phone service providers.

I have two mobile phones. I already had the Bitel phone, and then a boyfriend gave me a Fonex phone. It is expensive to call from one service provider to the other. Bitel has the most

subscribers. Fonex is cheaper. MegaCom is the cheapest and newest company. If someone gives me a MegaCom phone, I would carry three phones. –Cholpon

The two participants who did not own mobile phones were women from the rural group. One was Damira, the mother in the family group. The other person who did not own a phone was Kalima, the woman in the friend group. She revealed that she had owned a phone in the past, but had sold it because she needed the money.

As this study was conducted in 2006, it was not surprising to learn that none of the participants owned a smart phone. The phones they did own tended to be traditional mobile phones from manufacturers such as Nokia and Samsung. Participants' phones ranged from being the newest and latest models to ones that were several years older and had been passed down by friends or family.

Almost all participants had access to a landline at home or at work or both. Several participants mentioned that landlines could often be unreliable. In one case, we heard stories about families that used a house mobile phone either because landlines were not available in their neighborhood or because it was more convenient or cheaper to have a mobile phone instead. More details about how participants used landlines versus mobiles can be found later in this section.

During my time in the country, I saw the proliferation of the mobile phone and its prevalence and growing role in communication and commerce in Kyrgyzstan. When on the street, it is common to see many people talking on mobile phones while out and about. There are also other visible signs of the growing mobile market in the

country. Billboards advertising mobile phones and services were everywhere in the capital city of Bishkek (see Figure 16 ).



Figure 16. Example of a mobile phone that are ubiquitous in Bishkek

In addition to the advertising, the sale of mobile phones was evident in both the city's main department store and the local bazaars. The department store, called TsUM, is in a four-story building, and the first floor is dedicated almost entirely to mobile phones. At each visit to the store, we saw the largest concentration of shoppers peering in the cases at the displays of mobile phones and mobile phone accessories (see figure xxx). Besides the central shopping area, mobile phones were also a prevalent item at the Dordoy bazaar. At the bazaar, you could buy a variety of new and refurbished mobile phones and accessories, including SIM cards. Several of our local research partners mentioned that the mobile phones in the bazaar were sometimes stolen or traded from other markets, such as ones in China.

At TsUM I was overwhelmed by the choices of phones and didn't know what to pick. –Aselya



Figure 17. Tsum department store (left), mobile phones for sale (right)

In addition to the prevalence of mobile phones for sale in the local stores and markets, there was also ample opportunity to pay a local street vendor for the use of a mobile phone. Much of the country's infrastructure dates back to Soviet times. As a result, some infrastructure, such as public pay phones, is no longer maintained and is crumbling. As a result, local vendors in Bishkek often allow customers to use a mobile phone for a fee (see Figure 18).

The mobile phones that are available at kiosks cost 2 som per minute, which is expensive. –  
Aselya



Figure 18. Mobile phone for hire at a local vendor in downtown Bishkek

During the interviews, participants would often share how and why they got their mobile phones. For the younger participants, a mobile phone functioned as a status symbol, and the process of purchasing one was often described as an important occasion that involved consulting friends and family for advice. Adilet, the younger son from the family group in Kara Balta, told us about taking a special trip to the capital of Bishkek to purchase his phone. He met up with a friend who helped him pick out the phone.

I got a mobile phone two weeks ago. I decided to get one because of [needing to be in touch at] work. My friend told me that I should get one. He lives in Bishkek, so I traveled there to meet him, and we went together to buy it at TsUM. –Adilet

Another participant talked about feeling overwhelmed by the number of choices of mobile phones. While shopping, she ran into a friend who gave her advice.

At TsUM, I was overwhelmed by the choices of phones and didn't know what to pick. I ran into a male friend and asked him for advice about what kind of phone to get, and he is reliable

because he always buys phones there. He recommended a brand because it is reliable and good quality, and I bought the phone he recommended. –Aselya

For some, mobile phones were seen as essential, but expensive. Several people in the study reported that their phones were given to them as gifts by a family member or friend. When someone bought a new phone, it was customary to give away the older phone. In addition, one participant— Adilet, the younger brother in the rural family—related that he was told he needed to have a phone for work. Because he could not afford one, a colleague let him borrow the money to purchase the phone. Adilet was to repay him over time.

My colleagues asked me to get a [mobile] phone. They say that I'm the only one that can't be reached. The phone was expensive, but a colleague offered to let me buy it on credit over time. I just recently paid off the phone completely. –Adilet

When we asked Adilet what he used his phone for at work, he said it is for when he was working in the fields with others in his agricultural job.

When we are at work in the field, we call each other up to ask 'Where are you' or 'Where is the tractor?' - Adilet

Mobile phones in Kyrgyzstan were pervasive and seen as important. While their function was to allow people to communicate with others, mobile phones also acted as status symbols, especially among the young.

This section details how the people in our study talked about using their phones, when they used them, what they used them for, and what features and functions were important. Participants primarily used their mobile phones for making phone calls and texting. Some also talked about using other functionality, such as WAP (Wireless Application Protocol), also known as the mobile web.

Text messaging was a significant component of people's use of mobile phones.

We saw this pattern across participants, but it tended to be the younger people in our study who did more texting.

My colleagues were trying to teach me how to SMS, but I couldn't figure out how to respond. So now they just send me instructions about something [but don't expect me to respond]. My daughter is also trying to teach me how to SMS, but it's just easier to call someone back, instead of sitting there trying to figure out how to enter it. –Bakir

I just bought my phone, so I haven't had a chance to SMS yet. My friends do [SMS], but I just haven't had a chance to do it yet. –Adilet

When we asked the urban family how often they used texts versus calling, the two sons said that they texted much more than they called, whereas the father only occasionally sent an SMS.

Arif: 40 percent is calls, 60 percent SMS.

Jyrgal: 30 percent calls, 70 percent SMS.

Asan: Mostly for calls; once or twice a month, I'll SMS with my niece in Kazakhstan.

Several participants talked about why they preferred to SMS rather than call.

I like to write SMS and read it. –Aselya

It's comfortable; it's more handy—because you might not want to talk to them, or you are in lecture. –Cholpon

Especially among the young, texting was seen as an unobtrusive way to stay in close contact with peers.

As mentioned earlier, Kyrgyzstan is a multi-lingual country; most people speak both Russian and Kyrgyz. They may also speak additional languages, including Uzbek, Arabic, or English. Because of the different phones and the different languages, this adds complexity to text messaging. Phones typically come with a keyboard that uses

Cyrillic, Latin, or Arabic letters (see Figure 19). Within the same group of friends, we heard participants describe using different alphabets for texting based on their phones.

I don't have a Cyrillic phone, so when I text in Russian, I just used the Latin letters. –Alexei



Figure 19. Mobile phone that has a Latin and Cyrillic keyboard

Arif, who worked in the mobile phone company's call center, talked about the challenges that the mobile phone company faces when communicating with their customers via text.

On July 17, there was a mass advertisement of Mobi card (via text), and in the southern regions, they couldn't understand it because it is sent as SMS in Latin script. We had thousands more calls than usual of people who were calling because they didn't know what the message said. – Arif

Asan, the father of the urban family, summed up the challenge of SMS as being both generational and due to the limitations of language.

Young people know how to use all these services that mobile companies provide. However, people close to 40 or over don't even know how to use SMS because they don't know [the] English alphabet. –Asan

The embedded language of the keypad on the mobile phone, as Asan pointed out, is a limiting factor for older generations, because it requires knowledge of Latin script.

No one in the study currently used WAP, or mobile web services. Several participants had used them in the past, but did so because the services were offered for free on a trial basis. The participants who had exposure to WAP services thought they were helpful, but not worth the cost of paying for them.

WAP was free at first; it had a 50 som start-up fee. Now we have to pay by megabyte, and it is too expensive. –Aselya

At the time of the study, the people in our study did not see the value of paying for WAP services. The phone's function as a communication device, whether by voice or by text, was its greatest value.

In Kyrgyzstan, the cost of making a phone call varied for several reasons. Participants had specific decision criteria for making phone calls, including factors such as how long the call would be and what sort of phone or phone line the other person was using for the call. Economics were the driving factor behind decisions about making phone calls. Many of the participants in the study talked about how price influenced how and when they used a phone. For example, using landlines or home phones was often the cheapest way to get in touch. Therefore, participants would make lengthier calls from these landlines, either at home or at work. Mobile

phones were used when people were out and about, but phone calls on mobiles were often kept short. Also, calling someone else on the same network was often cheaper.

If I don't have units left on my cell phone, I use land lines and I use the home phone to make plans for going out with friends. –Arif

I also talk to my boyfriend mostly by phone. We used the home phone most of the time, but also on the mobile as well (30 percent). We talk about what are you doing, what's new.... it's mostly for discussion and chatting. –Aselya

We usually make our plans by phone because to walk to each others homes takes 15 to 20 minutes. We usually call the home phones at around 11:00 p.m., when people are home, to make plans. We mostly use the landline. More rarely, we use the mobile phone, because Mobi card minutes are expensive. –Arif

One of the participants in the Bishkek group worked in customer service for the mobile phone company. He revealed that, many times, his friends and family would call him at work, because—given that the call was to the mobile phone company—the first several minutes of their call was free.

With friends, we arrange our plans by mobile phone. They often call me at work using the code for the service section, because then we can talk for two to three minutes for free. –Arif

Since not everyone had a mobile phone, those who did would often pass on information to other friends who had no mobile phones of their own.

I also call friends by cell phone, but not all have cell phones. So the friends that do pass information to those who don't. Sometimes, we call using home phones. On the mobile phone, though, the units quickly run out when calling landlines. It's usually 50-50 whether I call or they call. –Nazar

As Asan, the father of the urban family, said, the home phone was used for longer conversations with family, but the mobile phone was used for most other calls that were quick.

We have a land line, but more than anything we use the mobile phones. It is comfortable and quick and conversations have to be logical because of the cost. We only use the home phone for the kids' calls and for relatives. I use the mobile phone for his business (as a driver). Probably 30-40 percent of our total calls are from the home phone. To call within the family,

we use mobile phones. In the city, if we have the possibility to use landlines, we do—it is cheaper. –Asan

Bakir, the father of the rural family, spoke of how mobile phones were changing life in villages that were rural and remote. He spoke of the village that his brother and mother lived in. There was just one landline in the village, and it closed everyday at 5:00 p.m.

The village administrator works the village phone. It works from 8:00 to 5:00. Everyone is welcome to come and call on the village phone, but now days, all members of the village have mobile phones; they prefer to have their own. The connection in the village is pretty good. – Bakir

The introduction and adoption of mobile phones in Kyrgyzstan provided people with more options of who to call and how to call them. Many people referred to a structured decision process, motivated by money concerns, to help them determine the best, and cheapest, way to communicate with someone else.

Similar to research from other developing regions, participants in our study talked about engaging in the practice of beeping (Donner, 2005). Beeping is the practice of calling someone else and hanging up before he/she answers; it is a way to notify the person to call you back. This is done by people who have limited units or credits on their phone: the person calling back is the one who pays for the call.

I don't always answer my phone; if it's close, I will. But sometimes people beep to the wrong number trying to find someone else. I would just call back and find out that they were looking for someone else. –Bakir

If I have no units, but find out that someone called a lot, then I can tell. Sometimes, it is five missed calls, and the space between the calls is very short. I can tell it is urgent, and [I] need to call back. If it's just one or two missed calls and they are not close together, then it's less urgent, and I'll call later. –Nazar

Based on the interviews and our observations of people on the street, it is clear that the mobile phone was the pervasive technology. The mobile phone was relatively affordable and easy to access and maintain. The young saw the mobile phone as a status symbol. The older generation saw the phone as a practical utilitarian device that helped them keep in close contact with loved ones. As people in this setting often had many concerns about money, the mobile phone gave them the ability to make specific decisions about how to use the phone and which way to call to minimize costs. The mobile phone was seen as useful in its ability to connect people in social networks to one another, whether it was by calling or by sending text messages. However, the characters on the keyboard may limit text messaging if a person does not know the Latin alphabet.

### **Computers and the Internet**

In this section, I will discuss computers and the Internet. While these technologies were available in Kyrgyzstan, they were less ubiquitous than the mobile phone. Most participants in the study had either used a computer or the Internet at some point before, but very few had access to a computer at home or at work. The computers that people did have access to were not always connected to the Internet. This was especially true for participants in the rural groups. In the rural family, none of the participants regularly used the Internet. In the rural friend group, Kalima, the female who no longer owned a mobile phone, had never used a computer or the Internet.

During the interviews, we asked participants when they had used computers and the Internet and what they used them for. Email was not a feature that was used extensively. The younger people in the study had experience with email, but it was not always seen as crucial. Nazar, in the rural group, mentioned that he used the Internet, but did not email. He said that he had emailed in the past, but the accounts were now locked, and he did not use them anymore. He used to email mostly with friends, but was frustrated with email because it felt so slow.

I find email uncomfortable. Chat and SMS are better; they are fast and you get an answer right back. Maybe if I had Internet at home, I'd email, but for now, I don't. When I use the Internet, I do so for movies, music, and games. I play World of Warcraft... and Counterstrike. There is a need for speed when you play games. I play games at home and at the [gaming] club. I probably play games one to two hours a day, sometimes three. –Nazar

Alexei, another member of the rural friends group, talked about how he had been online more in the past.

I used to be online a lot last year. A close friend of mine went abroad, and I'd be online a lot talking and chatting with her. But we stopped chatting so much. I don't do too much email. –Alexei

Most young people had their first experience with computers in school or while attending university. Computers were part of the curriculum, but, as Adilet mentioned, the focus seemed to be more on hardware than software.

In school, there were computers, but not Internet. I've never used the Internet. The computers in school were old. I used them; I took a computer class. It was called 'Intro to Computers.' It was basically how the computer works and what the different parts are. There were no programs, but we learned about the working parts of the computer. –Adilet

Alexei, a man in his twenties in the rural group, talked about how he used his home computer mostly for entertainment.

I first used computers at University five or six years ago. There was a special course on computers. I worked as an administrator in the gaming clubs. I had my own computer at home for music, movies, and typing—things like that. –Alexei

Many of the young people in the two urban groups were still attending or had recently attended university. They accessed the Internet at school or in Internet cafes.

At the university, I use it everyday because it is available there. I probably use it an hour and a half everyday. –Arif

As mentioned above, access to the Internet was considered important to keep in touch with family or friends who had gone abroad. Arif and Jyrgal talked about accessing the Internet to stay in touch with their mother.

We typically go to the Internet cafe about three to four times a week; but right now, our mom is in Germany, so we go everyday to be in touch with her. We stay online for five minutes to an hour; it depends. –Arif and Jyrgal

Several of the young people in the urban group had Internet access at home.

Yes, we have the Internet at home. I use it everyday. I use it for chat rooms, games, email, and local area network chat in our special district. It's Internet by local area network. There is a special provider called Megaline, [which] provides free exchange of information and videos between people who are users of Megaline; you can chat for free with people who are logged on. Megaline costs 750 som per month depending on traffic. You get Internet access; it's DSL. I play Counterstrike, World of WarCraft... Battlenet, many games, and Football. I email other people in Kyrgyzstan. I probably spend three or four hours on it everyday. –Nurbek

The young people in the study used computers for entertainment and communicating with friends and family. Similar to the case of the mobile phone, cost played an important factor in how often and for how long participants went online.

Several people in the study mentioned that having access to computers was important, especially at home. Computers were seen as important for the purpose of education.

It isn't common for people to have computers at home, although families that have students in 6th or 7th grade usually have a computer in the home. The students need the computer for school, so the parent would buy a computer for the students. It might cost, at a minimum, \$300 for a new one, but the more power you need, it will be more expensive. On average, it's about \$500, which includes a monitor. These prices are for independent products that come from China, not from companies. –Nazar

Having a computer at home, while important to education, was also seen as a way to keep the young people close by. For example, Bakir, the father in the rural group, talked about how he would have preferred to have a computer at home. At the time of the interview, his daughters had to go to the library to find information.

If we had the Internet at home, then the girls could get the information at home instead of having to go out to the library or to school [to use the computers and do homework]. –Bakir

As we have seen, people went online for a variety of reasons. They went online to communicate with others via email or chat. They used computers for games, music, and movies. They also used computers to complete tasks such as word processing. Asif, the older son in the urban family, worked at a call center for one of the mobile phone service providers. He talked about how chat (or instant messaging) was an important communication channel at work. It acted as a way to leverage more experienced workers' expertise, but also to bond with other workers and release stress when answering customer calls.

During work, we use the intranet to chat while we are answering the customer calls. We ask how are you, talk about the stupid things that callers ask us about, what did we do last night, and so on. Sometimes, it's hard to type and chat while answering calls, so maybe someone will go silent for a while, but everyone understands, and then he'll come back and say what the call was about. It used to be that we could all chat together, but a week ago the company ended the public intranet chat. Now we have to do private chats, meaning only two people at a time, but we still use the intranet for it. This chat is important psychological relief from the stressful job. – Arif

Among the people in the urban friend group, the Internet was relatively easy to access via work or school, which meant that the participants used it for a variety of activities, including schoolwork and socializing. Two of the participants talked about using Hi5 (High 5), a social network site, to connect with friends (see Figure 20).

I use [the Internet] everyday while in school, 'cause it's free. I use it for pictures and music. I use [Microsoft] Word for typing when there is need. I also use the Internet for homework, to find information, and to study. I send emails. I go on Hi5. I'll go to Internet cafes twice a week; if there is something new, I'll send an email. –Cholpon

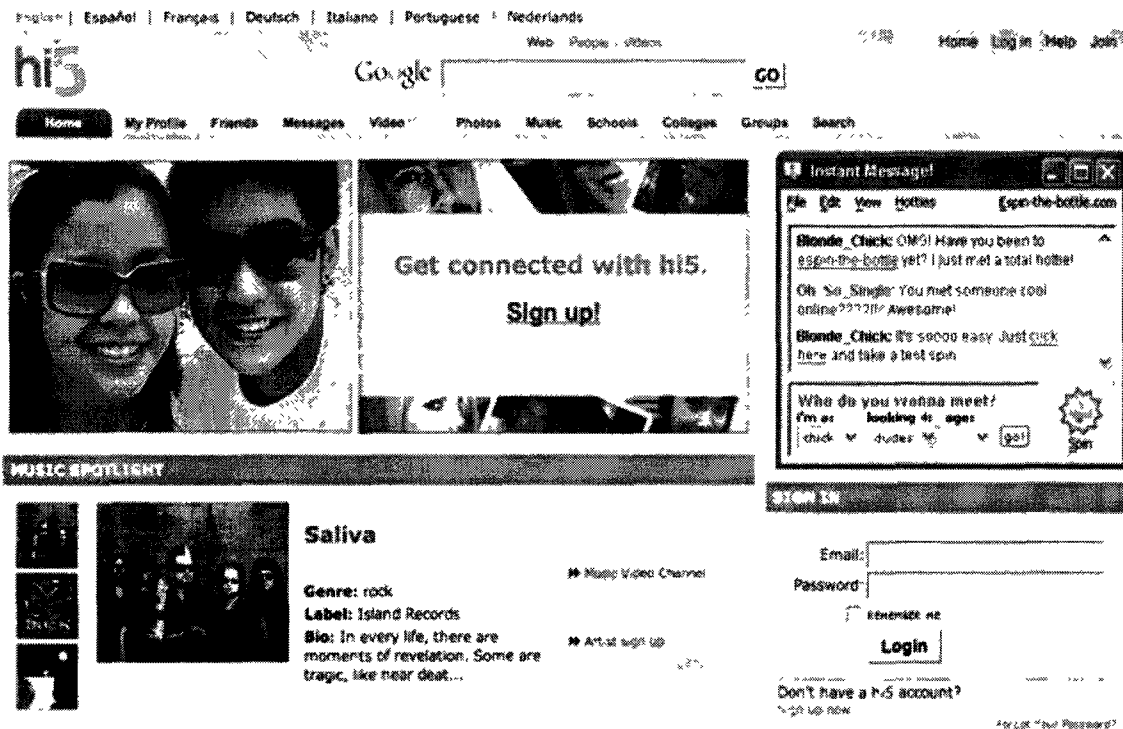


Figure 20. Screenshot of Hi5, a popular social networking site with some of the young people in the study

According to Cholpon, Hi5 was a popular means of social networking among students at her University. It is in English, and many of the students in her school used it to stay in touch.

When I was a freshman two years ago, not many students were using Hi5, but now almost all the students there use it. We use it to share photos and search for ex-classmates from school who have gone to other countries. It's very interesting to talk to them. We created a group for our school, and now all students are in this group. It's helpful to meet other people from other countries. I used to use it every day during school, but now [that it is summer] everyone is at Lake Issyk Kul. –Cholpon

Young people valued the Internet, but as evidence shows, they tended to use it mostly for entertainment and socializing. To a lesser extent, they also used the Internet for more instrumental tasks, such as homework or research.

Some participants stated that mobile phones are more useful than computers, because the phones are portable and have the functionality that people, including elders, need—that is, they give people the ability to be connected and in touch with others.

Mobile phones are more useful. They are mobile...anyone could carry a mobile phone. It's easy to handle and interface with and has the right functions. Elders don't need computers... what would they need them for? But mobile phones can help connect people and connect them frequently—which is what matters. --Nazar

Reflecting on the use of mobiles versus the use of Internet, it is easy to see why mobiles were the more ubiquitous technology in the region. They are more affordable and portable; and they can be shared, as when older phones were handed down to friends or family. Mobile phones also supported people's desire to have control over costs and were flexible enough to have value even when one might not be able to afford service. The Internet was still seen as more of a luxury, one that supports entertainment and connection. It was considered less practical than a mobile phone.

### **Public access sites**

In Kyrgyzstan, there were a variety of places where people could access computers and the Internet. These places were not free, but instead charged for use, typically based on time. In Kyrgyzstan, places to access computers and the Internet were all businesses, unlike in the U.S., where Internet is often available for free in libraries and community centers. The services offered at each site differed greatly. Some businesses only offered specialized services. The concentration of these sorts of businesses was higher in Bishkek than in Kara Balta. Below is a summary of three of

the prevalent types of store front businesses that specialized in offering services that rely on technology: Internet cafes, gaming clubs, and general computing services.

Internet cafes provided a variety of services, including per-minute access for the use of the Internet and a computer. Programs were relatively limited to Internet browsers. In addition to the use of Internet and a computer, many Internet cafes also did a brisk business offering VoIP, or Voice over IP. This service allows patrons to make phone calls, typically overseas, at rates that are much cheaper than calls made by landline or mobile phones. During my time in Bishkek, I visited several Internet cafes, and the VoIP services were almost as popular or more popular than the business for the use of the Internet. People who used the Internet services in the cafes tended to be young people, while the VoIP services attracted patrons of various ages.

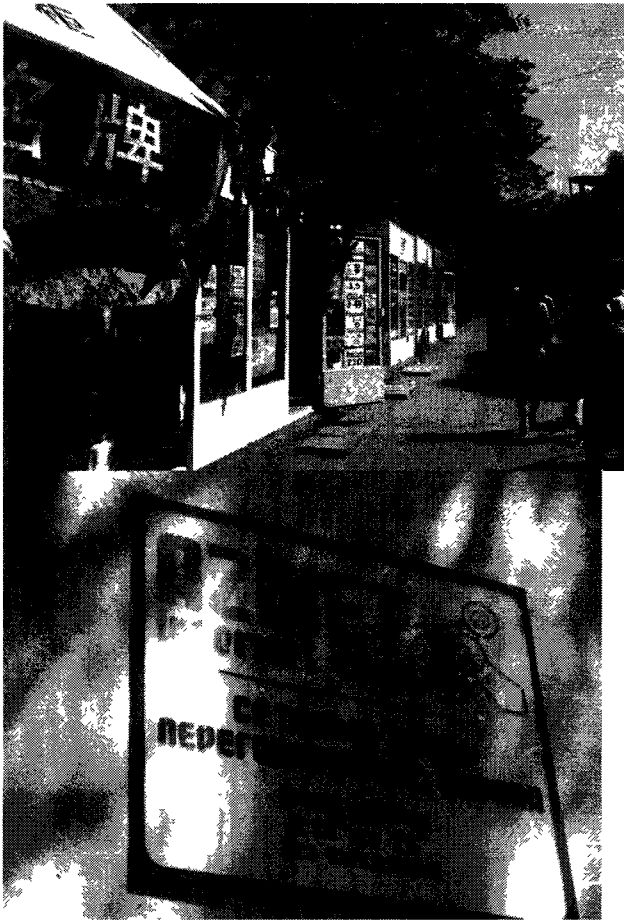


Figure 21. Image of a business offering IP telephony (or VOIP) and an Internet club

Similar to Internet cafes, gaming clubs or cafes also had computers for rent, and some also had Internet access. Gaming clubs focused on providing access to computer games. These computers were often networked and allowed patrons to play against others online; but the networks were often site-specific or city-specific, meaning you could play games only against other people in the cafe or perhaps other people within that region of the city. In contrast to Internet cafes, Gaming clubs tended to be a lot busier. Often, a line of people stood waiting to get in. It also appeared that the duration of use for computers at a gaming cafe was a lot longer. The demographics of gaming clubs were quite different as well. The clubs tended to attract the young, with a

large portion of very young people, including teens and pre-teens. In addition, patrons tended to be almost all male. It was rare to see girls or women in the gaming cafes. We observed people playing a variety of games, but the ones that were popular tended to be the ones that are popular in many parts of the world: World of Warcraft and Counterstrike.

In addition to what we observed while visiting these gaming clubs, we gained some insight from conversations with one of the participants in the study who had recently opened a gaming club. Alexei, from the young group of friends in Kara Balta, talked extensively about the club he had opened (see Figure 22).



Figure 22. Alexei's gaming club in Kara Balta

During University, I had worked at a few computer clubs as an administrator. It started as a six-month internship for my diploma work, but then those clubs closed. They usually only lasted two to three years, because the equipment eventually wears out, and the owners can't afford to

get new equipment. I wanted to open my own club. I bought ten new computers from a firm. I know computers and that made it easier deciding which ones to buy. I'm not sure how long they will last. It depends on how well my brother and I can maintain them. We'll see. After only one year, they are already starting to get old. Luckily my brothers and I can repair them ourselves; we don't need to call specialists. My brother also works at the club as an administrator.

At his gaming club, Alexei did not provide Internet access for patrons to use.

We asked him if he had plans to add it in the future.

I might add it for my own use, but not for people in the club to use. I'm located just 150 meters away from another club that provides Internet and IP Telephony (VOIP). We made an agreement to stay out of each other's areas of business; therefore, I won't provide Internet, and they won't have gaming.

When asked about the types of games and where they came from, Alexei

replied:

Counterstrike and World of Warcraft are the most popular. We play World of Warcraft on a local network, because playing on the Internet is too expensive. Even though these are the most popular, I often get new games. I buy them from TsUM in Bishkek or my friends bring them from Russia or somewhere else they've traveled. I find out about new games just by talking to other people who play them, or sometimes you hear about them on TV.

The hours of the club and the clientele who visited it fluctuated quite a bit.

Now that it is summer, fewer people come to the club, maybe 50 to 100 each week. During the winter, it is very busy after 4:00 p.m., because there is a school close by. Most of the clients are school children, but there are also people older than 18. We also have some that are 40. The hours of the club depend on if we have clients or not. If no clients are there, then we close earlier.

Because the club only had 10 computers, we speculated that many times, a number of people shared the same computer. This was behavior we had seen in some of the larger computer clubs in Bishkek (see Figure 23).

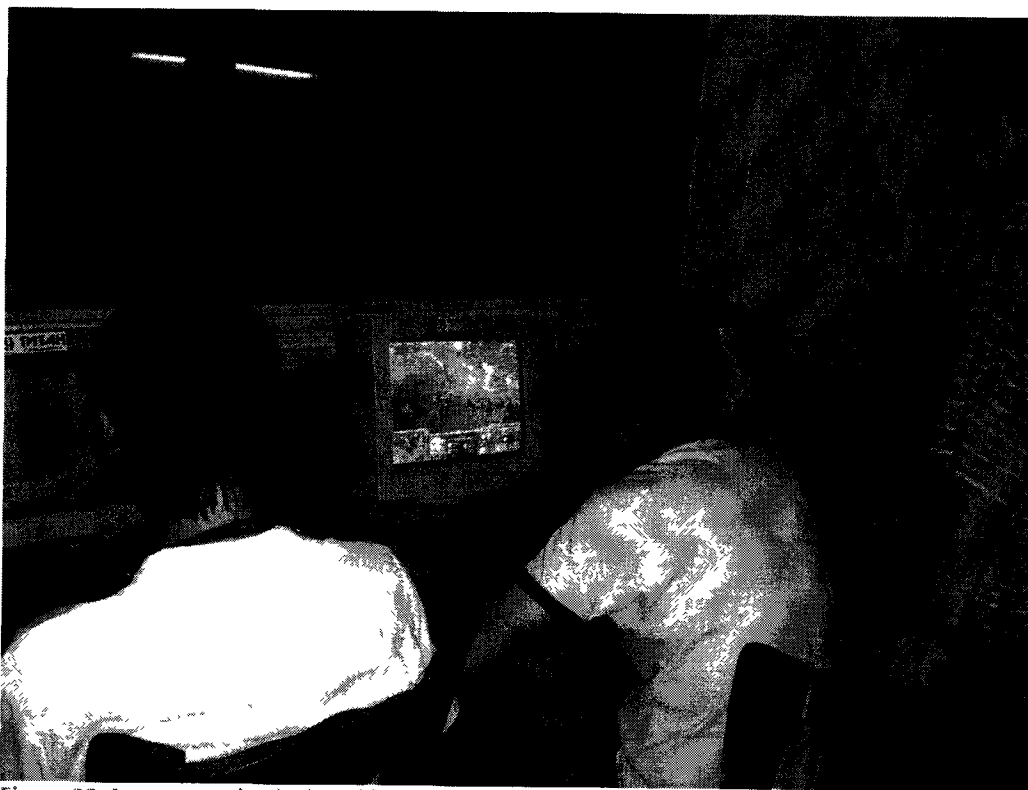


Figure 23. Young people playing video games in a Gaming club in Bishkek

We asked Alexei to talk about the difference between his club and those in Bishkek.

The biggest difference is the number of computers. In Bishkek, many of them have more than 20 computers. The price for playing games is the same 10/15 som per hour depending on the time of day; after 6:00 p.m. is cheaper. There are three or four computer clubs in Kara Balta. The biggest one has 15 computers. I would add five more computers if I could find the money. I have the space, but not the money. The club's space is my own. It is not rented. It is in an apartment that I own. Our home is a separate location. I am now only paying for electricity and games and for taxes [he wouldn't discuss how much taxes are or for what]. Any business is easy. I know business, so it's easy to keep it going. My education helps. Right after university, I worked in a bank, but I didn't like it, and the pay was low, and I wasn't working the way I had learned in school. I am now earning more in the club. Plus, I am now working in my hobby. It would be good if I could work in a bank and also have my own work on the side.

Finally, the third type of service or micro business that was related to technology involved printing computer files and making copies. These businesses were often less formal and could be found in bazaars or in the kiosks set up under the road

crossing in Bishkek. You could bring a file on a USB drive and get it printed for a low fee.



Figure 24. A printing kiosk in Bishkek

What we observed of the businesses that provided computer related services reflected what participants told us in the interviews about the types of services they value.

This survey of technology use and access in 2006 in Kyrgyzstan demonstrates the ways in which life in a developing county contrasts to life in more highly resourced contexts. Internet access was typically not available in the home. Email had little utility for the people we talked to in this study. Due to a variety of factors, the mobile phone was the technology that people were seeking out. A mobile phone has a low price point, which makes it more accessible for acquisition and adoption. Old mobile phones were passed between social networks and handed down. The mobile phone's

fundamental features, those that give people the ability to keep in close social contact via calls or text, make it an attractive technology for a culture in which social networks are of such importance—a point I will expand on later in this chapter. Finally, the mobile phone enables people to make strategic choices about costs for services, including the practice of beeping, choosing between SMS and voice calls, and choosing a different calling method, such as a landline. The mobile phone will continue to play a key role within this analysis; it recurs in the following section about challenges and constraints and again in the theme of privacy in public. In the final theme of social networks, I will provide a deeper analysis of the importance of maintaining and leveraging the social network. In this discussion, I will again make it clear why the mobile phone is such a key technology for people living in this context.

### **Challenges and constraints of everyday life**

One focus of the research was to understand the challenges that people living in Kyrgyzstan faced in everyday life. I asked about these challenges in the interviews, which also provided context for some of the challenges my research team and I encountered first-hand while traveling in the region. In this section, therefore, I will illustrate some of the challenges faced by people living in Kyrgyzstan. I will also include details of how people attempted to overcome the challenges they faced. Focusing on challenges can help reveal opportunities for developing information and communication technology to provide meaningful solutions. In this section, I have synthesized the challenges into a variety of themes that include the issue of dealing

with bureaucracy, concerns about money, finding information, safety, and transportation. Each of these concerns reveals part of the picture of daily life for people in Kyrgyzstan.

One of the recurring challenges that participants mentioned during the interviews was the challenge of interacting with bureaucracy. People faced difficulties when trying to do things like pay bills or taxes, or contend with unclear government regulations. Bakir, the father in the rural family, told a story of the challenge of getting a permit to connect a gas line to his home.

I didn't know which permits I'd need to connect the line to the house. The price was expensive. I would have got one installed right away, but the cost was too much. I'm waiting for my salary. We started [to install the gas line], but didn't finish because I am waiting for the money.

Bakir mentioned that in order to find out the permits he needed, he relied on a friend who worked at the gas company. The friend did not work with permits, but was able to put him in touch with someone else at the gas company who did. Bakir reflected on the process, including how long it was expected to take and how unclear the process and fees were. He speculated that the process was difficult on purpose, because the people processing permits were attempting to solicit bribes.

It can take a long time to get a permit. You have to write the paper [application] and go to the meetings; it can take lots of time. If you have money, you can get it in one week; but being in touch with my friend will make it go a little faster, maybe two or three weeks. I don't have free time during the workweek. I don't have one free hour because I'm working [as a taxi driver]—that is why I asked my friend and why my friend agreed to help me. If I didn't have the friend helping me, I would have had to take off work to go through all the procedures. I probably would have just tried to do it quick and pay the price (the bribe). Otherwise, it might take until winter. If I had to take time off work, it might take 10 days off to do it all. No one tells how many signatures you need on the permit. You need to go to one more person, then you have to go to two more people, but it just takes so long. It would be much better if the process was stated up front, so you know what was involved and what you would have to do. Right now, these problems can only be worked out by money, so you just end up giving bribes in order to get stuff done. I feel like they do it on purpose; they make the long lines and the process hard,

so people have to bribe them. Damira, his wife chimes in and says, I'm not sure it is on purpose. Bakir shrugs, Yes they do, that's part of the reason they get the bribes.

Another participant from the rural group, Nazar, talked about driving without his driver's license on him and getting pulled over.

I was driving in a car last week, and I had forgot my driver's license at home. The militia men (the traffic police) stopped and asked me for it. I didn't have it on me, so I called my father on the mobile phone and asked if he would bring it to me. But it turned out that my father knew the officer, so they talked on the cell phone, and it wasn't a problem. If my father didn't help me, it would have been an expensive problem. They charge you a fine and then impound the car. You have to pay for the car to get it out, because it would stay overnight. So it's not only a fine, but 350 som plus everyday in the garage. –Nazar

Arif, in the Bishkek group, talked about having to call the water company repeatedly because the cold water was not working in their apartment.

Yesterday, I called the water company because the cold water isn't reaching our floor. After calling, the problem was solved for a couple of hours, but today the same problem is happening again. I just have to keep calling. –Arif

In the three stories above, each participant talked about the frustrations of dealing with issues of bureaucracy and infrastructure. In addition, Bakir's story alluded to the underlying corruption and systemic bribery that is common in Kyrgyzstan. In the first two instances above, both participants overcame the challenge of dealing with bureaucracy or authority by leveraging people in their social networks. This theme, relying on friends and family, was prevalent in many areas of Kyrgyz life. I will continue to return to this theme of the importance of social networks.

The problem of economic constraints was a recurring issue for all the people in our study. Not having enough money, or being concerned about the costs of goods and services, surfaced repeatedly in both groups and across different age groups and

genders. Participants had generalized concerns about money: not having enough and the poor state of the economy.

A big problem is money. It would be great if I could have a higher salary. It's related to the economy of the country: The money is the main problem; it will get better if the economy gets better. –Damira

I bought my mobile phone two years ago so I could be in touch with my mother. But I had to sell it. I sold it five months ago because I needed the money. I sold it to a friend. –Kalima

In addition to general concerns about money, participants all expressed concerns about being able to pay bills or pay lenders. In Kyrgyzstan, it is quite common to borrow money from family and friends (Kuehnast & Dudwick).

I borrowed money from someone, but I couldn't pay it back, so my sister helped me. It wasn't an interest type of loan. I just had to pay the money back. I work in the market and used the phone there to call my sister to ask for the money. –Kalima

We have the same problems. They are day-to-day problems about the house and credit. We are often worried about how we are going to pay for the credit to pay for the house every month. –Damira and Bakir

Me and my mother bought a car on loan. There are problems to pay the loan, so we ask friends or family for help; we only ask close friends. –Alexei

When it comes to using the phone, it can be a problem. We usually like to call from city to city: You pay 50 som per month and don't get charged per minute. But if you call outside of town, then it gets expensive...when you have bills of 2000 som, then it hits the budget. Then we look at the itemized call list to see who called whom. Now a days, we limited ourselves to spending 160 som per month. –Damira

I always have problems with money. Recently, I borrowed from one person, and then the money was due, and I had to borrow from another person to pay the other back. Now I have to give money to more than one person, and I will try and do this myself. I am trying to mostly just borrow money from relatives, which is easier. –Kalima

Hospitality and providing help to friends is a common component of Kyrgyz life. The collective nature of the society instantiates feelings of obligation or commitment that compel people to work together and help each other. Several participants mentioned offering help or asking for help from others.

We were planning a birthday party for a friend. He was turning 18, and we wanted to plan a special party. We had a plan of things to buy and had everyone give money. When we got all the money, we realized it wasn't enough. We asked one person's parents to cook some food, because we know one of the mothers cooked the best. We also made our grocery list shorter...I met someone in the bazaar, and we talked about the financial problems for the party, that there was not enough money. There is never enough money. –Jyrgal

Friends and family often ask me for help, mostly about their finances. A lot of the time, they don't have any money and they need loans. Mostly these are friends who ask. –Alexei

I was talking to my friend about her older sister, who is 36 years old. She has many problems—financial problems. We wanted to try and find a way to help her, but we can't, because we don't have the money to help. –Kalima

This theme of economic uncertainty and concern about money pervaded the interviews. Again, it is clear that people relied heavily on social networks to offset the financial challenges they faced.

In the case of more tangible and specific challenges, participants in both Bishkek and Kara Balta talked about the difficulty of finding a phone number for a person or business you were trying to call. No phone books or official directories have been printed in Kyrgyzstan since Soviet times. The lack of a reliable and easily accessed resource to find phone numbers was a challenge for several people.

To find a phone number, I have to go through other people. I was looking for a relative's number. So I'd call someone, and then they have to call three people. I finally got the number I was looking for. We spent money calling on mobile into city to find the number we needed. –Bakir

In Bishkek, there were several directory numbers to call, but participants mentioned that the numbers were often busy or you had to wait on hold. They also voiced frustration at having to deal with the local phone company.

When I called the water company, I called 109 the directory number. It was busy at first. There are only 20 operators for the whole city. I had to wait 3-4 minutes. It's pretty common to have to wait 10 minutes to get through and sometimes it can take all day. –Arif

To get service for your home phone, 108 is the number to call. If you have to have a home phone repaired, you can hardly ever get through. If you can get through, they don't tell you when someone will come to repair or even promise that a person can come. There is a monopoly of the phone service and too many users, and the phone company can't handle all the demands, and they won't share the market or split into smaller services. If there were competition, it would be better for the population. –Asan

Participants also talked about a CD that was sold in some of the shops. This CD provided a digital copy of the phone company's directory (see Figure xxx).

There is a disk that contains the phone company directory information. It is not official, though. It is copied by people who work at the phone company and distributed to friends. You can also buy it in shops that sell CDs for about 150 som. You can probably find it by searching on Yandex.ru (a popular Russian search engine). Small things/programs can be downloaded from the Internet. There is also a mobile phone information service, but it costs a lot to call it, and the operators take a long time to find information which makes the call even more expensive. –Arif

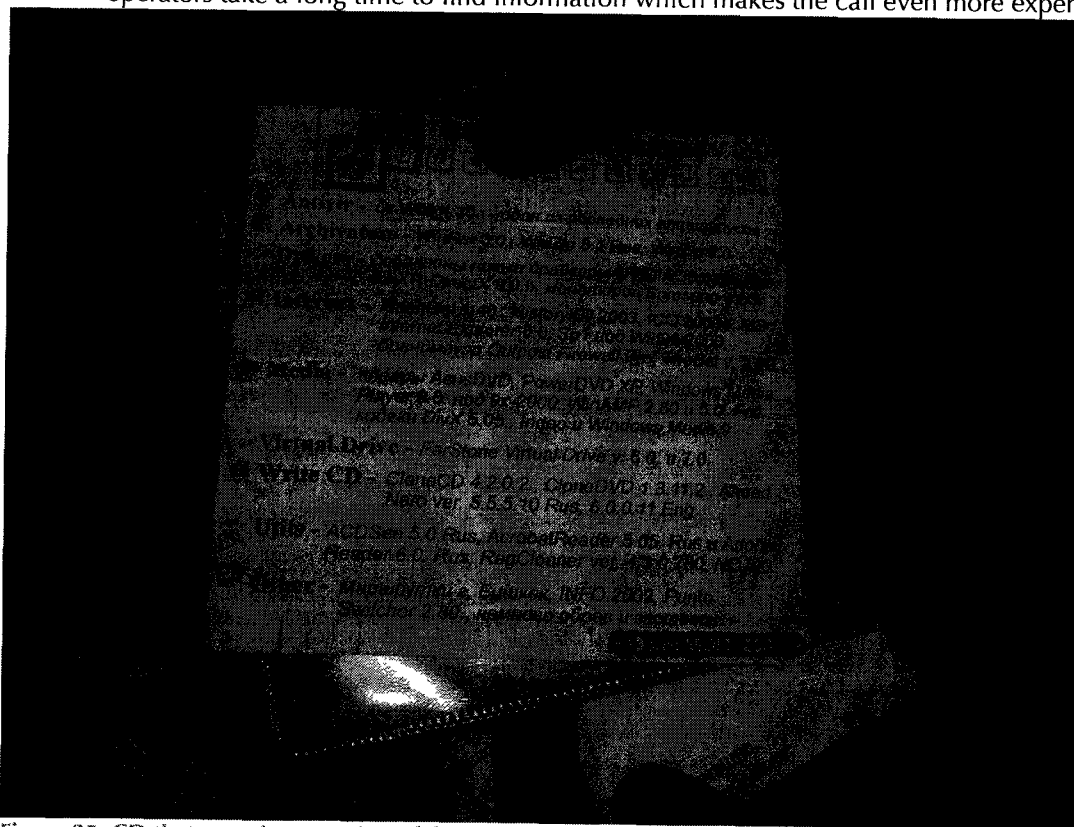


Figure 25. CD that contains a version of the official phone company directory for sale in a local shop

This example of the lack of an accessible, centralized phone directory points to a more specific challenge—that of finding information. Since people and social

networks tended to be the main sources of information for people in Kyrgyzstan, not being able to find a person's phone number was a significant challenge.

During our study, several participants voiced concerns about safety and spoke of how they took measures to ensure safety. Asan, the father in the Bishkek group, talked about getting a mobile phone for his own safety, but also so he could keep in close contact with his children.

I got the mobile phone as a gift, and I use it for work and for personal safety. I am often working at night or have to suddenly go to another republic. It is unsafe times. With the mobile phone, I can call my wife, sons, and friends and let them know what's going on. And as a parent, it's really good that they have mobile phones, because they are often coming home late. As a modern parent of the 21st century, I can call them and check on what's going on with them and find out where they are ... The mobile phone is now like the eyes and the ears...it is a big part of communications. –Asan

Later, Asan also retold the story of how a mobile phone can help with personal safety and be a lifeline for people in dangerous situations.

The mobile phone is also important because we don't have anything like a 911 emergency line. There was a man in Almaty, [Kazakhstan]. He was kidnapped and then beaten up and left half dead on the side of the road. He managed to press the emergency number on his mobile phone, and they found him through GPS. Without the mobile and the emergency number, he would have died. –Asan

In these two cases, participants talked about concerns for their safety. The mobile phone was often seen as a way to be connected to sources of help in dangerous situations or as a means of checking in on loved ones. Other examples of concerns about safety and vulnerability were mentioned by female participants.

Cholpon discussed how frustrating it was to take a marshrutka to University. Oftentimes, it would not stop and pick her up. We asked her if she would share a private taxi with someone she did not know.

No, I wouldn't share a taxi with someone else [in Bishkek]. I would share one with my brother, but not someone I didn't know; it wouldn't be safe. –Cholpon

Kalima, the female friend in the group in Kara Balta, talked about feeling vulnerable when she goes back to her hometown, a small village in the Naryn Oblast (province), which is a primarily poor and rural area in the Southern part of the country. Kalima, an unmarried woman in her mid twenties, talked about her fear of being kidnapped.

I go once a year to my village in the Naryn Oblast, but I don't want to be introduced to anyone there. It's a fashionable thing to be kidnapped. I don't want that to happen to me.–Kalima

Her concern is a legitimate one. In Kyrgyzstan, bride kidnapping, while not legal, is still prevalent, especially in the rural areas in the country. Research has shown that non-consensual kidnapping, known as *kysz ala kachuu*, has been on the upswing since Soviet Times (1991 and on) (Kleinbach & Salimjanova). It is practiced exclusively by ethnic Kyrgyz men in a display of masculinity and a demonstration of ethnic pride (Handrahan, 2004). Although the common perception in the country is that non-consensual kidnapping is a traditional practice and legitimized by Kyrgyz *adat* (traditional customary law), Kleinbach and Salimjanova refute this in their research. Many women living in the country live in fear that they will be kidnapped and forced to marry their captors. Handrahan describes these kidnapping episodes:

Very often forced kidnapping involves three or four men, a car and vodka. The men go in search of a girl/woman that they know or deem attractive. Sometimes kidnapping is done in daylight with the woman captured as she is walking down the street. Other times the kidnapping is planned at night and involves tricking the woman out of her house or yurt (tent). The man often has a full wedding feast already waiting at home. Once the kidnapped woman crosses the threshold of the man's home, the oldest woman in the man's family places the *jooluk* (scarf) on her head and the kidnapped woman is considered married. Some people assert that marriage happens later, with consummation, which may involve rape. If after such a marriage the woman decides to escape, she is likely to face rejection by her family and her

village because she has 'dishonoured' Kyrgyz tradition. Many men and women claim it is an honour to be kidnapped because bride-kidnapping is seen as the ultimate confirmation of a woman's worth; 'only beautiful women are kidnapped', etc. [Hadrahan 2004]

In our study, Kalima was the only participant that mentioned the tradition, but she was also the only woman from a rural village. The other young women in the study were from Bishkek, where these types of kidnappings are rare.

While Kyrgyzstan is a relatively safe country, the people in our study expressed concerns for themselves or their loved ones. Safety concerns were very real, and participants talked about the ways in which they avoided unsafe situations or mitigated them by traveling with others or having a mobile phone.

An additional challenge of everyday life in Kyrgyzstan is transportation. While some people own private vehicles, most do not. People rely on official taxis. It is also common to pay someone for a short ride, even if the car is not an official taxi. The cheapest and most convenient way for most people to travel in the city of Bishkek and beyond is by marshrutka (see Figure 26), the mini-van buses that are ubiquitous on the roads of the country. But the marshrutka, while affordable, also presents challenges for riders. Marshrutkas do not have scheduled stops for pick up or drop off; instead, riders must wave the driver down on the street or ask to get off. When marshrutkas are full, they do not pick up additional passengers. If marshrutkas are traveling to destinations further afield, they will not leave until all seats are full. Therefore, there are no schedules and passengers must wait for extended periods for the bus to fill before it will leave. Taxis, while more convenient, are expensive. As travelers to the region, our team experienced the challenges of riding marshrutkas.

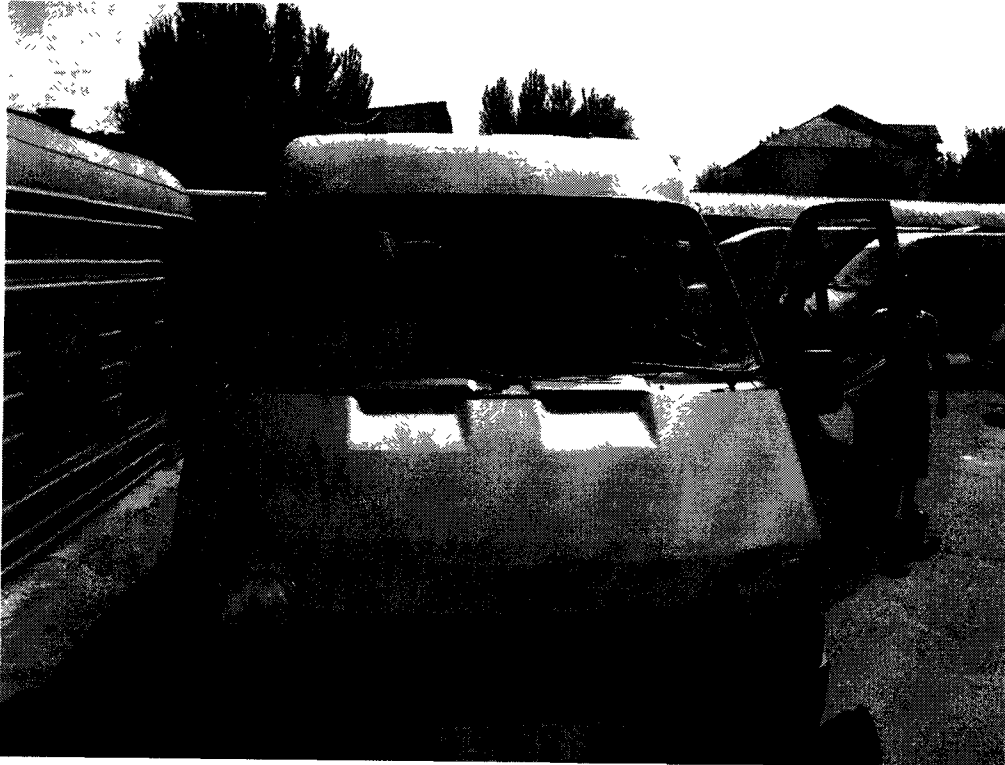


Figure 26. Picture of a marshrutka

Cholpon explained the challenge of trying to take a marshrutka to school.

The problem I have with the marshrutka is that it is often full. There is one that goes from house to the university, but it starts further out in the region, and when it passes my house, it's almost always full. It never stops. If I wait for the next one, I'll miss class, so I have to get a taxi, which is expensive. It means that I don't have any money for lunch. Sometimes, I'll go with my brother, and he is going close to the university—so we can split the costs. –Cholpon

Nazar, from Kara Balta, also talked about how it was difficult to get to the university.

There are two ways to get to university. Either my father gives me a ride or I take a taxi, which is expensive to do everyday. There is no marshrutka and no buses that go there. I don't share a taxi, because they stay in particular places and won't drop you at the university directly. This is the problem with the shared taxi. –Nazar

Since marshrutkas are privately owned and not regulated, it often appears that there is little consistency in pricing for similar trips. Arif talked about how he often had the experience of arguing with the driver about price or about where to stop.

When I got on the marshrutka, I handed him a 10-som note, and he yelled, 'Is this for one? Do you need change?' I was on my way to work and needed change, but he was upset with me. I

don't usually talk to the driver, but sometimes I have to argue with them about where I want to stop. I ask for a stop, and they say, 'Can't you walk an extra 10 meters?' And I say, I am paying five som, not four. I want to stop where I want to stop. –Arif

Since most people do not own their own cars, they rely on marshrutkas or taxis to get around. As demonstrated, this experience is often frustrating. Marshrutkas do not take you where you need to go or are full. Taxis are expensive. Transportation is a crucial resource and helps people access resources, such as goods and services and education. Also, transportation allows people to access social connections and, therefore, to cultivate social capital. The theme of transportation will be investigated in more detail in the design ethnography described in Chapter 5.

Looking at challenges of everyday life reveals both the broad and specific concerns of people living in Kyrgyzstan. The problems of institutions that were slow, untrustworthy, and impenetrable caused frustration for the people we spoke to. Money concerns pervaded all aspects of life. We did not interview extremely poor participants in this study; rather, the participants would be considered middle class. However, everyone mentioned the issue of money—it was a major problem they faced. In addition to money concerns, the lack of a centralized phone directory that is easy to access points to a more specific challenge, that of finding information. Because people and social networks tend to be the main sources of information for people in Kyrgyzstan, not being able to find a person's phone number is a significant challenge. Additionally, people had concerns about safety and how to protect themselves and their loved ones in uncertain times and situations. Finally, the challenge of transportation impacts many other challenges detailed here: the ability to earn money,

make social connections, and access education. Looking at challenges in daily life can yield suggestions and innovations for design solutions for information and communication technology. The specific design solutions will be discussed in more detail in Chapter 7.

### **Private in Public: Parental control, mobile phones, and romance**

Several of the younger participants in the study talked about spending time with boyfriends and girlfriends, and much of this time was spent in public or on the telephone. In Kyrgyz culture, family structure emphasizes collectivism and hierarchy (Arnett, 2007). Collectivism is reflected in the expectation that children will, from an early age, play an active role in family life, from doing chores to interacting with and taking care of younger children, such as siblings and cousins. It is also hierarchical in that the parents play a central role in children's lives and have final say over a variety of decisions, including education and choice of marriage partner. Arnett talks about how this often leads to conflict or tension during adolescence.

There are different reasons for conflict between [Kyrgyz] adolescents and their parents. The primary reason is overzealous control by parents of children's time, patterns of socialization and entertainment and money. Parents control whom their children socialize with, how and where they spend their free time, how much time they spend on studies and computer games, how late they can stay outside the home, and where they spend the money they receive from their parents. Parents explain their control by claiming that they want their children to be successful and happy in the future. Parental denial of adolescent romance is another problem that creates misunderstanding between them and their children. (Arnett, 2007)

We saw this phenomenon play out in several ways. Even though the young people in our study were 18 and over, parents and their opinions strongly influenced young people's lives. Most of the young people still lived at home with their parents

and sometimes their extended families. It was clear from talking to the family groups that the father in each case made the bulk of the decisions in the family, from money and safety issues of the children to simple things like purchasing the right type of meat from the market. This hierarchical relationship also plays into the romantic practices of young people. According to Arnett, Parents continuously warn their children about the consequences of intimate relationships with the opposite sex (p 577).

In our study, we saw the impact of this hierarchical structure play out in the interviews. The format of the interview was to talk to the group together and then split out and talk to each individual in more depth. In the urban family interview, the younger son Jyrgal was reticent in the group setting. He disclosed few personal details, and his participation was limited. However, during the one-on-one interview, he opened up and disclosed many more details about his personal life. He also shared with us that he had a girlfriend and talked about their communication practices, and particularly how their mobile phones facilitated their communication. He did not talk about his girlfriend in front of his father.

Last week, I met my girlfriend out on the street; we were talking about her upcoming trip to Lake Issyk Kul. She's there now. We were talking about what we will do and how she's going to be there and I'll be here. It was romantic. Since she's been there, we exchange lots of SMS, because it's cheaper [than calling]. -Jyrgal

He also talked about the frequency of their communication. They spent a lot of time sending texts and talking on the phone. But due to the cost of the mobile phone, they saved their lengthy calls for when they were home and could use the landline, which was cheaper.

I walk her home, and then I come home and call her up again. We talk on the phone for hours. My parents are against it. It's a problem, because the phone is busy for parents; they don't like that I'm on the phone for hours. –Jyrgal

Cultural attitudes in Kyrgyzstan generally look down upon sexual behavior among young people, especially adolescents. Parents demand abstinence and continuously warn about the dangers of intimacy and sex with those of the opposite sex (Arnett, 2007). As we learned from participants, young people often use their mobile phones to facilitate communication and stay in touch with their romantic interests. This new technology is helping create private space in public contexts. The mobile phone has become a way to circumvent parental oversight. It enables a sense of privacy that goes beyond other communication methods available to them.

In addition to the mobile phones, there are other ways that young people create opportunities for privacy in public space. The young people in our study who talked about their romantic relationships all mentioned walking in the public parks as one of the main activities they did with their partners. We also witnessed on the streets of Bishkek the many young couples hand-in-hand in the parks.

Having a girlfriend doesn't hit the budget in general; it's mostly about walking [in the park]. Sometimes you go to the movies—you gather up with friends; but I don't spend a lot of money on her because it's so limited. –Jyrgal

We usually meet at her house to watch movies or go out and walk in a park. –Arif

This walking in the park is often done with other couples. Kalima, the woman in her early twenties, talked about how she and her girlfriends all go walking with their boyfriends in the park.

We go walking together in the evening with our boyfriends. My friends' boyfriends walk with us, but my boyfriend is busy and can't come all the time. He lives in Bishkek, but when he visits, we all go walking.

The phenomenon of young people creating opportunities for privacy is not unique to Kyrgyzstan. Young people throughout the world have their own tactics for creating their own space and creating distance from their parents. What is unique and what should be reflected on in this study is how young people, who are expected to adhere to the strict rules set by parents and family members, create their own private spaces within sanctioned practices. Parents like that mobile phones provide more access and reach into young people's lives, but this very same technology is allowing their children to be more autonomous and create new relationships and connections that may not be known or sanctioned by the parents.

### **Social networks**

What is clear from all the themes presented so far is that social networks are of crucial importance to people living in Kyrgyzstan. The importance of the social network is evident in all aspects of daily life. The social network provides support that is personal, emotional, and financial. Part of this importance is based on cultural practices of gift giving. This phenomenon in Kyrgyzstan is well documented [Kuehnast and Dudwick 2002].

Social relations in Kyrgyz society are based upon person-centered social networks. Thus, in the Kyrgyz Republic, as well as elsewhere in Central Asia, gift-giving and other forms of reciprocity are essential to social life, especially for cultivating, maintaining, and expanding networks important for security and social mobility. During a time when both the state and the market are unreliable, the gift exchange networks still provide social support, personal financing, and mutual assistance in Kyrgyz society. [Kuehnast 2002].

Throughout the interviews, we gathered evidence of the importance of informal social networks. In this section, I will use what we learned from participants to

elaborate on the ways that the social network acts as a support network. From previous research, surveys in Central Asia had shown that people place more trust in family and friends than they do in traditional institutions (see Figure 27).

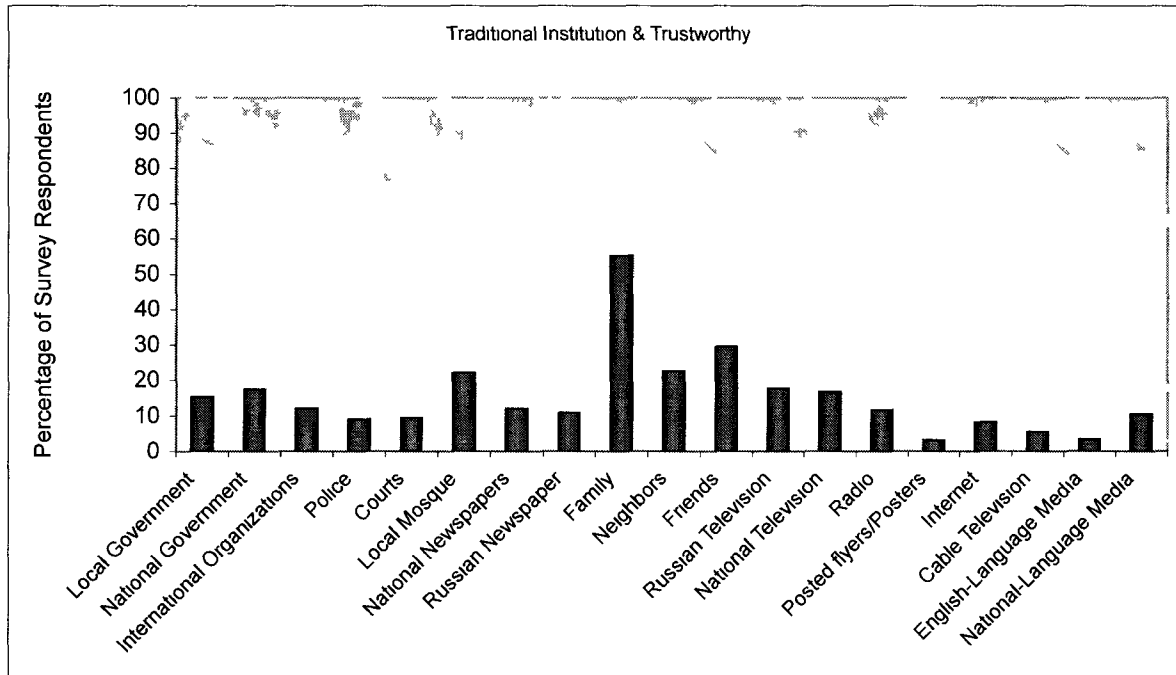


Figure 27 Comparison of trustworthiness in traditional and informal institutions

We asked participants to draw pictures of their social networks and answer a variety of questions about how they shared information and support with these friends and family (see Figure 28). These drawings acted as probes (Gaver, et al., 1999) for a conversation about the specifics of how the participants' social networks functioned.

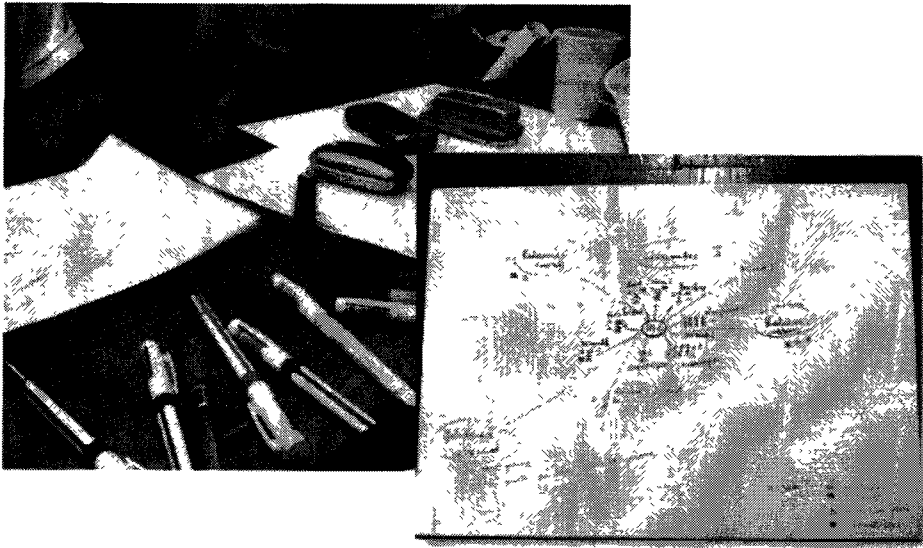


Figure 28. Social network mapping exercise

The data was analyzed and consolidated across participants and is shown in Figure 29 below.

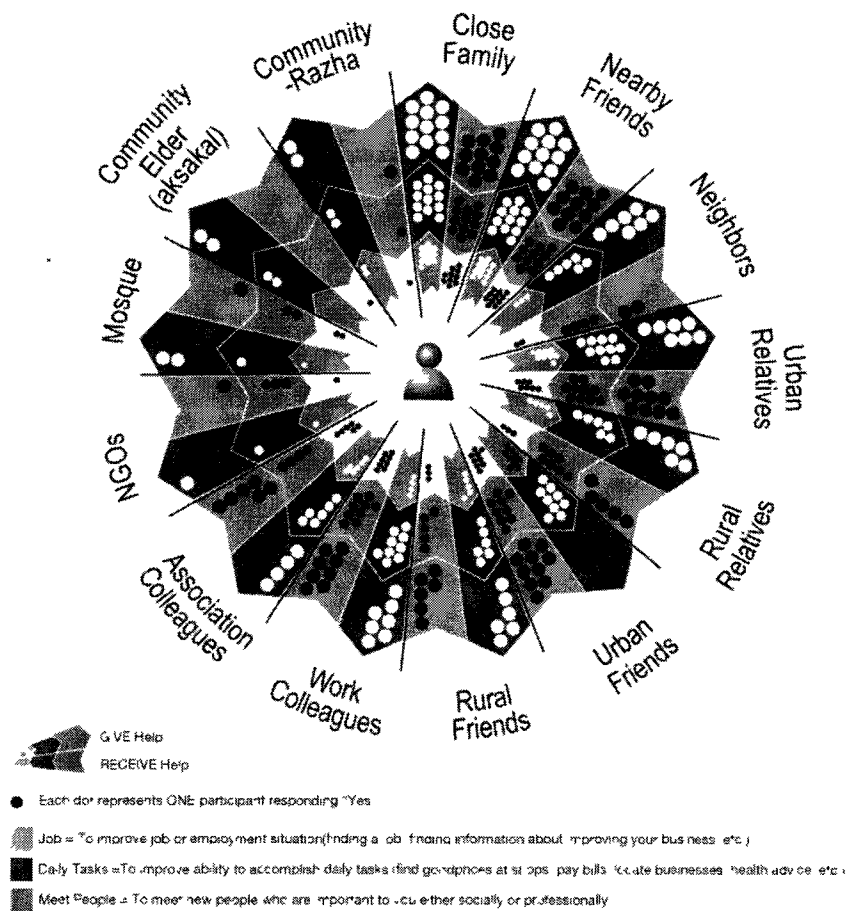


Figure 29. Synthesis of the social network mapping

Participants talked about the importance of staying in touch with family and friends. When talking about whom they call and how often they call, the frequency was quite high across all of the people in the study. They were reaching out and staying in touch on a daily basis with most family members. We saw a slight generational difference in the way people communicated. The older generation, the parents in the family groups, tended to use the phone, either the mobile phone or a landline depending on what was cheaper, to call other family members. For example, in the rural group, the mother, Damira, mentioned she called her father all day long. Her husband, Bakir, said he talked to family members in Bishkek at least once a day.

Bakir had six sisters and mentioned that they consulted him for help on things ranging from money to advice and general support. In the urban group, the father, Asan, talked about calling his sister everyday.

I use the regular [landline] very often to call my sister. She lives close, but we don't see each other everyday. I call to say 'How are you? Are you at home? What are you doing?' I call her practically everyday at the end of the day. –Asan

Young people often had frequent contact with their peers, their immediate families, and their extended families. We learned in the study that cousins were a prevalent and important fixture in young people's lives. Young people did talk on phones quite a bit, but the generational difference we saw was that young people were sending SMS much more often than making phone calls. This was due not only to the immediacy of the act, but also the cost.

I have a scary number of relatives in town and in the countryside, too. I have around 30 cousins, probably more—it's crazy. We gather up together every week: the families that are close and interact often, probably 11 families who come together often. –Nurbek

With my relatives who live far away, we call each other a lot, but don't meet that much. –Bakir

The social networks in Kyrgyzstan tend to incorporate strong intergenerational ties. Several of the young people talked about knowing the parents of their friends and the friends of their parents and relatives.

I see these families (his friends' families) everyday. The moms come out on the bench and socialize everyday. The five guys that I hang out with—I know all their moms too. –Nurbek

Cholpon told a story about being at Lake Issyk Kul and not being able find a place to stay.

We couldn't find a room; there was one, but it wasn't clean. We went to four different guesthouses. We didn't expect it to be so crowded, because it was Thursday. So I called my father, and he had a friend who was able to help us get a room.

Young people in both Bishkek and Kara Balta alluded to the fact that it is easy to know lots of people due to proximity, similar interests, or the fact that the cities are small.

The city is small, and we are always running into people we know. As a result, we have many friends. –Aselya

The customers [who visit my business] are almost always my friends. We have similar work at the club, and we mostly talk about games. –Alexei

The social networks have always been a crucial resource to the people in Kyrgyzstan. Culturally and historically, the people in this region tend to have many close connections. Because they live in a society in which people distrust official institutions, the people of Kyrgyzstan consider the social network to be central. It is clear that the mobile phone, with its ability to provide easier access to the social network, has become an attractive tool for maintaining connections both near and far.

The social network facilitates the gathering and disseminating of important information related to family news and what is happening in the country. Families who had no phones relied on those who did to communicate information about important events:

With my relatives who live far away, we call each other a lot, but don't meet that much. But if there is an important event like a birth or death, the relatives that don't have a phone ask me to call up and tell everyone else about it. –Bakir

Several of the participants in the study were Uyghur, which is an ethnic group common in Western China and found in several countries in Central Asia. Several members of the urban group were Uyghur, and the young people were active participants in a community group celebrating Uyghur culture. Arif talked about helping to plan an event for the group and about how they advertised it.

To advertise the event, we printed 50 posters that we hung in University and around the different neighborhoods. We also told all our friends. There is the joke about the 'Uighur telephone,' which means if you tell one person, everyone will know the next day. –Arif  
At the time we conducted the research, the country of Kyrgyzstan was

politically stable. The Tulip Revolution had happened the year before in 2005. Since then, the country has continued to experience a great deal of political change. In 2010 there was another revolution: the country was embroiled in protests that led to the ousting of the president. During the interviews, we asked the participants about how they found out about news. We discovered that, as in all other aspects of life, the social network played a large role.

To find out about news, I talk to parents and my friends. My father is better than TV: he always knows the news. –Alexei

Asan, the father in the urban group, mentioned that he preferred to get the news from official sources and not other people. He then went on to reveal that he had a friend who worked in the Presidential building (which is called the White House).

I get news from sources like television and papers and not usually other people. We had a good political-economy course in university, so I can analyze information myself. But I also have an unnamed source in the White House. –Asan

Asan's sons talked about how they relied on friends for news.

We find news from friends. Rumors and news travel fast in this community. –Arif

In Kyrgyzstan, a place where official sources of information can be scarce or untrustworthy, it is clear that people turn to members of their network for the latest news.

As previously mentioned, several people in the study talked about money as being a challenge in everyday life. One way that people overcame this challenge was to leverage help from family and friends or from other sources. The social network was

crucial to help people make purchases or get loans. Bakir talked about the challenge of getting the use of a tractor for agricultural work. He described a communal rental service that was available in the town they lived in.

It seems like many of the problems we face have to do with money. My brother called and said we need to cut the grass, but the tractor is broken. Tractors are available, but often they are old and you have to pay both to use it and pay for the gas. If something breaks, there is no guarantee that the tractor will get the entire job done. You have to stand in line for the tractor to use it; sometimes you don't even get to use it. In Kara Balta, we have a special service: people can get together and put together an order for agriculture. They first have to collect the money, which is sometimes hard, but it happens during the harvest season, which is now. People come together and hire the tractor together. –Bakir

While banks do provide loans, people still have to revert to asking friends and family for support to make purchases or pay off other loans.

Me and my mother bought a car by getting a loan through a bank. But sometimes there are problems to pay the loan, so we ask friends or family for help. –Alexei

In the previous section, I discussed how money and economic concerns are often the biggest challenges people face. In many of the examples, it is clear that it is friends and family who help each other with money and who enable each other to make purchases or to get by.

Within the Kyrgyz culture, the notion of hospitality is important, as is gift giving. We witnessed this first hand during the interviews that were conducted in people's homes. When we arrived, we were offered a big selection of things to eat and drink, which the family had made for the interview. It was not polite to start the conversation until informal socializing and eating had been done, and we spent a considerable amount of time just chatting and eating food with our hosts. However, this notion of hospitality can be costly for those whose budgets are already strained. Kalima, the

young woman in the rural group, lived alone. She talked about how much she enjoys hosting people in her home.

I like to have guests—to invite them to my home. It hits the budget sometimes, but it's ok. I'm the hostess all the time. I'd say about half of what I earn pays for groceries and food items. Sometimes, friends will bring some products with them, but I can't ask them all time, since I am the one who is the hostess –Kalima

Hospitality is evident during informal events—such as Kalima hosting her friends or our participants hosting us in their homes—but there are more formal events that draw together family and friends from across the social network. Celebrations of births, weddings, and funerals are large and important events. The family is expected to pitch in and help out on these occasions. Arif mentioned that when there was a death in the family, he was very busy helping with the duties to prepare for the event. Nurbek talked about attending a large event in honor of his friend's father. This event was to celebrate the one-year anniversary of the father's death. All of the friends and family were in attendance for this event.

This notion of hospitality as part of Kyrgyz culture is important because it acts to provide the expectations and rules according to which the social network operates. Expectations of hospitality are reciprocal; they therefore create balance and give-and-take between the people within the social network.

As mentioned earlier, the frequency of the contact between people in the social network is high. Much of this contact is the day-to-day flow of friendships and communication in Kyrgyzstan. Our participants talked about what they communicated with other people in their network. The interactions ranged from maintaining the

network—conversing and checking in—to asking for advice or guidance with personal problems, all the way up to asking for specific help in terms of favors or money.

My girlfriends come to me with personal problems about boys. Sometimes, friends come and ask for help with schoolwork, and I am always helping my brother and sister with homework. Sometimes, people ask teachers for help with schoolwork, and some are good and will help, so maybe someone will go once and find out. If the teacher isn't helpful, they won't go for help a second time. Older students usually tell us who are the helpful teachers. –Aselya

When I met a former classmate, we talked for a few minutes. We caught up, talked about our studies and families, and asked about other classmates. We talked about the weather and what we are doing for summer work. –Arif

Catching up about them and their families, what they are doing, asking about salaries for summer jobs, this is very common to do here. We ask about where are you? Why haven't we seen you? What's new? We make plans to meet and then call all of our friends. We usually meet in the park, because we have very many beautiful parks in the city. –Arif

For maintaining social networks, reciprocity is crucial, particularly in a culture like Kyrgyzstan where the notion is that you must give in order to receive. The people in our study gave us lots of examples of their involvement in giving and taking—in terms of advice, favors, help, and money.

My friends ask me for rides or help with a car. I have 23 years of driver experience. I have a group of classmates from school, there are six of them, and we gather together. We meet quite often, and I also help them with money. –Bakir

You absolutely must help your neighbors.–Adilet

Friends and family often ask me for help, mostly about their finances. A lot of the time, they don't have any money, and they need loans. Mostly, these are friends who ask. –Alexei

My father is always helping friends and other people with money and loans. We don't have formal lending in our neighborhood, but I see my father do it. –Aselya

I have another friend in the village who is married and has three children. We stay in touch even though she is married; her husband is fine [with the friendship]. We meet every few weeks. The friend lives in the southern part of Kara Balta. I try and help her the most by giving her money or buying them food or clothes for the children. –Kalima

This notion of reciprocity and giving is deeply embedded in the Kyrgyz culture. In the interviews, it was evident there was a sense of pride in being asked for help and being perceived as helpful.

In conservative Uighur families, it is ordinary duty for everyone to help out with ordinary chores like clearing the table. But some people just sit and expect to be treated like a king. If a boy gives help to girls and women [with chores] instead of sitting lazily, then they know he is a helpful person. –Arif

I am younger than friends, but people still turn to me for advice and money and loans. –Nurbek

It was clear that there are socio-economic differences between groups of people in Kyrgyzstan. Nurbek commented on the fact that class differences clearly existed within his social circle and that among the expectations and stereotypes was the perception that Uyghur people held certain types of jobs.

There are social differences amongst the friends, but there have been no conflicts. A little more about richer and poorer there are benefits; those who have less money know how to get money. The richer ones are good to have as friends, 'cause they have possibilities too. We all work; we all have jobs. I work as a bartender in a café, and the owner of the café is also Uyghur. Most of the Uyghur keep the café; it's another stereotype: most people do that type of business; for Uyghur, it is cafes and trading on Dordoy (the large bazaar) –Nurbek

The expectation of reciprocity is a key feature of what keeps the social network a fruitful source of social capital. Reciprocity includes the exchange of favors, information, and money. People in Kyrgyzstan take pride in being asked for help from others they are close to. Several participants talked about how friends and family were an important source of information and help. In addition, some participants mentioned that they were the go-to person for certain questions within their social network. Arif talked about how it was important to consult others to find a good mechanic.

I called up my friends to be referred to a master mechanic, because there are lots of people who work on cars, but they aren't all good. I'd say 80 percent of the mechanics aren't good and can't be trusted, so it's better to find a mechanic through friends. The good masters aren't as cheap, but the quality of their work is good. –Arif

People ask me for help with technical stuff. I like to take apart equipment and put it back together. Gradually, all my family came to realize that I am good at this, and they call me to ask for help. –Arif

In this section, I have provided evidence to demonstrate the crucial importance of social networks and social relations in Kyrgyzstan. People are in close, constant contact with people in their network, especially family. Networks of families and friends tend to be large and reach across geographical areas. Communicating within social networks is important for their maintenance; therefore the phone, and specifically the mobile phone, is key. The traditional notion of hospitality continues to be crucial and is enacted in a way that supports the social network and also generates acts of reciprocity. People leverage their networks to get by, whether they are looking for information, borrowing money, or seeking emotional support.

### **Summary and reflection**

In this section, I presented the themes and shared evidence from the Kyrgyzstan design ethnography, all of which was gathered from the fieldwork. First, I discussed the use of and access to technology that was current during 2006. The mobile phone was the clear favored technology in this context, more so than computers or even Internet access. While computers and the Internet were used, especially by young people, for staying in touch and for entertainment, it was the mobile phone that was the pervasive technology across generations and settings. The reason for this is that the mobile phone has an accessible price point, is a key tool for the crucial act of maintaining and supporting the social network, and provides people with freedom and control over how to use it and, therefore, how much it will cost. Second, I detailed some of the challenges and constraints of everyday life in Kyrgyzstan. Economic issues and money

concerns pervaded every aspect of life. Money was scarce, which caused worry over family and the future. Bureaucracy was a challenge for the participants in the study, and having to work with institutions that were slow, untrustworthy, and impenetrable caused frustration and was costly in terms of bribes and time. Other specific challenges included the lack of a centralized phone directory, issues of safety, and the inconvenience of an unreliable transportation infrastructure. These challenges are the inspiration for some specific design solutions and considerations for design that will be discussed in more detail in Chapter 7. The theme of privacy demonstrated young people's ability to create private spaces in public places, often by leveraging real public places, such as parks, but also by making use of virtual spaces, such as those that were enabled by the mobile phone. This chapter concludes with the theme of social networks, which are crucial to this context for a variety of reasons. First, they offset untrustworthy or unreliable traditional institutions, such as government and media. Second, social networks are central to social life and relations because of the roots of this collective culture and its traditions and expectations of hospitality and reciprocity. Third, the social network helps people get by in ways that would not be possible without it; for example, the provision of information and economic support is crucial.

Upon reflection the Kyrgyzstan design ethnography yielded a variety of findings, some which were expected and others which were novel. Based on the quantitative data collected as part of the CAICT project, it was not a surprise to discover that mobile phones were indeed the technology of choice. Also, from previous research in

the country and a review of the literature, it was also expected that the social network played an essential role in people's lives. However, what was compelling was how these two factors supported each other. The mobile phone was the technology of choice for many reasons, including economic ones. But after conducting the research within the context, it was clear how the technology, in this case the affordable and portable mobile phone, was popular. The mobile phone fit neatly into the values of the culture which was to be able to connect to others in the social network. The mobile phone facilitated and improved what was already seen as important in the culture: the ability to connect people to one another in order to access support to get by. Another essential component of the use of mobiles was how they were being adopted across a variety of demographics. They helped to facilitate intergenerational communication. While some in the Western media speculate the use of technology being the focus of young people, it was revealing to see how mobiles were in use across different age groups in the Kyrgyzstan design ethnography.

The finding and themes from this design ethnography will be revisited in Chapter 6: *Analysis and Interpretation* and will be used to support the findings of the dissertation, which are detailed in Chapter 7.

## Chapter 5: Seattle Design Ethnography

---

### **Stories on the Bus: Route 22**

*Note: This section is fictional, although based on observations and interviews with participants in the study. All the names used here are pseudonyms. This section is meant to introduce you to some of the participants from the study and contextualize the research findings within an ethnographic description of the setting.*

The Route 22 bus rumbles down the street. The heat is unbearable and unusual for Seattle. It is 95 degrees outside, but it feels much hotter on the bus, which does not have air conditioning. The bus is going to White Center. White Center is known for its diversity and for a recent annexation battle with the two cities on either side of it: Seattle to the north and Burien to the south. Its populations include South Asian communities from Laos and Cambodia and a variety of Latino cultures from Ecuador, Mexico, and Honduras, to name a few. White Center has been undergoing a resurgence. While poverty levels are higher here than in most other areas of urban King County (36% vs. 20%), the community is in the process of revitalization. It was chosen as a *Making Connections* site by the Annie E. Casey Foundation, which has funded a variety of initiatives and programs to revitalize the business climate in the community, strengthen educational opportunities (particularly early learning education), and provide job training and placement. All of these efforts are transforming the community and the lives of those who live there.

The bus goes through West Seattle and stops on California Avenue. A woman gets on with her two children. She is carrying bags and has three bus passes out: one for herself and one for each of her kids. She juggles the passes so she can scan each

one in the card reader; one of the passes does not seem to scan. The bus driver waits patiently, glances up in the mirror, and looks around. People on the bus are getting restless. With the bus stopped, the minimal relief of the wind is gone, and it feels as though people's impatience is growing as the bus heats up. Finally the driver just waves her on. "Nah, it's fine. Maybe it's the heat. Go ahead."

She sits down across from me. The kids sit in the seat behind her. She looks at me and says, "I don't know about these ORCA cards. This is the second time my son's has stopped working. Last time, I had to go all the way downtown to get him a new one. Hi. I'm Ann," she adds. We strike up a conversation about the ORCA card and the problems she has had getting it to work. "We're going to meet my boyfriend, Brian. He works down in White Center."

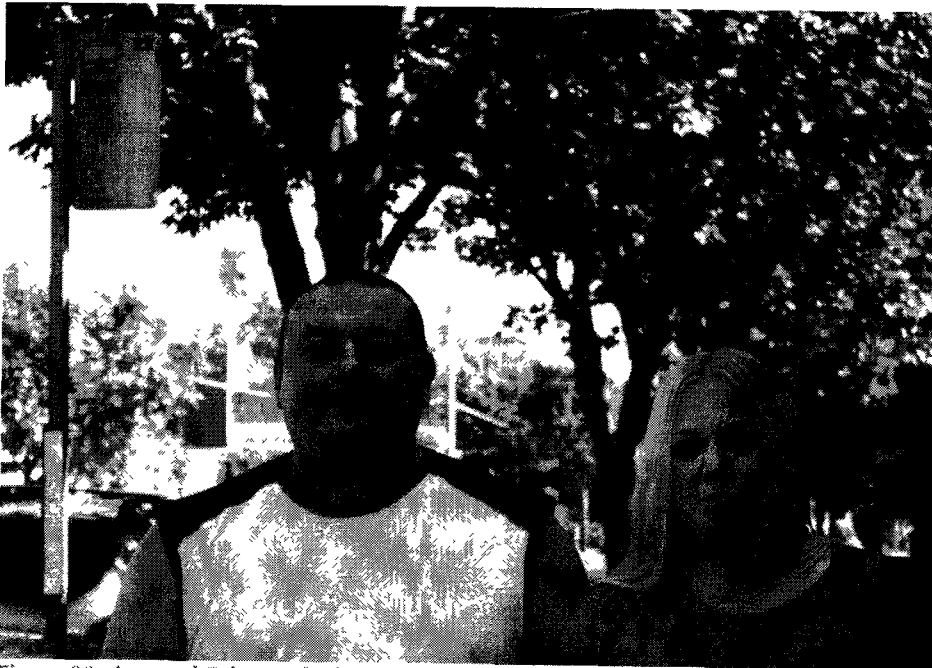


Figure 30. Ann and Brian at the bus stop, waiting for the 22

At the next stop, two men in their twenties get on. They are friends, maybe a couple. Joey is Vietnamese-American, and Gabe is white. They sit down behind me. I listen to them chatting. They are talking about Joey's mobile phone.

Gabe says, "It's actually cheaper than having a landline. If you got one, then we could cut the apartment phone and save money overall."

Joey responds, "I'm the last stand-out. I'm happy not having one. Besides, I can just use yours," he says and laughs.



Figure 31. Joey and Gabe in West Seattle

At the front of the bus sits a man by himself: This is Ryan. He is listening to a CD player and has his headphones on. Even so, the music is loud enough that I can hear it from several rows away. Ryan is happily humming along to the music. He is of large build and wears a t-shirt that probably used to be white. It has stretched out at the neck, and the rings of sweat under his arms are visible. On the seat next to him are several plastic bags; perhaps he is homeless. At the next stop, the driver turns around and tries to get his attention. "Hey, buddy, hey!" Ryan lifts up the ear of one of the

heads phones; the music gets louder. The bus driver says, "Can you turn that down a little? I let you ride, and now show some respect and turn the music lower."

Ryan appears to be annoyed. "I know," he says. "I know. But I just wanted to relax and enjoy the bus."

The driver lowers his voice. "You can, but please, just turn it down a bit." Ryan grumbles, but agrees.



Figure 32. Ryan in downtown in Seattle

In front of me, a middle-aged white couple talks about what they plan to do that evening. "I think we should go over to Columbia City," says Adam. "There is this Italian restaurant that's getting rave reviews on Chowhound."

Rachel sighs. "But that means we have to go all the way back downtown to catch the bus. There isn't anything we can easily get to go cross town. Remember when we went to Rainier Beach? It took us like two hours to get home."

Adam says, "It'll be fun; we can take light rail."

Rachel affectionately punches him on the shoulder and says, "I think you deliberately find out-of-the-way places so you can indulge in your transportation hobby."

As he tugs on the cord signaling to the bus driver that they plan to get off at the next stop, he replies, "What's so bad about that?"

They get up and shuffle up the aisle to get off the bus.



Figure 33. Adam and Rachel in West Seattle

As Adam and Rachel depart, two African American women with a baby take their seats. The older woman appears to be a grandmother or an aunt. She is chiding the younger woman (possibly in her early twenties) about how to hold the baby. They pass the smiling, giggling baby back and forth as they talk about their plans for the weekend.

The older woman, Helen, says, "I think we could go down and visit your cousin; she's been sick. It's two or three buses, but if we don't see her this weekend, then it'll be at least another month."

Eleesha, her niece, replies, "Really? It's just such a long trip. Why can't she come see us? She's the one with the car."

Helen says, "We can't ask her to do that with how she's been. You can come with me or stay at home, but if you stay, then so does the baby. I can't manage her by myself all day."

Eleesha says, "OK, as long as we can stop at the Marshall's before we go. I need to get the baby a couple things."



Figure 34. Helen and Eleesha at a coffee shop in the Greenbridge neighborhood.

In front of Helen and Eleesha sit two men. The man sitting on the inside seat is Shawn. He does not say much—just stares out the window. He shares the seat with Eddy, who talks pretty much constantly. Eddy has something to say to everyone who passes him, even as he continues to talk to Shawn. "I just thank the lord Jesus Christ for giving me a second chance; I really do. Sometimes, I feel like I shouldn't even be here."

“Umm hmmm,” says Shawn. He is older, African American, and slight of build. Although he says little, he listens to Eddy as Eddy continues to talk.

Eddy is younger—in his mid-forties—and Latino. He wears baggy shorts and is sweating profusely. He has a handkerchief that he uses to continuously mop his forehead and neck. “I’m just happy we get to roam around before we have to head back to the house. It’s tough living in that place with same 12 guys to talk to. At least riding the bus, I get to see some of the world. To get to know my new city and check out what’s going on. I’ve lived all over, and I gotta say, I think I’m really gonna like living here. I feel healthier. I think it’s the air.”

“Yeah,” says Shawn. “The air; and I’m sure getting clean helps.”

“Well yeah, of course getting clean makes you feel healthy, but I’ve done it before. I was in rehab outside of Vegas, but it was so hot there all the time, I never wanted to do nothing. But here in Seattle, it just feels like a new start, a chance to get really healthy. I was just praying about it the other day and thanking Jesus for giving me this chance to really change things this time.”

“Umm, hmmm,” says Shawn, listening as Eddy continues to chatter



Figure 35. Eddy and Shawn outside at a Starbucks in the Des Moines neighborhood

Additional participants (from Group 5, the group of homeless riders):



Figure 36 Top left: Louis, Cynthia, Tim, and Stephen

## Introduction

In Chapter 5, I will present the themes that I distilled from my synthesis of data that was collected from the design ethnography that I conducted in the city of Seattle, Washington, in the U.S.A. In Seattle, I spoke with five groups of socially connected people, either family or friends. The groups all lived within the urban boundaries of the city. The results of this design ethnography articulate the particular challenges of transportation among people who do not have cars. In the first section, I will discuss

the issue of transit dependence in more detail and the rationale for focusing on the experiences of those who are transit dependent. I will present rich data from the descriptions that the participants gave of their transportation challenges. This will include videos, stories, and photographs of these participants. First, I will detail how people in this design ethnography used technology, including mobile phones, the Internet, and public access sites. Second, I will discuss how people in the study used transportation to get around and what types of information they needed to do so. Third, I will describe some of the challenges of being transit dependent and how participants attempted to overcome the challenges they faced. Finally, I will discuss the role transportation played in maintaining social connections.

### **Transit dependency**

This design ethnography focuses on the experiences of transit-dependent riders in an urban neighborhood just outside the city of Seattle. I define as transit dependent anyone who does not own a car, whether by choice or by necessity. In the United States, transit agencies often focus on increasing ridership, meaning that they seek to get more people to take the bus or subway. Therefore, the focus of services and information systems that support transit is often on attracting the “choice” audience (Garrett & Taylor). The choice audience could also be thought of as the non-dependent rider. Such a person owns a car, often commutes during typical working hours, and therefore would be driving during rush hour or peak times. There are pragmatic reasons for the transit agencies to focus on the non-dependent or choice rider.

Increasing the number of new riders, or the number of those who are not currently riding or are only riding intermittently, can increase transit use. It can also decrease single car usage (one person per car), thereby decreasing gridlock and positively impacting environmental goals. However, this shift in focus, as Garrett and Taylor point out, is at odds with the increasing numbers of inner-city riders who lack access to other transit options.

The incongruence between transit ridership patterns and subsidy policies has both social and spatial consequences that can potentially reinforce existing patterns of racial, ethnic, and economic segregation. Poor or mediocre public transit service in areas with high proportions of transit dependents exacerbates problems of social and economic isolation. From the standpoint of equity planning, this serves only to decrease choices for those who already have limited transportation options. (Garrett & Taylor).

This shift to attract choice riders has implications for transit services, including a larger focus on fixed rail and light rail projects that connect suburban areas to central cities. It also plays out in the formulation of information systems. This can be seen in the choices of which ICTs (information and communication technologies) to develop and for which platforms. For example, the push to develop mobile apps or applications is more likely to address populations who can afford smart phones and data plans. These audiences tend to be wealthier, and although some fall into the transit-dependent rider category, many tend to be the choice riders—people who are using their ICTs to make decisions about which way to commute (bus versus car.) The central tenet of user-centered design is to focus on the user, but it is not a homogenized view of the user; rather, it requires audience segmentation and prioritization. Therefore, the focus on the choice rider in ICT design often plays out in a similar way to focusing on the choice rider in transit policy. The needs and desires of

choice riders are often treated as higher priorities than those of less resourced, transit-dependent riders. Overlooking or omitting transit-dependent riders' and their needs increases the risks that the systems being designed will ignore their needs.

For this study, I chose to focus on transit-dependent riders for several reasons. First, my concerns are motivated by social justice. Technology has the potential to intervene in a positive way, and by focusing on people in need and understanding their unique perspective, we can help create equitable access to services and systems. Secondly, transit-dependent riders are often expert riders. Due to their prolonged use of and rich experiences with transit, they may have a more nuanced understanding of the ways in which the system does and does not work. I am interested in using my understanding of the strategies and tactics of these experts to show how the transit systems work and how they might be improved for this audience. Third, transportation is a crucial resource to help people access economic opportunities and social networks. As the focus of this dissertation is to look at constraints, this design ethnography provides the opportunity to look deeper at a constraint that is often overlooked.

Transit dependence assumes a variety of forms. The central component of transit dependence is the lack of ownership of a vehicle. According to the U.S. Department of Transportation's Federal Highway Administration, the number of vehicles per capita in the State of Washington is 0.87. That data indicates that most people either own or have access to a vehicle. But many do not. Those who do not are dependent on public transportation to get around. People are dependent on public

transportation for a number of reasons. They may not own or have access to a reliable vehicle, or they may not have a driver's license. Looking deeper, there are a variety of reasons people do not own cars or have licenses. In this study, I asked our participants about vehicle access, about their reasons for relying solely on public transportation, and about whether or not they had access to a private vehicle. I specifically recruited participants who did not own cars.

The recurring characteristics of transit-dependent riders can be divided into two main categories and four overlapping subgroups (see Figure 37). The two main categories focus on the reason people are transit dependent—that is, on whether they are transit dependent by necessity or by choice. A person is considered transit dependent *by necessity* if that person does not have the option of owning or using a car. *By choice* means that the person could own or use a car, but chooses not to. The overlapping subgroups include those people who are poor, unlicensed, thrifty, or whose choices are directed by environmental concerns. I believe that these classifications would be applicable in other locations if the study was repeated; this assumption, however, needs to be verified.

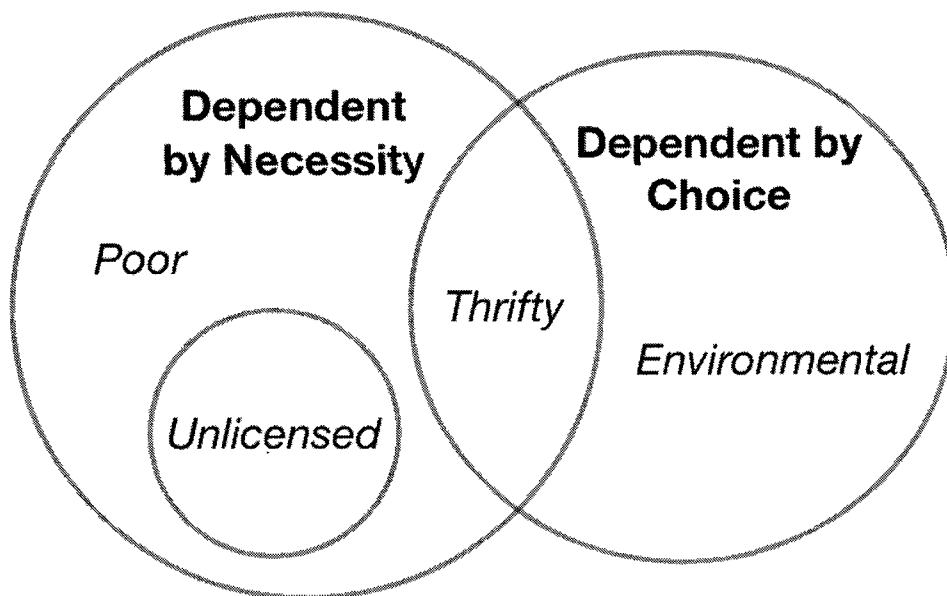


Figure 37. Transit Dependent Riders

The transit dependent *by necessity* category is made up of two subgroups: Unlicensed and Poor. People did not have licenses for various reasons. Some, for example, were not interested in driving; others had had their licenses revoked. As Rachel said, “I don’t even know how to drive.” Eddy had lost his license due to unstated legal issues, but he mentioned that getting back his license was an important goal.

People in the Poor group did not drive because they could not afford to drive or own a car. Many of the people who participated in this study lived in poverty. Some of these people were homeless, some lived in rehabilitation group homes, and others were low-wage earners who struggled to get by. In all six of the group interviews, the issue of cost was a main factor motivating people to take the bus instead of drive. Costs associated with car ownership or driving included the high price of gas and the cost of parking in downtown Seattle. Some people also mentioned the costs associated with

getting a driver's license, keeping the car registered, and being able to afford car insurance.

I see more and more people taking the bus. With parking and gas being so expensive, it's easier to get around by bus. –Cynthia

Intersecting the two main categories is the Thrifty group. Whereas none of the people in the Poor group could afford to own a car, people in the Thrifty group thought cars were expensive luxuries and a hassle. The people in this group preferred to save money for other things. Several participants in the Thrifty group were students. They intentionally chose to ride the bus instead of own a car to save money.

People who have cars never have money to do anything. They don't have any left over money. We know it goes to gas, insurance, license, and the rest. I like driving; I'm just taking the bus right now. It's not for environmental reasons; it's just not in my budget. –Gabe

Finally, the Environmental group saw transit dependence as an extension of their environmental values. These people could drive if they wanted to, but preferred to take transit because they believed it was the right thing to do. Financially, the Environmental group was the least economically constrained.

I ride the bus because it reduces my carbon footprint. If I were to drive, I'd prefer a hybrid car. I've always been interested in the environment, ever since college. –Adam

This environmental reason for taking public transit would probably occur in any major metropolitan area in the U.S. It is my assumption that in a city like Seattle, which attracts people who pride themselves on care and concern for the environment, it is common for environmental values to be the reason people choose to ride. However, Seattle is a city in which most people own cars. Members of the Environmental group talked about how their car-driving friends perceived them. They also mentioned that they had friends who purported to be committed to environmental

causes, but who owned cars; the participants in the Environmental group viewed this as a contradiction.

We're like nomads. Our friends will reach out to us and ask us questions about how to get somewhere, because we do know the bus. It's funny how much people pity us for taking the bus. We don't have other friends who take the bus as much. Most other friends drive cars, even those who are green. Like my one friend who is a vegetarian, but owns a car.

Classifying the transit-dependent riders into these categories and groups shows the differences and similarities among riders and their motivations for riding. However, these categories should not be seen as static. As the diagram shows, the groups overlap, and membership in any one group could change. In addition, if you imagine an even larger circle of car-drivers, you would see their membership also change when impacted by certain factors. For example, economic set backs could make car drivers belong to the Thrifty or Poor groups. Losing one's license for legal reasons, such as a driving-under-the-influence or probation violation, could also make a person suddenly become transit dependent.

Understanding the causes and motivations for transit dependency is helpful to understand the remaining themes in this section. Taking transit by choice, rather than by necessity, yields a very different experience and set of expectations of the transportation system. An important aspect of being transit dependent by choice is the knowledge that one has other options: If a person in this category were to find that taking transit had become a burden, that person could resort to some other means of transportation. By contrast, being transit dependent by necessity includes the realization that the only option is public transportation.

## **Technology use and access**

Because one of the areas of focus for this study was to consider how ICTs could be better designed to meet the needs of resource constrained populations, I investigated how participants accessed and used technology. As part of this investigation, I asked participants what types of technologies they used and why. I also observed several public access sites. This section details the themes related to the use of mobile phones, the Internet, and public access sites.

### **Mobile phones**

When asked about using technology in their everyday lives, all participants indicated that they used a variety of different technologies. The most ubiquitous and the most valued of these technologies was the mobile phone. This finding mirrors findings from the developing countries: People in low resource environments rely more on mobiles than on the Internet (see the Kyrgyz design ethnography in Chapter 4 and (Kolko, et al.)).

Almost all the people we interviewed for the study, including those living in extremely poor conditions, such as the homeless, had mobile phones. In addition, while riding the bus, we observed the role of the mobile phone as a way to connect with others, whether by texting or calling. The mobile phone was also used for entertainment or distraction while riding. We observed people using a variety of phones while riding, both smart phones and older or more basic models.

In the interviews, we asked participants if they had mobile phones, the types of phones they had, and what they used their phones for. Table 4 summarizes the ownership and features of mobile phones.

Table 4. Summary of Mobile Phone Ownership and Features

	Owned	%
Mobile phones	12/15	83%
Smart phones (w/ data plans)	5/12 (3/5)	4% (60%)
Application enabled phones	2/15	13%
Landlines	6/8	75%

While most participants owned mobile phones, very few had landlines (meaning traditional phones) in their homes. These numbers may be slightly skewed, because five out of the 15 participants were homeless and therefore would not have had landlines. Even so, this data represents a larger pattern of phone ownership in the U.S. The latest statistics show that 26% or one in four Americans have only wireless phones and no landline phones. (Blumberg & Luke).

I'm kind of a hold out. I didn't get a cell phone until I moved here. It's cheaper to talk long distance with my family—way cheaper than the old landline. We got rid of that to save money.  
–Gabe

Other participants had home phones, but only kept them for emergency purposes.

I'd like to get rid of our landline, but my wife likes to have it in case of an emergency. –Adam

In addition, we observed that while five of the participants had smart phones, only three of them had active data plans, which typically cost \$60–\$70 per month. Data plans were used intermittently by some: They had pay-as-you-go plans or turned

on the service when they could afford it. This represented a trend, which we will detail more in the Internet section, of the intermittent use of pay-for-technology services.

I got the Blackberry. I don't need to bother anyone for anything when my service is on. I put the address on and boom, it gives me everything...Need to find store, boom, put it in address, boom, put it in my contacts. It's awesome. For \$69.00, I get everything. It's totally worth [it]. It's like a mobile office. –Eddy

As participants mentioned, their access to data plans depended on their current funds. It was seen as valuable to have a device that could access the Internet and potentially have a variety of features, even if these features were not always activated due to cost. Even though some participants had smart phones, only two had application-enabled phones like a Blackberry, Android, or iPhone. These two participants had Blackberry devices, but did not typically download applications. This leads me to speculate that other application-enabled devices, such as iPhones, may have price points that are too high for this audience. In addition, because iPhones do not work without data plans, they do not support intermittent or pay-as-you-go use. They may be less attractive to resource-constrained populations as a result.

I don't have a fancy phone. I'm super cheap. I had a Razr, and it broke. Now I have a Samsung; I don't really like it. I have big fingers, and the buttons are tiny. –Gabe

For some, owning or keeping track of a mobile phone was difficult. One homeless participant talked about how he tended to lose things.

With my bipolar disorder, I don't have a lot of money, and I lose things. I had one in my locker, but it was gone. I don't like to carry a lot of things. –Louis

For other participants, who were currently homeless, a mobile phone was seen as a necessity. It was the only way that people, especially family, could get a hold of them. The following discussion took place with the group that was homeless.

Right now, in the situation that some of us are in, where you are not always going to have 50 cents, and there isn't always a pay phone around, a cell phone is really important. Sometimes, your family needs to get a hold of you. –Ryan

I used to use the phones at shelters, but they only have the phone out [for people to use] at certain times of the day. If you need to get a hold of someone, you need to wait for them to get in and for the phones to be accessible. –Cynthia

There are no incoming calls in the shelters or at phone booths, so cell phones are helpful. –Stephen

If someone wants to call me at 6:00 a.m., [cell phones] make it easier. –Ryan

Participants used their mobile phones for a variety of activities. How much or how often a person used the phone depended on the types of things he/she could do with it. Most participants in our study frequently sent SMS text messages. As Eleesha, the 23-year-old woman, said, "Texting is like breathing." Some participants chose to send a text instead of making a phone call. They mentioned that they preferred to text because it was faster and cheaper.

I text family and friends. Texting is convenient. Calling wastes a minute for a two-second call. I don't use the phone until 9:00 p.m. when the minutes are free. So, I text during the day and then arrange a time to talk in the evening. I think last month I had over 1000 texts. –Eleesha

Another theme that emerged around text use was that of respect. Texting was seen as a way to be respectful of other people's money and time. The person to whom you were sending the text could choose to respond or ignore it. Texting was therefore seen as less of a disruption.

Sometimes, they are unavailable over the phone. It's faster and easier: cut through the hi-how-are-you, meet me here, time, ok, bye. Sometimes it's faster, more convenient, if your friend is at work or unavailable or sleeping. –Gabe

Sometimes, you don't like to answer the phone, and a lot of people don't check their voice mail. With text, you know you got the info. Gives you more time to think about what you want to say. Some people won't answer the phone, but they'll answer the text right away. –Brian

Some mobile phone users used the SMS function to query Google for information. Having texted queries to SMS 466453 or GOOGLE, users received location-based answers, such as weather forecasts or directions to a destination. Two participants said that this SMS service adequately substituted for mobile web browsing.

I text Google. I love texting Google; it gives me the business listing I need. I love that. It just works –Joey

I like to text my family and friends. I text people in the ministry. I also sign up to get texts from my teams, from the Broncos and Rockies, so I can keep up on them –Eddy

Participants also mentioned using text messages to coordinate locations while traveling. They mentioned texting friends to find out which bus the friends were riding. One participant described using the unique four-number code on each bus to coordinate with friends who might be taking the same route (see Figure 38, below).

I text my friends to find out where they are. I text, "What bus are you getting on? What time does your bus come? Where does your bus let you off?" I also use those numbers on the bus, not the bus number, but the four digits that are different on every bus—that helps your friends find you. – Eleesha.



Figure 38. Bus showing the unique four-digit code (in yellow) that participants used to coordinate location via text.

Some participants also mentioned that they used their data plans and web-enabled mobile phones to substitute for Internet access.

I have Straight Talk 45 prepaid minutes, so I use the web. I look for anything: cars, apartments, jobs... I also email and send pictures from here to my parents. –Louis

The Internet on the phone is good enough to check e-mail. It's a little slow, but it works. –Ann

## Internet

Each participant in the study mentioned that he/she accessed the Internet occasionally. Few, however, had service at home, and if they did have service, it was intermittent. Typically, participants accessed the Internet wherever it was free. For example, some people lived in an apartment building that offered a free wireless network. In other places, people “borrowed” unsecured networks from their neighbors. While many participants owned computers and laptops, Internet access was

considered a luxury. Computers were often used for playing games. If a free wireless network was not available at home, people accessed the Internet from schools, libraries, and shelters. Some users accessed the Internet with their mobile phones.

Participants used the Internet for a variety of things, ranging from entertainment to keeping in touch with friends and family to doing tasks related to their livelihood and health. In terms of entertainment, the Internet was used as a way to access television shows or music, both on the phone and the computer.

I like that I can get TV on my phone. I might watch it while waiting at the bus stop. . . . But it's great for the kids. They usually use it. – Ann, motioning to her LG smart phone.

I watch music videos or things on YouTube. I listen to podcasts or stream shows and connect them to the TV. –Brian

Most participants used email and Facebook to stay in touch and communicate with family and friends.

We share what we call Bus Stop moments on Facebook –Adam

Some participants used the Internet to complete tasks, such as paying bills, looking for work or housing, and getting transit information. They also mentioned that it is a way to keep in touch with medical providers.

I Google a lot, for jobs or homes. A lot of time, I'm looking for housing. I give my email address to my doctors in case they want to send me something. –Cynthia

Participants mentioned using the Internet to look for work. One participant mentioned that job-hunting on the Internet represented a burden, because most employers require that applicants fill out online applications, but she had no access to the Internet at home.

When I'm looking for a job, most of it has to be done online. Lots of places don't even accept paper applications anymore. It's annoying, because we don't have a computer, so to apply, I

have to call a place, then go find a place to get online, then fill it out, then go back and keep checking. –Eleesha

### **Public access sites**

As mentioned above, participants who did not have access to the Internet where they lived often sought out places where they could get Internet access for free. The places that were most often used by people to access the Internet were libraries and community centers. During the study, we observed some of these places and talked with the staff. One librarian in a local branch library in White Center mentioned that the computers were almost always full, and sometimes patrons had to wait. When visiting these sites, I noticed that the computers always tended to be full. Sometimes the libraries or community centers were busy places, bustling with people. Other times, the only people besides the librarians were the people using the computers. Below is a description from my field notes of one of the smaller libraries.

*There are two rows of computers facing each other, 14 computers in all. They appear to be standard, older looking PCs. Two of the PCs are strictly reserved as reference, for looking up books in the library. These are the only two that are not currently occupied. The library is quiet besides the typing and clicking of the patrons on the computer. It is Friday afternoon in the summer. Many, but not all, of the people using the computers are teenagers. There are also older men and women here, too. It is quiet, minus the clicking of the keyboard. I browse the shelves of the library, looking at the books. I walk through the fiction, the children's section, history, and periodicals. There is no one here. No one browsing but me. Everyone else is using the computers in the middle of the library. It looks like it was organized to make the computers the center of the room, with all the old, neglected books standing watch. When I walk past the computer programs, it seems like there are two main activities going on: socializing and job hunting. A lot of the teens are using Facebook. I see an older man slowly type a message in Yahoo mail. I get a glance of some people looking on job sites. One woman is reading the Seattle Times online.*

For the transit-dependent riders in this study, technology was an important resource. Mobile phones were perceived as the most crucial of technologies, followed by the Internet, which was seen as a useful tool for staying in touch with others, accessing entertainment, looking for jobs, or staying in touch with health care

providers. The Internet was considered useful, but access to it was intermittent, and the participants relied on free ways to access it, such as open wireless networks or libraries and community centers.

### **Transportation use and information needs**

As part of the study, I wanted to learn more about the experiences of those who take the bus, including their reasons for travel and how they made choices about getting to the specific destinations. In this section, I will expand on the three categories in this area. First, understanding where riders go and for what purposes helps reveal the crucial role transportation plays in accessing resources. Second, as mentioned earlier, transit-dependent riders often tend to be expert users due to the expertise they have amassed from taking public transportation regularly. Therefore, learning about the types of information they need when they travel can reveal opportunities for developing and offering information that would be helpful to all riders. Third, part of understanding people's information needs and choices includes understanding the priorities of riders. What factors did riders privilege over others and what informed the choices they made when it came to transit options?

Transit-dependent riders rely on transit to get them where they need to go. This issue of need reveals transportation's position as a conduit to crucial services, resources, and opportunities. Participants in the study used transit to get to and from work and to access employment opportunities. I will discuss this issue in more detail later in the section about challenges.

I take the bus out to Seward Park. I mow lawns out there, so I take the bus –Stephen

Transit is also the primary way that transit-dependent riders connect with their social networks. Again, this finding will be explained in more detail later in the chapter. The poor riders in the study discussed how often the purpose of travel was to attend medical appointments. There is a clear link between poverty and problems with health. The poor tend to have higher rates of chronic diseases and more severe complications related to health (Woolf, Johnson, & Geiger).

I take the bus to a doctor's appointment at least once a week. –Ann

I take the 26 [bus] to the Cancer Care Alliance. I also sometimes take the Ferry to visit my daughter on Whidbey Island. –Cynthia

It is clear that medical appointments were a constant fixture in some of our participants' lives and that without access to transit, they would not be able to get the care they needed. Other participants talked about how transit was important to access social services, such as food stamps or job-search services.

Beyond the need for key services, transit functions to provide access to opportunities for entertainment. Several participants mentioned that they often took the bus for fun, as a way to explore the city or new neighborhoods.

I take the kids to the YMCA on Alaska. We go at least five times a week [in the Summer]. –Ann

I'll take a bus to wherever it will get me: Ride [the] bus to the last stop just to see where the heck it is, and then walk around the area. –Adam

I jump a bus to get out of Seattle, just to get lost and get out of the city. I'll enjoy the day and come back later. –Tim

People who depend on transit to get around tend to be quite savvy about the existing transit system. This was the case with our riders, who tended to know where to

go for information and how to get it. Participants in the study primarily relied on official sources of information, such as the King County Metro web site. (King County Metro is the agency that provides bus service in and around Seattle.)

I use the Trip Planner (on King County Metro's website) to figure out routes. I like it; it's nice. – Eleesha

Several participants had memorized the phone number for King County Metro's help line; others used printed copies of the schedule.

I find out the schedule by calling 553-3000. It's an awesome service; Metro runs that. –Eddy

I use the paper schedule; it's OK. I keep it at home. We live at a community environment: There are 12 men in one house. We have a whole stack of schedules. –Shawn

Some riders, especially those who spent a great deal of time in downtown Seattle, visited the information booth downtown to find out about routes and services. In addition to official sources of information, some riders—especially those who seemed to be more tech savvy and who used more online services—used other online sources of information, such as Google Transit.

Transit-dependent riders had specific priorities and preferences when it came to choosing which buses to ride and which routes to take. For the participants in the Poor or Thrifty categories, cost was a primary consideration when they made decisions about routes. Many riders, mentioning recent fare increases, were concerned about being able to afford to take the bus. As a way to save money, riders chose routes that had lower fares, although some of these cheaper routes were not the most direct. Other riders timed their commutes around the off-peak times of the day, which allowed them to save \$0.25 per ride.

The bus is expensive. It's \$1.75 for peak and \$1.50 for off peak. It costs \$3 to get to Tacoma, and they don't accept metro transfers. –Eleesha

If we had to go to the emergency room, I would call a taxi, because insurance pays for it. –Ann

The thing with Sound Transit (the regional transit provider), they travel to so many zones—the drivers are usually lazy; they overcharge you: they are supposed to change it to another zone. The zones are stupid. They ask you how far you are going. They don't change their zone back; they end up charging you more. They consider 25 or 50 cents to be nothing. –Gabe

Another important priority for all the transit-dependent riders in our study was reliability. Transit-dependent riders voiced frustration over buses that arrived late or not at all. They mentioned being frustrated about buses that would not stop because they were too crowded.

The bus drivers will not wait. They'll slam the door in your face. In Denver, if they see you running, they stop. Here, the drivers will drive off. You can be at the corner with the light red, and he won't let you on. –Louis

You have to adjust your schedule around the bus, and there are also lots of inconsistencies... It's just for you to get somewhere by 9:00 a.m., you have to get the 7 o'clock bus. –Ryan

I missed an appointment, 'cause the bus will inexplicably disappear. I'll tell the next driver, it's not like the bus evaporated. They laugh or say it's not their problem. –Gabe

The distances that riders had to walk to a bus stop also influenced their decisions to take certain buses. Some riders, especially those who were older or who had health concerns, feared that long walks could harm their health.

For me, it depends on how far it is to walk. My cutoff walking distance is around three blocks. After that, I have to take a "Senior Citizen" break. I don't want to over exert myself. –Helen

Others riders preferred to have the flexibility of walking a longer distance if by doing so they could catch a quicker bus or save money. The information services they used, like the web site's Trip Planner, did not always give riders the option of walking a longer distance to save time or money.

Sometimes, the Trip Planner tells you to go downtown and transfer, where I can just walk under the bridge and get a bus faster.—Adam

Other information services also had limitations and did not always help riders make informed decisions about possible transit options. For example, several riders used Google Transit, but found that its information was not always correct and did not take into account the topography of the city. For example, a bus stop might be within walking distance, only half a mile away, but up a steep hill. Participants wanted the information services they used to reflect knowledge of the terrain.

Sometimes Google doesn't have a clue.... Brandon Street is very steep; I can't walk up it! —Rachel

A handful of riders chose routes based on how scenic they were, such as whether they had a view of the city, water, or mountains.

I like taking the 54 because it has a better view. It goes down by the water. —Brian

Other riders mentioned that taking a bus with air conditioning was important on a hot day.

The heat makes it miserable; on a hot day in the summer, you feel the heat. —Louis

Riders mentioned the need for real-time, location-based information, the kind of information that is provided for free by OneBusAway, a website and mobile phone application created by students at the University of Washington (Ferris, Watkins, & Borning, 2010). Although the riders in our study articulated the need for the services that OneBusAway provides, none had heard of the tool or used it before. Later in this chapter, I will speculate on why participants had not discovered this service and how it could be made available to them.

Examining where riders need to go and why helps demonstrate the important role transit plays in their lives. The participants in our study were savvy when it came to finding information about transit; however, this information did not always meet their needs or provide the flexibility they required to make decisions about routes that matched their priorities of saving money or saving time. Finally, riders hoped for more real time information about transit, but were not aware of a popular tool that would have given them access to the information they needed.

### **Challenges and constraints of using transportation**

One focus of the research was to understand the challenges that people who are transit dependent face when using transportation and how these challenges impact them. This section illustrates some of the challenges people in our study faced when relying on transit as their primary source of transportation. Focusing on challenges can help reveal opportunities to develop or redesign information and communication technology in order to provide meaningful solutions. In this section, I have synthesized the challenges into a variety of themes that include the issue of loss of opportunity, fare avoidance, safety and fear, and respect. Each of these concerns reveals part of the picture of daily life for people who are transit dependent in the Puget Sound region.

Transit-dependent riders experience a variety of limitations due to their complete reliance on transit. The most crucial of these limitations occurs when the lack of transit options prevents people from taking advantage of opportunities for earning or saving money. As mentioned in Chapter 2, reliable access to transportation

is a key to alleviating poverty. Evidence collected in this study supports this link between lack of reliable transportation and the entrenched realities of poverty. The clearest examples of this loss of opportunity are seen in relation to housing and jobs. People who do not own cars must choose housing and job options that are accessible via public transit or within walking distance. As Helen states below, the lack of transportation options can prevent someone from saving money on housing.

I wanted to go look at an apartment in Kent. It was cheaper than my current place, but no busses went out there. The closest bus was 4 miles away. –Helen  
In a snippet from Eddy’s video diary (available here:

<http://www.youtube.com/watch?v=F8UQVwUepcY>), he talks about the challenge of getting around. He waiting for a bus in the city of Federal Way, which is south of Seattle. He speculates on how long he has to walk to reach the bus and how long he has to wait, and he wonders about access to jobs in this area (see Figure 39).



Figure 39. Eddy talking about waiting for buses in Federal Way (still from video diary)

People who are transit dependent must choose housing options based on their proximity to transit. Most participants in our study talked about how their primary criterion when choosing where to live was how close the housing was to transit.

The bus stops always right in front of our house, which is great. Ann

Having the bus line by our house determined where to buy. We've lived there two and a half years. –Rachel

I used to live in Georgetown. The place I lived—I chose it because of the bus line. –Adam

Choosing a place to live on the bus line was important. I rode out here just to see how many bus lines there were. The 54, 22, 128: they all go where I need to go. Choosing a place on the bus line, the actual neighborhood, wasn't the first choice, but being able to get to school was important. –Joey

Opportunity costs also applied to jobs. Some employers require a driver's license, even if driving is not part of the job. Others are located in places that are either difficult or impossible to access via transit.

You have to kind of turn down jobs through temp agencies or regular jobs because of the transit system, because it didn't get there, or you can't get there by a certain time; or I could get there, but couldn't get back. –Eddy

Even when transit is an option for getting to work, buses that are unreliable or late can cause riders to lose their jobs. Riders in our study were often late to work or appointments because of bus delays or a lack of bus routes to their destinations. The delays and lack of service contributed to tardiness, which cost several riders their jobs. This was generally the case for riders who worked minimum wage and low-skilled jobs.

Usually, the bus is late, you know. I used to work for the school district down here, and, um, sometimes the bus makes me late. Then I have to call in and let them know I'm late; but sometimes, I forget my phone at home in a rush to get out of the house and can't call it, and I'm late. Sometimes I get to work, and I'm late. It cost me a job one time. –Shawn

I've seen buses passing up my stop; this almost put my job in jeopardy a couple of times –Brian

I lost a client because of Metro. There was a bus that just didn't appear, and then the next one was considerably late. I had to call and cancel my appointment, because it was so late. They weren't interested in having someone canceling appointments. I wound up losing that account. –Gabe

The preceding challenges summarize the theme of opportunity costs—in the realm of employment and housing—for transit-dependent riders. Transit enables those who do not own cars to get around, but it simultaneously forecloses opportunities related to housing and jobs. Additionally, the unreliability of transit often leads to job loss among those who are employed in low-wage or low-skill jobs.

In some cases, however, transit-dependent riders had ways to make the transit system work for them—even when it was not ideal. In our study, participants talked

about instances when they took extreme measures to get where they needed to go. These situations occurred when the transit system did not run, such as late at night and in the early-morning hours. Other examples of extreme measures occurred during bad weather, when snow closed roads or interfered with service. One rider, for example, biked a long distance to work because no bus accommodated his early-morning shift at a fisheries plant.

When I first moved here to Seattle a couple months ago, I got a job at Custom Seafood and had to be there at 4:30 in the morning, so it was hard to find a bus; so I had to start biking 50 miles into the downtown on the Green River trails, starting riding my bike. Seems like there could be some all-night service to the main streets. On some main streets, a 24 hours bus would be awesome. Seems like Pacific Highway is such a busy street it should be ... Downtown should be more accessible from the suburbs. –Eddy

He later mentioned that this commute was one of the reasons his employment at the plant ended.

Another participant talked about his commute home from a late night job across town. Since the cross-town buses stopped running earlier, he had to take a bus downtown and then back out to the suburbs. The end of his trip was a long walk up a steep hill.

For the jobs that I have, I end up working in the evening and get off late at night. The last bus is at 2:00 a.m. I try and catch that bus, but have to get all the way downtown and then back over this way. At the time, I was living in Kent and working out here in Des Moines. I had to catch a bus, but the bus out here stops running early. I got off at 11:00, and I look at the schedule, and the bus stops running at 10:30, so I would have to go all the way downtown to get an express bus at night. I'd have to wait an hour or two downtown, then the express bus takes me to Kent. It would be so late that I'd miss the last bus up east hill and have to walk up a hill late at night. This was every night for three years. It was rainy and cold; it was a struggle. That's a mile up hill. –Shawn

These instances of taking extreme measures show the great lengths to which transit-dependent riders go to make the system work for them. In both cases above, the

riders were in the poor group, and they took these extreme measures out of necessity: to get to or from work and stay employed. The link between poverty and transportation is seen in these examples, especially in the case of Eddy, whose employment eventually ended because of this commute.

As mentioned previously, cost tends to be the primary concern for transit-dependent riders, especially those who are transit dependent by necessity due to issues of poverty. Participants in the interviews discussed the ways in which the costs of fares impacted them. They also shared strategies they used to avoid paying full fares. Fares on buses in Seattle have increased over the past several years. Metro has increased fares four times in the past four years. In addition, the transit agencies in the region, including Sound Transit, the regional transportation provider, plus the surrounding counties of Pierce, Snohomish, and Everett, have introduced an electronic, reusable fare card that works throughout the region. The ORCA card (One Regional Card for All) requires riders to have a balance on their cards or to have a monthly pass. Riders must swipe their cards each time they ride. In most areas outside of King County, the buses have done away with paper transfers, both to save costs and to encourage the adoption of ORCA. This transition from cash fares to the card has implications for poor riders, which will be discussed in more detail in the *Analysis* in Chapter 6.

In our study, the economic costs of transit were a concern for all riders. Several participants mentioned how they were surprised by the cost of fares and by how much the fares continued to increase. In addition, they talked about how the differences in fares, even in small amounts, can significantly impact their budgets.

If you want to promote ridership, it's incredible how much people have to pay.  
–Adam

They should lower the bus fares. It's \$1.75 for peak, off-peak \$1.50. To get to Tacoma, it costs \$3, and they don't accept Metro transfers. Too much money to use the ORCA card, since you can't use transfers. I don't know many people using ORCA card. –Eleesha

Some drivers are nice, some are stingier, if you can't afford an extra 25 cents. –Joey

A number of participants in our study talked about using discounted fares or getting help from charitable organizations to pay for fares. Oftentimes, participants discovered these discounts through social service organizations or from their doctors or medical providers. In some cases, they learned about these discounts from their peers. Once aware of discounts or fare support, participants were savvy about taking advantage of them.

I have a reduced fare permit for disabled fares. My doctor told me about it. They even gave me the paperwork. I had to fill it out and take it downtown to get my disabled fare card. –Ann

When I was in school, I had a student card. The school handed out the cards if you live more than two miles away, because they took away the school buses. I'm pretty sure they still do the passes. –Eleesha

I'm having problems getting my disabled bus pass. The criteria on the paperwork is not the same as being eligible for disability. It's taking a long time to get disability. But I think I have to take disability award letters directly to Metro. –Helen

I know that kids ride free on Sunday, which is nice. It's great when you don't have extra money and you want to go do something. –Ann

Participants also relied on charitable organizations or social service providers who gave fare support for people in poverty. Two participants spoke of a non-profit organization called Hopelink (<http://www.hope-link.org/>), which gives riders ORCA cards loaded with bus fare so they can get to doctors' offices and medical appointments.

Hopelink helps people who have medical coupons to get bus passes. They will send a cab if you have an emergency or need to get a hospital, and for the return trip home. I heard about Hopelink from DSHS (Department of Social and Health Services) or maybe from someone at the doctor's office. A lot of people use them. They will send a pass if you have a kid or if you have to escort someone. We used it when we lived in South Park and Eleesha hurt her leg. –Helen

I deal with Hopelink on disability. I go to Harborview [hospital] twice a week and get off in the [free] ride zone. They put money on my Orca card for me. Next month, I go back to Harborview for physical therapy and for my liver. They'll put money on my ORCA card. – Stephen

There was a Seattle Initiative program for jobs, and I was given a bus pass every month. DSHS gives you a bus pass if you're going through training or schooling. Neighborhood house gives you tickets if you need them. –Helen

In addition to saving money by using sanctioned discounts (such as disability permits or passes from charities), several riders spoke of practicing fare evasion. For these poor riders, fare evasion or avoidance is a part of life. Interview participants spoke of the different strategies they used to avoid paying full fare. While riding the bus during the field study, our team also noted a variety of practices that effectively allowed riders to avoid paying the fare. The strategies for fare avoidance ran the gamut, from paying less than full fare to not paying at all. In the Seattle bus system, fares are staggered by zones. There is also a Free Ride zone in the downtown corridor. When you board a bus in the Free Ride Zone in downtown Seattle, the fare is collected when you disembark. This Free Ride Zone is often cited as one of the ways that the system supports fare evasion. People get on downtown, and then, when they get to a destination outside of the free zone, they disembark, and the driver has little recourse. Fare evasion is a phenomenon well known to King County Metro, and the agency estimates that it loses up to \$3.4 million per year, or 2.4% of total revenue, because of fare evasion (*Report on Fare Evasion on Metro Transit*).

Fare avoidance, we observed, was both varied and prevalent. Some riders paid an insufficient fare, while others jumped off the bus without paying anything. Some innovative riders saved their expired transfer tickets to reuse in the future.

On the King County buses, when riders pay cash, they are given a transfer ticket (see Figure 40). These transfers are good for another ride on a King County bus. The colors of the transfers change from day to day.

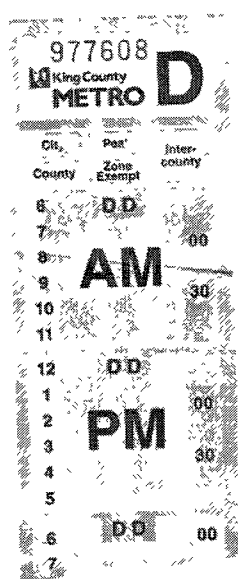


Figure 40. Picture of a King Count Metro bus transfer (Photo by flickr user underdoug, used with permission)

Typically, the length of time for a transfer is up to two hours. However, sometimes the length of the transfer is shorter or longer. Riders used transfers in a variety of ways to avoid paying for a full fare.

I save transfers. Every color, every letter. I learned how to do it in middle school. Then, I text or call someone to find out about the transfer [color of the day]. I have between 20 and 30 of them in my collection. I have a friend who has a sandwich bag full of them. –Eleesha

Eleesha related that the strategy of fair evasion, which in her case was the reuse of transfer tickets, was a practice she learned from peers. As she revealed in the study,

fair evasion was practiced by many people she new. This practice therefore had the approval of this particular peer group. It was something you could do to get by.

You can use a transfer all day long; [the bus driver] ain't gonna say nothing. You just walk real fast. –Helen

Helen's quotation reveals the driver's lack of ability to prevent fare evasion. The driver, as she described in this situation, is powerless to prevent the evasion. In other scenarios related by other riders (which I will detail later on), the driver was more of an enforcer of the rules— one who possessed the power to allow or not allow the rider to ride.

In addition to reusing transfers, some riders made choices about how to use their time. Such decisions were based on how much time was left on the transfer. They also used the transfers themselves as proofs of payment. A transfer was seen as evidence to make the case for a free ride if a bus was running late.

If you get a transfer for a long period of time, you get to do something else, like spend more time downtown. It doesn't dictate what I do, but it influences. Unless the bus is late, then I'll show them the transfer and say, 'Hey, the bus was late.' Usually, I haven't had to pay. –Gabe

Although the King County buses accept transfers, other buses, like the Regional Transit provider Sound Transit, did not. This caused difficulties for the poor riders.

Metro buses, they take transfers, but Sound Transit doesn't take transfers anymore. You have to have cash. You want people to board the bus and ride it, why don't you allow the transfer? I was down in Auburn, and they said, 'We don't take transfers.' I spent my last two dollars to board my bus, and I had to call my daughter to pick me up, because I couldn't get there from here. –Tim

Tim's story reveals the impact of fares on the poor as well as the cost of not supporting transfers outside of the Metro Bus system. He only had the exact change

that he had anticipated needing for the bus, and when the price did not match his expectations, he was stranded and had to call a family member for help.

Participants mentioned that they deployed several techniques to avoid paying full fare. Sometimes, they contrived to pay only part of the fare; other times, they paid nothing. Several participants mentioned that they usually were honest with the drivers, appealing to their compassion. Participants said that most drivers asked them to pay what they could afford or, if the riders were respectful, the drivers would allow them to ride without paying.

From what I was told (by a bus driver), they can't refuse anybody getting on the bus. As long as you tell them you don't have the money, they'll get you to where you want to go. But they won't give you a transfer. –Helen

Other drivers are more friendlier, you know. They let you get on the bus, even [when] you don't have the exact fare or you didn't have any fare at all. –Shawn

I have drivers tell me to put in what I have. I have a lot of that. I don't have the fare, but I need to get there, so they say, 'Put in what you have.' –Louis

I would say that nine times out of 10, [the bus drivers] let you on and tell you, 'Just put in what you have.' –Cynthia

When I get on, I talk to them. I let them know [that I don't have the fare]. Some are mean, and some aren't—it depends on the driver. Some don't want to; some say ok. –Louis

Maybe a bit more consideration. I know that the system is not a charitable organization, but if someone just started a job, and they don't have bus money, I'm not asking to ride for free all the time. Be considerate of a person's situation. –Eddy

I had a little job in Tacoma. The prices were different; I didn't have enough money. It was one of those busses that takes you to Tacoma—different line. It's the Puget Sound buses (Sound Transit), not Metro. The price is different, and the guy let me go, so I asked for a transfer, he said no, I couldn't. He let me ride, but no transfer. –Shawn

All of these quotations illustrate several points. First, paying what you can afford was an acceptable way to negotiate a ride when the rider lacked the money to pay full fare. While this was not an officially sanctioned policy of the transit agency, this

practice was revealed by many of the participants in the study. Second, the bus driver had the final say in determining whether or not a rider would be allowed to ride. Third, several poor riders felt that being open and honest with the driver was a helpful tactic when negotiating a pay-what-you-can fare.

Another practice that one participant mentioned was paying for a lower fare even if you did not qualify for it. Eleesha, a woman in her early twenties, who often asked for and received the youth fare, which was supposed to be for riders aged 17 and younger. In an entry from video diary entry, we see Helen, her bus companion, talking about the amount she and Eleesha paid for the fare (see clip at <http://www.youtube.com/watch?v=9e7drnFML4>). She states that Helen paid .75, but does not reveal that this was a discounted fare (see Figure 41).



Figure 41. Video still from Helen and Eleesha's video diary talking about fares

As shown in this section, poor riders struggled with the cost of public transportation. They indicated that they would like to see cheaper fares, and they stated that the rising cost of fares was a burden. They went to considerable lengths to save money on transportation, whether by choosing particular routes, such as taking longer but cheaper routes or walking further to get a cheaper bus, or by using sanctioned fare discounts or fare evasion. Strategies for fare evasion included paying what you can or disembarking without paying. Paper transfer functioned as a way to negotiate more time or “to game” the system.

When riding the bus, the people in our study recounted stories about how they had worried about their safety. These situations occurred in a variety of cases related to transit. For example, when they were waiting for the bus at night or when they were alone in an unsafe area, participants worried about their safety. When riding on the bus, some worried about the aggressive behavior of other passengers. Most riders appreciated the security cameras on buses, which lately have become more prevalent. Riders credited the presence of these cameras with creating a safer environment.

Some routes are just not safe. It's frustrating, because you just want to get home. Why would someone think of peeing on a bus or selling pot on a bus? There's just no common sense. Even if you take the same bus every day, you see different things. –Rachel

I avoid creepy areas or wait to cross the street....When it's dark out, it's nice to wait with someone you know. –Rachel

It feels safe because there are cameras [on the bus] and no violence. But maybe it's just the routes we use. –Ann

Several participants in the study mentioned that they avoided routes that had a lot of teenagers on them. In the city of Seattle, high school students take city buses

instead of school buses. Therefore, at certain times of the day, buses are full of teenagers, which made other people feel unsafe. Some participants talked about avoiding taking the bus altogether during those times when schools were letting out.

Safety was a concern for many of the participants, but was brought up most often by women in the study. Ann, the woman with two young children, discussed safety concerns as they related to riding the bus, but also to other factors, including riding in cars. She felt that cars were dangerous, because there was a greater chance an accident could occur. Taking into account the safety concerns of riders can be helpful when imagining ways that the transit system, or the information systems that support it, could be improved.

The final theme that emerged from the challenges of taking public transportation was respect, which came up for some of the riders, especially those in the Poor group. Respect was mentioned particularly by the homeless participants that we spoke to. Riders in our study told stories of being treated badly by bus drivers and transit authorities. Participants talked about buses that did not stop, sometimes because they were full, and other times for no obvious reason. The homeless riders suggested that drivers did not respect them and that it was likely that this was the reason they did not stop.

The way they treat me sometimes.... Drivers should treat [passengers] with respect. If you can't handle people in the public, get another job. They can be rude. –Tim

I stopped taking the light rail train because I felt attacked by some of the security guards. I got done working a 12 hour shift downtown, and the light rail police were harassing me. They slapped my feet. I wasn't even asleep; I was just sitting there. He said, 'No sleeping on the train.' I said, 'I wasn't asleep, bud.' I got up and started walking away, and he grabbed me. He asked

me if I wanted to spend the night in jail. It was a really bad experience. I stopped taking [the light rail]. –Eddy

Sometimes, the drivers just slam the door in your face. I went to Alki beach on the #55, and I was standing at the bus stop, and he drove up and then just drove right off. I called Metro to complain, using the bus number. They said they would write it up and put it in the driver's file. –Louis

I told the driver, 'You are being rude to me. Folks like you don't need to work for Metro.' I let it go, but my problem is...I get mad. I need to control my anger. I had to work on that. Most times, I'm a cool guy, and I tell them how it is, but if they want to be mean to me... –Tim

The issue of respect is an important one for those who are poor, homeless, and already feeling marginalized by society. For some in those groups there was a sense that transit was an equalizer: When you were taking transit, you were just another bus rider. You had a purpose and a destination. This issue of lack of respect also ties back into the theme discussed earlier in relation to the bus driver's power or lack of power when dealing with riders, particularly ones who might not be able to pay full fare. Several participants talked about how riding the bus can be an opportunity to relax. This theme cut across several groups in the interviews, but was emphasized by the homeless group and the group in recovery. All talked about how transit was sometimes a way to escape.

There is a lot of chaos downtown. There's chaos on buses too, but on buses, I don't have people coming up to me asking to buy dope or drinking. I can listen to my CD player and just ride the bus. –Ryan

I tend to reach out and talk to people, if I can minister, and then I minister to them. I tell them about the good word of Jesus. –Eddy

This theme of private in public demonstrates how riders, especially those who are marginalized, can feel a sense of purpose and belonging while taking public transportation.

In this section, I provided a variety of evidence that demonstrated the challenges that transit-dependent riders face. First, I noted the loss of opportunity that occurred as a result of being limited to particular locations for work or home. Second, I demonstrated the ways in which economic concerns drove a rider's ability to pay, or not pay, for transit services. Riders often went to great lengths to overcome these limitations, whether the limitation was not being able to pay the full fare or the limitation involved travelling to a place (particularly for work) that could not be conveniently accessed via the transit system. Finally, I shared evidence from two situations in which riders felt fearful or disrespected. These situations occurred because of the presence or intersections of other riders or the drivers themselves.

### **The role of transportation and maintaining social connections**

As mentioned earlier, reliable transportation is key to accessing a variety of resources, including income and opportunity. In the section about challenges, I discussed how being transit dependent often limits opportunities for finding jobs and housing. Transportation is also an important resource to help people maintain social connections and therefore create social capital. As mentioned earlier, one of the primary reasons participants took public transportation was to visit friends or family. It is important to note that in the Seattle design ethnography, the strength of social ties was not at all as prevalent as it was in the Kyrgyzstan study. While extended family members were often mentioned by the participants we spoke with, they did not play the same role or provide the same level of support that the extended families in

Kyrgyzstan did. In this section, I will discuss in more detail the ways in which people used transportation to maintain or create new social connections. Conversely, I will also address the issues that arose when a person's transit dependence was a barrier to social connections.

Taking the bus can be an opportunity to strengthen existing social connections or, in some cases, make new connections. Some participants saw time spent riding the bus as time to stay in touch with friends or family, typically by using the mobile phone to call or text. Also, because the people in our study did not have access to vehicles, taking the bus was often a social activity in and of itself. Members of the same household would take trips together on the bus or coordinate schedules and routes to ensure they were all on the same bus.

In addition to maintaining existing connections, the bus was also seen as an opportunity to create new social connections. One participant referred to the friends she had made on the bus as "bus buddies." These were people she got to know over a long period of time when taking the same bus and the same route to work each day.

When you take the bus often enough, you eventually make bus buddies. It's like your new best friend. It's the bus buddies that will make the driver wait for you when you're crossing the street.  
-Rachel

In addition, the social interaction with the bus driver or with the other regular riders of the bus could bring about feelings of connectedness, as Eddy describes here.

You know, transportation itself is like an experience. You get to know people, to reach out. I get to meet new people and a routine. Like when I worked Downtown, I was like, hey, getting on and knowing my driver and being like, hey, how about the Broncos or the Seahawks. It's a cool part of the day. -Eddy

Conversely, participants spoke of instances when a lack of public transportation options impacted social ties. Brian told us about a friend who lived across town in a neighborhood that was not easy to access by bus. Because both Brian and his friend were transit dependent, this location led over time to the diminishment of the friendship.

I have a friend who lives on Beacon Hill. It's an indirect route and hard to get to, so I'll either ask for a ride or I might ride my bike; otherwise I just won't go. It's almost not worth it to go. – Brian

Those who were in the dependent-by-choice group had more resources for overcoming the lack of transit options to a friend's house—for example, using the short-term car rental service known as "Zipcar."

It takes forever to take the bus [to see our friends] in Shoreline. There might not be a bus where we need to go, so in that instance, we might use a Zip Car. But we'll try and get it on a day where we have several things to do. –Adam

Several people in the study seemed to have limited social networks. Some of the participants were out of touch with family and friends; others rarely mentioned the role that their social connections played in their lives. This was clear in the first group of participants, who were both living in a group home and in recovery programs.

I'm kind of out of touch with everyone. I'm just trying to get myself together.... I go to the Library in Renton. I just go there to get in touch with people I haven't seen—email through my sister or my cousins—and then they try and get in touch with them in some way. –Shawn

I'm from Cali. I have no family here. –Eddy

The homeless group of participants had broader social networks than one might imagine. Several members of the homeless group mentioned having family who lived in the area and with whom they would be in touch, either by phone or in person. In addition, the homeless community was a broad social network in and of itself. The

people in the group were well known to each other, and there was a sense of camaraderie and familiarity within this group. Another study, taken from my field notes, demonstrates the close knit aspect of this community.

I interviewed Group 5 today in downtown Seattle. I had been in contact with two people, Tim and Ryan, who both wanted to meet me at noon downtown. During my phone calls with them, they revealed that they had learned about the study from each other and that they knew each other. I asked them to bring at least one friend each and meet me in front of the Starbucks at Westlake Center on Pine and 4. I told them I would be carrying a sign that read "UW Transportation Study." Based on the phone conversations I had with Tim and Ryan leading up to the study, I had the sense that there may have been issues of poverty in play. They were highly interested in the \$20 honorarium and had a variety of concerns about being there on time and doing the right thing. Both of them called me several times to make sure the details of the study were correct. The day of the study, I met Deidre (another researcher on the project) at quarter til so we could check in and make sure everything was ready for the interviews. I then made my way to the Starbucks so I could meet Tim and Ryan. I stood in front of the main entrance for about 5 minutes waiting. I then decided to check around the front of the building to see if they were waiting there instead. I walked around front with my sign and heard: "there she is!" I was quickly surrounded by about 25 people eager to take part in the study. Luckily, I was able to find Tim and Ryan, who had made themselves known. They wanted to know if they could bring all the other people with them. I told them that they could only bring one each. They each had a male friend with them. At the last minute, I decided to invite another person who was there, that was Cynthia. I thought it would be helpful to have at least one woman in the group. Later, I talked more to Ryan about the large group of people. He was disappointed that I couldn't include them all. He also mentioned that he was worried that some of them would be mad at him because of the \$20.

What is revealing in this excerpt from my field notes is that the social network that Tim, Ryan, and their friends belonged to was quite well knit. It was evident that they shared information with each other, especially when it came to opportunities to make money or receive services. In contrast, the other groups we talked with admitted either to having broken networks, such as was the case with Eddy and Shawn in the recovery group, or to having somewhat small or non-visible ones, such as Ann and Brian and Joey and Gabe. The environmentally motivated riders, Adam and Rachel, were the exception and talked about having a group of friends and family that they

saw socially. In addition, in Adam's video diaries, his group of friends often made appearances.

This issue of understanding the social network is important for several reasons. First, we know that people in resource-constrained environments often use social networks to get by. This was evident in the Kyrgyzstan design ethnography, but was absent here in the Seattle design ethnography. Second, part of the study protocol was to investigate the opportunity for ride sharing in resource-constrained environments (which I will cover in the next section). This detail about social networks helps us to understand what opportunities may be present for ride sharing.

### **The opportunity for ride sharing**

As part of the study, I was interested in learning more about the possibilities for ride-sharing among transit-dependent riders. Several studies have shown that reliable access to transportation is key to alleviating poverty (Hanmer, Booth, & Lovell, 2000), (Sanchez). Conducted in a variety of urban and rural settings in the U.S. in the late 1990s, these studies looked for predictive success factors for people transitioning from public assistance to self-sufficiency, also commonly known as "Welfare to Work." The consensus among these studies was that car ownership was a strong positive predictor, a phenomenon also referred to as "driving out of poverty" (Brabo, Kilde, Pesek-Herriges, Quinn, & Sanderud-Nordquist; Taylor, 2009). Indeed, a lack of access to transportation amplifies the challenges that the poor already face. Transportation also

plays a crucial role in maintaining and improving social networks, and a lack of access to social networks leads to a lack of social capital (Bradbury).

One way to support rider autonomy is to investigate casual carpooling, commonly referred to as “slugging” (Burriss & Winn). In this practice, drivers pick up passengers who are going the same direction they are. Traditionally, slugging works well when both parties have something to gain. The rider might gain a faster, more direct ride home than is available with public transportation and multiple transfers. With an extra passenger, the driver might gain access to the high occupancy vehicle (HOV) or commuter lanes, which provide quicker travel times. Sometimes, riders may be asked to contribute gas money; other times, the ride is free. Slugging is successful in densely populated environments that experience gridlock. Some successful examples are in Washington D.C., Jakarta, and Houston. In some cities, slugging occurs at large companies, where it leverages the trust of the larger shared-employer social network. In all of these examples, both drivers and riders benefit; the practice is reciprocal.

While investigating the possibility of casual carpooling for transit-dependent and poor riders, I encountered several challenges. First, data show resistance to casual carpooling by transit-dependent riders due to concerns about safety. Second, riders we spoke to were concerned about the imbalance that could be created by accepting rides from strangers, or even from friends or coworkers. No one wanted to be a burden to someone else. Third, several of the participants in the study had limited access to social networks or had access to social networks that were transit dependent. Such circumstances may limit the potential for ride sharing applications.

In this section of the interviews, I asked riders about their willingness to accept rides from a variety of sources, starting with close friends or family and extending to acquaintances and strangers. I also asked about their willingness to look for rides online. Due to concerns about safety, there was a great deal of resistance to the idea of accepting rides from strangers.

I used to [hitchhike]. Luckily, I'm still around. There are some crazy people out there. I used to hitchhike from town to town. What I'd do is, I'd call a friend, and see if they can find me a ride where I need to go. If not, then I'd just take the bus and then have to walk. –Shawn

Before, I might have considered using an online ride share site—that is, before I had kids. It might make sense for long distance trips, but it's hard to trust strangers. I wouldn't take the kids if I took a ride that was offered online. –Ann

I wouldn't do it because I don't trust strangers. –Brian

In terms of getting a ride from someone in the neighborhood, it depends on if I know anything about the person. Have I seen them before? Maybe on the bus? I might consider it. –Rachel

I would take a ride from someone [I didn't know] if a friend of mine is in the car. But I wouldn't take a ride from just someone in the neighborhood that I didn't know. I definitely wouldn't hitchhike. I've seen too many scary movies. –Elesha

While most participants dismissed the possibility of hitchhiking themselves, one group mentioned that if they did own a car, they would consider picking up someone else who was hitchhiking, although it depended on who it was.

I might consider picking up a hitchhiker. I like to think that everyone is part of your universal family, and we're not out to hurt each other. –Adam

I have a soft spot for women, children, and old people. I'd help them if I saw them hitchhiking. –Rachel

Although participants were skeptical of accepting rides from strangers, they could see the value in being able to get a ride to where they wanted to go. However, they mentioned that it would have to be flexible and offer services when they needed

them. One participant mentioned that she had experienced a type of ride sharing while working at a temp agency.

I'm curious about how to get involved in ridesharing. How do you get into the system? How much does it cost? I'm guessing it would have to be a regular thing. But I think it would be useful to have a flexible option, if you just need it once in a while. –Brian

I wanted to volunteer north of Seattle and tried to recruit friends to do it with me so I could get a ride. Something like that [ridesharing] would have been a good idea. –Ann

I shared rides with everyone at the temp agency. We didn't know each other, but we'd meet at the temp agency, and if we were worked at the same spot, I'd get a ride. –Helen

When discussing the possibility of ridesharing, several participants discussed the role that friends and family played in helping them get around. As mentioned earlier, some participants in our study did not have strong social networks due to their circumstances. Among other participants, who did have strong social networks, it seemed that asking for rides was a common occurrence. One rider, Eddy, talked about how it was different growing up and how sharing rides was part of daily life.

I would definitely get a ride [from someone I knew in the neighborhood], at least in my hometown. I don't know how Seattle is, but in my hometown, we are country. I grew up in Fresno. There is gangs, and there is some ghetto problems, but mostly the atmosphere...it's just the way the people are. In an agricultural community, it's like feast and famine. Everyone is used to helping each other. Yeah you could ask somebody, someone you don't know in your neighborhood: 'Hey man, I'm about to be late. Hey man, get it'—it's like that. In Seattle? No way, not on Pac[ific] Highway! (Laughs.) –Eddy

One group, Helen and Eleesha, who had previously indicated that they have a strong network of family and friends, talked about how getting rides from others was a common occurrence.

If we need a ride somewhere special, we'll call someone and just ask them to pick us up. –Helen

Other riders related that when someone accepts a ride, that person needs to offer something in return. This notion, of reciprocity, that is, giving in order to receive,

is a key component of structuring and supporting social networks. Participants talked about reciprocity in two ways. First, they identified it as a requirement of ride sharing. The person who gets a ride needs to be able to give something back, like gas money.

When I lived in Las Vegas, if you didn't have gas money, you weren't going anywhere. You were pitching in. –Shawn

Second, participants spoke of being reluctant to ask for rides from friends who had cars, because they didn't want to be seen as a burden. There is a willingness to accept a ride that is offered, but a lack of willingness to ask for a ride.

If it was for something like a trip to the emergency room, I would call a taxi, because insurance pays for it. I'm wary about asking friends for rides, because I doesn't want them to feel like I'm taking advantage of them. –Ann

Sometimes I catch a ride when a volunteer at my work offers. I would take a ride if it was offered. –Brian

I wouldn't ask someone I know for a ride, although I would consider it if someone asked me for a ride. – Ann

A coworker might sometimes pick us up at the bus stop. If someone offers a ride, I won't turn it down. –Adam

If someone is offering me a ride, I won't say no. I'm not that big of a fan of transit that I'll say no. I'd rather get a ride. –Gabe

When investigating the possibility of ride-sharing for this population, a variety of questions must be considered. First, how can such a system be designed within social networks that are relatively weak? Second, how does a system take into account concerns about safety? Third, in what ways could a ride sharing system instill or include the notion of reciprocity? I will address these questions in more detail in Chapter 7: *Findings*.

## **Summary and reflection**

In this section, I provided the themes and evidence from the Seattle design ethnography (including data drawn from interviews and videos) to exemplify the issues discovered during the field work. The chapter started with a fictional account of life on the bus. Transportation is a key resource that connects people to other resources, such as jobs, services, and social networks.

Next, I introduced the notion of transit dependency and why it was important to study the experiences of those who are transit dependent. First, the transit dependent are seldom the focus of transit agencies, and therefore their needs may be overlooked. Second, the transit dependent are often poor or marginalized: Not designing for their needs can result in oversights that negatively impact their lives. Third, those who are transit dependent are experts at using the transit systems. They have deep knowledge and experience of the system and therefore are well suited to discuss its challenges.

Next, I detailed how transit-dependent riders used technology and accessed information about transit. We learned that the mobile phone was a crucial technology, as was the Internet, although the use of the Internet was often intermittent. People in this study supplemented their Internet access by leveraging public access sites like libraries and community centers that provided free internet and computer access.

A discussion of themes surrounding challenges and constraints related to transportation yielded a variety of factors. These included the opportunity costs of being transit dependent: that is, how a person's selection of jobs and housing were often limited due to a lack of transportation options. Transit-dependent riders often

struggled economically, which impacted their transit priorities and choices. I also detailed the ways in which the people in our study talked about offsetting the economic challenges of transit, including their use of fare avoidance. Finally, I discussed the role of transportation and social connections and speculated on the challenges associated with a ride-sharing application that could help offset the difficulties of transit dependence.

Upon reflection, the Seattle design ethnography yielded a variety of findings, some which were surprising. Having first hand experience with public transportation in Seattle, I had heard about fare evasion, but the extent of the practice and the specific ways individuals found to ride without paying full fare was new to me. The people in the study who took part in the fare evasion presented this practice as one that was necessary in their lives and that within the context of their community, these practices were not seen as illicit. The other eye opening findings from this ethnography had to do with how transportation, and how access to transportation lead to the access (or lack their of) to other resources like food, jobs and health care. This finding was detailed in the literature and one of the motivations for investigating transportation in more detail, but hearing people's stories about how transportation had limited their options were compelling.

Further analysis of the themes and a broader discussion of implications for design and research will be discussed in Chapter 6: *Analysis, Interpretation, & Synthesis*.

## Chapter 6: Analysis and Synthesis

---

### **Introduction**

The purpose of this ethnographic study is to explore ways to investigate resource-constrained settings with a view to identifying design implications that are specific and appropriate to the context and also instructive for other communities or settings. In Chapters 4 and 5, I presented the data and findings collected from the two design ethnographies, one conducted in Kyrgyzstan, the other in Seattle. In this chapter, I will discuss two main themes based on the synthesis of the two design ethnographies. First, I will present the theme of agency, or the ability of people to act, and the three related sub-themes of resourcefulness, resilience, and powerlessness. Second, I will present the theme of the maintenance and support of social networks, specifically focusing on the concept of reciprocity. After examining both of these themes, I will show how they can be used to inform the design of new systems or evaluations of existing systems.

### **Agency**

Agency is the term used to describe the ability of human beings to act autonomously and choose freely. As mentioned in the literature review, I employ the concept of agency as represented in Giddens' structuration theory, which has several characteristics. First, agency is concerned with the possibility of doing something, which implies a notion of power or a potential to act. Second, agency is both enabled and constrained by the structural properties that exist in society. Third, the relationship

between human actors and the structures of society both reinforces and shapes social structures over time. Therefore, while this section looks closely at the theme of agency, this theme cannot be discussed without also invoking the structural properties people encounter in their daily lives.

When I reflected on the data collected from the two design ethnographies, the theme of agency emerged as a helpful construct to synthesize the different ways people experienced and overcame challenges in their daily lives. Looking deeper at the ways that people enacted agency led me to three analytic categories: resourcefulness, resilience, and powerlessness. In the following section, I will explore each of these categories and include supporting data from the design ethnographies. The first category is resourcefulness, which refers to the ability of people to deploy their expert knowledge either to overcome or to exploit structures in a way that is sanctioned and productive. The second category is resilience, which refers to the ability of people to manipulate structures or resources in ways that are unsanctioned or that compensate for gaps in the existing structure. The results of resilient acts are productive in the sense that individuals and groups can still achieve desired outcomes, even in systems that are not designed to support these particular acts. The third category is powerlessness, which refers to circumstances that reduce people's ability to act or that cause actions to fail to yield results that are supportive of a person's intentions. In the next section, I will use examples from the design ethnographies to explore each of the categories of agency.

**Resourcefulness**

The first category within the theme of agency is resourcefulness.

Resourcefulness refers to the ability of people to deploy their expert knowledge either to overcome or to exploit structural constraints in ways that are sanctioned and productive. People demonstrate their resourcefulness in all kinds of ways, but their resourcefulness is particularly evident in situations in which they have developed expertise and can apply their knowledge to bring about desired results.

**Resourcefulness in the Kyrgyzstan design ethnography**

In the Kyrgyzstan design ethnography, we see several examples of how people deploy resourcefulness to overcome the constraints of daily life. In this section, I will return to evidence presented in Chapter 4 to show the ways in which the people in our study were resourceful when faced with challenges. Examples include overcoming economic concerns, dealing with bureaucracy, finding a phone number, purchasing a mobile phone, and creating private spaces in public.

A predominant theme from the Kyrgyzstan design ethnography was the participants' concern about money. As a result of this concern, we learned about a variety of strategies people used to make choices that could save money and about the ways that people leveraged family and friends in times of need. Many participants demonstrated a money-saving strategy related to making choices about phone calls. Because economic concerns were a driving factor, participants had several resourceful strategies when it came to limiting costs. Participants employed hierarchies of decision making when it came to choosing how and when to make a phone call. To keep prices

down, those with mobile phones often used SMS instead of calling. Others took advantage of cheaper within-network rates by having multiple phones for different service providers. A landline, either at home or work, was used for lengthier calls. All of these options increased people's ability to control their spending. Their resourcefulness allowed them to choose from among the available options and select the one that would save the most money and be the most appropriate for the type of call. This enacting of agency was supported by the structures that had been set up by the mobile phone service providers in Kyrgyzstan. For example, making a phone call requires that you have units on your SIM card. However, the units are only charged to the person making the call. Therefore, the caller can make a call and hang up before the receiver answers. This signals to the receiver that he/she should call back and, as a result, pay for the call. This practice (known as beeping) is common in many developing countries, as detailed by Donner (Donner).

Money concerns pervaded life for our participants. Many people in our study struggled to pay bills or to afford large purchases, such as cars or farming equipment. Participants commonly exhibited resourcefulness by leveraging friends and family to help them overcome their economic limitations. This practice of social lending and borrowing is rooted in the traditions of this communal culture and is often the only option people have when more formal lending is not available from institutions, such as banks or the government.

A variety of challenges faced by people in the design ethnography were due in part to the limitations of the country's infrastructure or to systemic corruption. One

such example, mentioned by the rural family group, was the challenge of getting a permit from a local government office. When faced with this task, our participant, Bakir, could choose between three options: exert considerable time and effort going through the existing channels and miss work as a result; pay a bribe to speed up the process; or request help from a friend who worked at the permit office. Resourcefully, he chose the later.

I don't have one free hour because I'm working [as a taxi driver]; that is why I asked my friend and why my friend agreed to help me. If I didn't have the friend helping me, I would have had to take off work to go through all the procedures. I probably would have just tried to do it quick and pay the price (the bribe). –Bakir

By leveraging his social network for help, Bakir saved the time he would have spent waiting and the precious resource of money that he would have spent on a bribe.

When it came to the challenge of finding information, participants also leveraged their social networks. The specific example from the design ethnography was related to finding a phone number. People in the study mentioned that they had two options: call the city phone directory and spend a long time waiting on hold or ask family or friends. They often chose the later. They also deployed a third strategy, which I will return to in the section on resiliency.

Another way in which resourcefulness surfaced in the Kyrgyzstan design ethnography was related to acquiring a mobile phone. As mentioned in the design ethnography, getting a mobile phone was an important event, especially for young people. There were two ways people acquired mobile phones: The first was by inheriting them from friends or family members who were upgrading their phones. The second was by purchasing a mobile phone in Bishkek's large department store. Both of

these methods involved the social network. In the second example (purchasing a new phone), the participants deployed their resourcefulness by consulting friends or family about the type of phone to get. They chose a person they deemed trustworthy or knowledgeable to help with the decision, oftentimes having this person accompany them to make the purchase.

A final way in which participants in the Kyrgyzstan study were resourceful was related to creating private spaces in public. Many households in Kyrgyzstan are multi-generational, and private spaces are often extremely limited. In order to supplement this space, many of the young people in the study talked about going for walks in the local parks with their peers and romantic interests. This use of existing resources—the parks and their friends—to supplement a resource that was lacking (namely, privacy) demonstrated the young people's resourcefulness.

In summary, many of the resourceful practices from the Kyrgyzstan design ethnography came about in response to the challenges of daily life, whether those concerns were economic, informational, or personal. In many of the examples of resourcefulness, the participants leveraged their social networks to help them achieve their desired goals. They deployed expertise in these situations in several ways. As we saw in the case of choosing how and when to call, for example, participants considered all the options for communicating and chose the one that would save them money. When leveraging the expertise of others, they strategically chose the person who had the right connections (as in the case of overcoming bureaucracy) or who had extensive knowledge about mobile phones (as in the case of purchasing a phone).

### **Resourcefulness in the Seattle design ethnography**

In the Seattle design ethnography, people who were transit dependent deployed resourcefulness in several ways. Their expertise as frequent riders gave them the knowledge and skills to make choices that helped improve or maximize the bus riding experience. For example, participants knew from experience which routes were the fastest and slowest and which routes were unsafe or unpleasant. Several participants in the study noted that they avoided routes that had lots of students on board.

The buses that run by the high schools get really loud in the back, and some drivers just ignore it. For the buses between 2:55 and 3:20, just scratch those off the list. –Joey

Other riders deployed their expertise to choose routes that had features that would make their rides more enjoyable. For example, Brian chose a route that had a pleasant view.

The 54 has a better view because it goes down by the water. –Brian

Eleesha and Helen talked about choosing a bus that was equipped with air conditioning (see figure xxx).

*Figure xxx. Eleesha and Helen looking for air-conditioned buses.*

These examples show how transit-dependent riders used their expertise and knowledge of the system to make informed choices to make their rides more comfortable. They were not motivated solely by the efficiencies of getting from point A to point B, but rather chose or avoided routes based on preference and comfort.

Riders in the Seattle study also displayed resourcefulness when making decisions about how transit factored into their overall planning for the day. This played out in several ways. Some riders added a considerable amount of extra time to their commutes by taking earlier buses to ensure they arrived at locations on time. Arriving early or on time was crucial for those riders who had lost jobs in the past due to late buses.

Buses are inconsistent...they are 5 or 15 minutes late here or there. It's really bad 'cause you may need to be somewhere. I'd get to my job site at 4:15 to start work at 5:00. I would be too early for work, but if I took the next bus I'd be too late. My boss didn't like me getting there so early. –Ryan

Others optimized their trips by planning errands that coincided with particular bus routes. They then used any extra time on a transfer ticket to take care of unplanned errands or engage in leisure activities. They saw this extra time as free time.

These examples show that riders demonstrated their resourcefulness in two ways. First, users deployed strategies to account for the ways in which the system can be unpredictable. Their past experiences with late buses gave them the incentive to overcompensate, especially when time was a factor. This seems to be especially relevant for some of the types of jobs that poor riders had, specifically ones that were low-skilled. Being late for work, either because of buses that run sporadically or because sometimes buses are late, is more likely to be problematic for people who work in low-skill and low-wage jobs that tend to be heavily based on shifts. Contrast this to other types of jobs, specifically for knowledge workers, where shifts are more approximate and fluid and tend to mirror the heavier commute times, which in turn reflect times when more transit options are available. People who are commuting at

these times have more transportation options and, most likely, more flexibility, so a late-running bus would be more of an inconvenience than cause for disciplinary action or termination.

The second way that riders deployed resourcefulness in these examples was to maximize their free time. Bus schedules, which are fixed, typically structure riders' time. But receiving a transfer with extra time on it allowed riders to make choices and extend their free time without having to pay more. This demonstrates the ways in which transit-dependent riders often made choices informed more by cost than by time.

A final example of resourcefulness in the Seattle design ethnography is evident in the ways that riders used the bus as a form of entertainment, relaxation, and refuge. Some participants talked about going on rides on the bus just to see where it would take them. Several participants in our study had talked about discovering that a particular bus often changes mid route.

One of the things I like is that sometimes a bus emerges at the end as another route. Sometimes it's really handy—like the 54 ends up in Greenwood, and I like hanging out in that area for fun.  
—Gabe

The route changes from 54 to 5, which goes all the way to the zoo. My 11-year-old son told me about that, but I don't know how he found out. —Ann

Riders demonstrate their resourcefulness in these types of discoveries and explorations. By discovering that buses change routes, riders can stretch their rides to further destinations without having to transfer to another bus. Often, this allows them to save money and time. As a result of this discovery of other routes, which was mentioned by several groups in the study, riders were able to thread together disparate

neighborhoods in the city. Riders discovered these far away neighborhoods by exploring along familiar routes, thereby increasing the options for entertainment via the bus.

A second dimension to this use of buses for exploration is the use of the ride time itself. As mentioned in the design ethnography, members of the homeless group also talked about how bus rides provided moments of refuge, which allowed them to gain a sense of privacy and autonomy while in public. People who are homeless spend much of their time within the downtown core where services are concentrated. They are also, due to their activities and appearance, often marked as homeless and asked not to loiter in public places. The activity of riding the bus is an equalizing one. Once on the bus, the homeless person is just another rider engaged in the legitimate and sanctioned purpose of moving around the city. Being another bus rider means the person is no longer marked as homeless. As our group of homeless riders shared, being on the bus was an opportunity to enjoy private time and space in their lives, which at most other times are lived in the public sphere.

Each of these examples from the Seattle design ethnography demonstrates how individuals used their knowledge of transit to bring about desired results. As a component of agency, being resourceful signifies how people interact with existing structures in ways that are sanctioned in order to bring about desired results.

When looking at the two studies, this is a contrast between the ways in which people were resourceful. In the Kyrgyzstan study, the resources tended to be the expertise or help of friends and family. In the Seattle design ethnography, the resources

tended to be existing expertise, amassed from personal experience of the system or structure and supplemented with existing informational resources.

### **Resiliency**

The next theme of agency is resilience. I use this term to thematize a set of findings that show how people manipulate structures or resources in order to overcome barriers. Resiliency differs from the earlier category of resourcefulness in that the behaviors people deploy to bring about desired results are often unsanctioned or at least out of the bounds of existing structures. Resilient acts are often directly opposed to the ways in which structures are intended to work, or they address gaps in the structures. The results are productive in the sense that individuals and groups can still achieve desired outcomes even in systems that are not designed to support these particular acts.

### **Resiliency in the Kyrgyzstan design ethnography**

In the Kyrgyzstan design ethnography, we see examples of how people demonstrate resiliency when faced with the constraints of daily life. In this section, I will return to evidence presented in Chapter 4 to show the strategies that the people in our study deployed to overcome gaps in the system. Examples included the creation of a shadow phone directory and the use of mobile phones by young people to support romantic relationships.

As mentioned in the design ethnography and in the previous section on resourcefulness, there is no official phone directory for people living in Kyrgyzstan. When a person does not know a phone number, that person has three options: Call the

understaffed phone line provided by the city and wait for a long time to find a phone number; ask a family member or friend; or purchase a copy of the unofficial phone directory in a local store.

There is a disk that contains the phone company directory information. It is not official, though. It is copied by people who work at the phone company and distributed to friends. You can also buy it in shops that sell CDs for about 150 soms. –Arif

The existence of this shadow phone directory demonstrates acts of agency in two ways. First, the individuals who worked at the phone company made the unauthorized CD as an act of resilience. They saw an opportunity to create and distribute copies in order to meet an existing need and to close a gap in the structure—to make it more accessible. We can also assume that this act was not one of selflessness: The employees who made this copy were being resourceful by selling it. Secondly, the people who purchased the CD in the stores were being resilient by seeking out and supplementing an information resource that did not exist within the structure itself.

Another act of resiliency demonstrated by people in the Kyrgyzstan study was related to the ways in which young people used their mobile phones to create private space in romantic relationships. As mentioned in Chapter 4, dating and relationships between young people were closely monitored by family members, especially parents. Young people in Kyrgyzstan had traditional ways of obtaining more privacy by spending time in public, as detailed in the earlier section on resourcefulness. This practice was commonplace and sanctioned by social norms in the country. However, the introduction of the mobile phone created more opportunities for young people to

create more privacy beyond public spaces and away from parental and family oversight. Young people in the study talked about using the mobile phone to keep in close contact with romantic interests. These new opportunities went beyond what was sanctioned within traditional practices.

In summary, there were ways in which the participants in the Kyrgyzstan design ethnography engaged in resilient acts that either supplemented the gaps in existing structures or went against sanctioned practices.

### **Resiliency in the Seattle design ethnography**

In the Seattle design ethnography, we see examples of how people who are transit dependent demonstrated resiliency when faced with the constraints of the transit system. As mentioned earlier, transportation is a crucial resource that allows people to move around and access key resources, such as jobs and healthcare. When people who are transit dependent face obstacles that restrict or thwart their mobility, they demonstrate resilience by overcoming these challenges in perspicacious ways. Two examples are riders evading fares and riders taking extreme measures to get where they need to go. In the example of evading fares, we learned in the design ethnography that riders had a variety of techniques that they used to avoid paying for a bus ride. These activities ranged from the simple, such as misrepresenting one's age in order to get a discount, to complex, such as saving and ordering transfer tickets to reuse them on different days. In addition, some riders appealed to the bus drivers for sympathy or charity, while others simply refused to pay by boarding in the free-ride zone and exiting the bus without paying. All of these examples demonstrate agency in

certain ways. For transit-dependent riders who are poor, these practices were seen as a necessary condition of using public transportation to get around.

It is clear that the structure of transit is set up to dissuade fare evasion. However, riders in our study had developed tactics to get around these structures. A helpful point of focus here is the relationship between the evasion on the part of the rider and the enforcement on the part of the driver. The driver, as the authoritative face of the transit structure, has the ultimate say as to whether someone can or cannot ride. Therefore, riders who engaged in fare evasion mentioned that a key strategy was to “be honest” and appeal to the driver. Many mentioned that this was often the most effective tactic. The driver’s own agency was invoked in these situations. He or she had the ability to enforce the rules of the structure, or to choose not to.

Fare evasion is also a helpful example to discuss how acts of resiliency can be unsanctioned. There was a contrast between how the groups viewed the act of fare evasion: some thought it was wrong, while others saw it as necessary. In some of the groups, fare evasion was seen as an accepted act within the community. As the following quotation demonstrates, acts of fare evasion are often learned from other community members.

I save transfers: every color, every letter. I learned how to do it in middle school. Then, I text or call someone to find out about the transfer [color of the day]. I have between 20 and 30 of them in my collection. I have a friend who has a sandwich bag full of them. –Eleesha

Eleesha mentioned that she learned about the practice in middle school. She also mentioned a friend who developed a highly organized way to enact this practice of reusing transfer tickets to avoid paying the fare. This example illustrates two

qualities of resilience specifically and of agency in general. First, resilient practices are often transmitted within the social network. Second, resilient practices, while unsanctioned by the official system, can be sanctioned by the immediate social network. I want to highlight the social dimension at play here. Acts of agency are often learned, reinforced, and sanctioned by the social network.

In the design ethnography, we learned that fare evasion was common to some groups, but not all. Additionally, there was disagreement within particular groups about certain fare evasion tactics. While all groups raised the issue of cost and increasing fares, we observed the fare evasion practices primarily in the poor and homeless groups. Riders in the environmental group tended to have bus passes, whether subsidized by an employer or self-funded. The environmental group also spoke with a sense of pride about supporting the transit system and paying one's way. Additionally, the thrifty group did not engage in systematic fare evasion. One participant in this group talked about forgetting his bus pass and appealing to the bus driver, but he said that it was an unusual occurrence.

I was using the U-Pass [bus pass issued by the University of Washington]. I lost it. I just couldn't find it. So I just asked the bus driver. He let me ride and gave me a transfer not just to downtown, but also all the way home. –Joey

The environmental group and the thrifty group, like the poor group, had voiced concern over the cost of riding the bus. Instead of evading fares, however, these two groups communicated their dissatisfaction about cost directly to the transit authorities. They enacted their agency in ways that were more in line with the “resourceful category” (that is, their actions were sanctioned and within the structure). By contrast,

some members of the poor group had deployed resilient—and unsanctioned—ways to combat the limitations of the system.

Not all examples of resiliency involved unsanctioned activities. When the transit system did not accommodate riders' needs, they often made concessions or improvised solutions. In our study, participants talked about instances when they took extreme measures to get where they needed to go. These situations occurred when the transit system did not run, such as during the late-night and early-morning hours and when bad weather (e.g., snow) closed roads or interfered with service. One rider, for example, rode his bike 30 miles to work, because no bus accommodated his early-morning shift at a fisheries plant. He mentioned that this commute was one of the reasons his employment at the plant ended. The point is that riders often take extreme measures to enact agency when the structure does not accommodate their needs.

In summary, in the Seattle design ethnography, resilient acts occurred when riders overcame the limitations of the system to meet their own needs. The type of agency reflected in this kind of resilience involved transit-dependent riders taking actions that were outside of the system or structure in which they lived; but these riders were still able to bring about their intended outcomes because of their knowledge of how to manipulate resources.

When the two design ethnographies are compared, we can see an apparent contrast in the acts of resiliency. In the Seattle design ethnography, practices of

resiliency were visible because the structures in which they were enacted were clearly defined. Acts such as fare evasion are clearly acts that circumvent the ways in which the system was designed to function. In the Kyrgyzstan study, the examples of resiliency were present, but at times, harder to see. This was due to several factors. First, in Kyrgyzstan, the conventions related to what is and what is not sanctioned differed from the conventions in Seattle. For example, bribing governmental officials in Kyrgyzstan was not uncommon and could even be considered a standard practice. So while this may seem like an unsanctioned activity, it existed as an accepted convention and is therefore described in the section on resourcefulness. In the Kyrgyzstan examples, acts of resiliency occurred to offset gaps that existed within infrastructure or to facilitate culturally unsanctioned activities.

### **Powerlessness**

Finally, the last theme of agency, powerlessness, captures the instances when people have little or no recourse to overcome constraints. Their agency is thwarted, intentionally or otherwise, by a system that removes the ability for action.

Powerlessness could also be considered a lack of agency: the system or structure forecloses any possibility to act and does not yield results that are supportive of a person's intentions.

### **Powerlessness in the Kyrgyzstan design ethnography**

In the Kyrgyzstan design ethnography, we see instances when people were powerless to overcome the constraints of a system or structure. The examples from this design ethnography are related to the ability to move around freely. The constraints

that our participants faced had to do with challenges related to transportation options, but also the ability to travel due to safety concerns.

People in Kyrgyzstan face a variety of challenges when they try to get around. In this section, I will revisit the challenges specifically related to taking the marshrutkas, or minibuses, that are ubiquitous on the streets in Kyrgyzstan. To reiterate, traveling by marshrutka involves a variety of difficulties: there are no set schedules; there are often not enough vehicles to accommodate riders, which leaves some people stranded; and destinations are not always marked. As a result of these challenges, some participants mentioned that they struggled to get to where they needed to go on time. The problem was compounded when the alternative was taking a taxi, which costs considerably more money and is seen as an unsafe option for women traveling alone. Since transportation is a key resource that connects people to other resources, such as work, education, and social connections, these issues are more than just an inconvenience.

A second challenge related to travel was conveyed by Kalima, who was in the rural friends group. She talked about avoiding travel to her home village because of her vulnerability to the traditional practice of bride kidnapping. The powerlessness that Kalima felt in the face of the tradition kept her away from her hometown. If she did go, these concerns forced her to keep a low profile so that no one, except immediate family, would know she was there. As I mentioned earlier, social networks in Kyrgyzstan play a key role in helping people to overcome challenges in everyday life. Kalima's legitimate reluctance to travel home could act to weaken social connections and reduce opportunities to leverage friends and family to help get by or get ahead.

In summary, in the Kyrgyzstan design ethnography, there were several instances when participants were powerless in the face of constraints. These constraints were both infrastructural and cultural.

### **Powerlessness in the Seattle design ethnography**

Transit-dependent riders experience powerlessness when their ability to move around is thwarted by the system or by the constraints within which they live.

Powerlessness results in feelings of fear, frustration, and defeat. The Seattle design ethnography includes three specific examples of powerlessness: safety concerns, being late, and feelings of disrespect.

Several participants mentioned times when they felt unsafe due to their status as transit dependent. Safety concerns arose when they were waiting for the bus or riding the bus, especially at night. Additionally, safety concerns were more often mentioned by women in the study. Riders sometimes had ways to enact a certain level of agency when they were in situations that felt unsafe, but not always. For example, several participants in the study talked about how riding the bus with a large group of high school students made them nervous. In those instances, they could get off the bus or enact their expertise to avoid the routes and times that students would be taking the bus. They also demonstrated other, smaller acts of agency, such as connecting with others in their social networks by texting or calling a family member or friend. At other times, they might alert the bus driver to a specific safety concern, especially when it involved another passenger on the bus; however, this tactic was not always successful. Again, all of these examples show how riders exhibited agency in the face of

powerlessness, but in ways that did not always successfully alleviate their main concerns.

A second example of powerlessness from the Seattle design ethnography is related to the unpredictability of transit services. While all transit services, including the ones profiled in the study, make running on time a priority, it is not always possible. When buses are late, this can have negative impacts on riders and exacerbate their feelings of powerlessness. Several participants in the study mentioned that a late bus had caused them to arrive late to work and in some cases had even cost them their jobs. Other than leaving a large window of time to get to appointments, riders had few options for agency in these situations, which were outside of their control. As mentioned in the section about resourcefulness, the consequences of lateness are often more acute for poor riders in unskilled jobs with high turnover. They also tend to be more severe when a worker does not have a long-term track record or relationship with the employer.

A final element of powerlessness in the Seattle design ethnography was the feeling of not being respected. This issue was prevalent for riders in the poor group, and particularly for the homeless participants. The lack of respect was demonstrated in a variety of ways (such as when buses refused to stop) and was associated with the authoritative faces of the transit system: some drivers and security guards. Feeling that one is not respected can exacerbate feelings of powerlessness, especially among riders who may already be stigmatized due to homelessness, race, or poverty.

The issue of respect reveals a tension that occurs between some transit-dependent riders and the people who are acting on behalf of the structure or the transit agency. Specific structures—in this case, transportation—often mirror the values, stereotypes, and injustices of the larger society. As mentioned earlier, those who are socially stigmatized may also be accustomed to perceiving these acts of injustice, whether real or imagined. These examples of the microcosm of transit could be applied to other settings or situations where there is tension between authority (and those who misuse it) and those who are subjugated to the larger power structures in society.

Issues of powerlessness are apparent in the settings of both design ethnographies. In both cases, participants were powerless in the face of transit constraints. Also, in both cases, issues of social status—gender in the Kyrgyzstan study and homelessness in the Seattle design ethnography—limited the agency of participants due to external societal forces.

## **Reciprocity**

In this section, I will detail the second analytic theme generated from the two design ethnographies: reciprocity. Reciprocity is a component of social networks; the term is used to describe the mutualistic exchange of tangible and abstract outcomes of social interactions. As I discuss this theme, I will revisit the definitions of social networks and social capital and address how the theme of reciprocity is evident in the two design ethnographies.

### **Social networks, social capital, and reciprocity**

Social networks are groups of interrelated individuals. As I described in the literature review in Chapter 2, social networks are collections of individuals and groups that are related through sustained, at times intermittent, interactions that leave discernible traces over time. One of the components of social networks is the production of social capital, which is a resource generated by individuals and groups during their day-to-day interactions and which allows people to get by or get ahead. Reciprocity is the back-and-forth exchange that takes place with other people in the same social network. It is commonly thought of as the exchange of benefits, materials, and favors between individuals.

One of the seminal works on reciprocity was by the sociologist Gouldner. In his 1960 article on the topic, he synthesized and critiqued the ways that reciprocity has been used across a variety of disciplines (Gouldner). Gouldner's definition of reciprocity included the following: Reciprocity is a component of any social system, which in turn acts to stabilize that system. Reciprocity can exist between individuals, but also between individuals and larger structures, such as political parties. Reciprocal exchanges are not necessarily equal, and reciprocity can exist within relationships where there is a power imbalance. In such cases, parts of the exchange are coerced, so that instead of being an exchange for equal materials or intangibles, the transaction is evidence of the power imbalance. Gouldner posited that for reciprocity, each party has rights and duties that reinforce the relationship.

There can be stable patterns of reciprocity qua exchange only insofar as each party has both rights and duties. In effect, then, reciprocity has its significance for role systems in that it tends

to structure each role so as to include both rights and duties (Gouldner).

Reciprocity acts both to reinforce and recreate societal structures in this back-and-forth exchange between individuals. It is mutually gratifying to both parties involved in the exchange, but not always equal. The sense of obligation that drives reciprocal relationships is twofold: 1) It is created by cultural and community-based norms, and 2) it represents either a repaying of past exchange or the expectation of future exchange. Gouldner also believed that a norm of reciprocity is universal, meaning that it exists in all cultures and settings. The ways in which it is formulated, however, shifts and changes depending on the context. A final key piece of Gouldner's definition of the concept of reciprocity is that it can have an alienating effect. As he stated, "The norm may lead individuals to establish relations only or primarily with those who can reciprocate, thus inducing neglect of the needs of those unable to do so." This means that individuals are motivated to seek out and create relationships with those who can provide them with a mutualistic exchange. This idea parallels Granovetter's theory of the strength of weak ties, which states that individuals benefit from a social network that consists of both strong and weak ties, but it is the weak ties that are often the key to gaining more beneficial outcomes due to their diversity and ability to bridge across social networks (Granovetter, 1973). He specifically stated that the poor tend to have fewer weak ties. In both of these theories, we can see how people who lack resources, such as the poor, could fail to reap the benefits from exchanges and social connections.

When we reflect on the data collected from the two design ethnographies, we see that reciprocity was evident in both settings, but that it played out in different ways. This recalls to mind the idea that reciprocity is universal, but context-specific. The design ethnographies provide some helpful examples of how people engage in reciprocity to overcome the challenges of daily life.

### **Reciprocity in the Kyrgyzstan design ethnography**

In the Kyrgyzstan design ethnography, the importance of the social network was apparent. Previous qualitative and quantitative research in the region had shown that people in Central Asia tended to trust their social network, meaning family and friends, more than traditional institutions (such as government, police, and the courts) and media sources (such as news, television, and the Internet) (Kolko, et al.). In addition, social networks were seen as the primary ways to get help and assistance, and the traditional gift giving culture in Kyrgyzstan thrives on the notion of reciprocity (Kuehnast & Dudwick).

In the design ethnography, the importance of the social network was a recurring theme. In almost all the examples of the challenges of daily life, the typical strategy to overcome or alleviate the challenge was to leverage the help of friends and family. In the theme of agency, specifically in the categories of resilience and resourcefulness, individuals from the Kyrgyzstan design ethnographies relied on friends and family to get by.

The motivations for participating in reciprocal relationships echoed some key characteristics in Gouldner's definition of reciprocity. For example, participants

alluded to the social norms and expectations of reciprocity in Kyrgyz culture. For instance, Adilet, in the rural friend group, summed up the obligatory nature of reciprocity:

You absolutely must help your neighbors. –Adilet

Helping someone in one's social network was something that was simply expected and done.

Another aspect of Gouldner's definition of reciprocity is mutual beneficence and the belief that acts constitute a repaying of past exchange or the expectation of future exchange. This notion—that individuals act out of obligation and expectation—may be evident in the Kyrgyzstan design ethnography; however, it manifested itself not simply in individual actions, but more broadly, as can be seen in the idea that “if I provide you with help, you may, in the future provide me or my family with help.” The reciprocal exchanges in the Kyrgyzstan design ethnography extended beyond the individual to the entirety of the social networks, making the reciprocal exchange work on a larger scale—the many to the many, instead of the one to the one.

An additional benefit of reciprocity exhibited in the Kyrgyzstan design ethnography was the generation of social capital. Reciprocity often refers to the exchange of goods and services (that is, tangible material); but when the value of reciprocity is so ingrained in a particular setting or culture, the practices of being helpful and of giving not only material goods, but also other intangibles (like advice, hospitality, and social connections) reaps rewards in terms of social capital. In addition, participants in our study took pride in being the people whom others sought out for

favours. This, too, reinforced the cultural norms. People who were sought out for their qualities as problem solvers or their ability to loan money or other support achieved a high level of status. They had a reputation for being resourceful and helpful, qualities that in turn increased their own social capital. Bakir, the father in the rural group, retold several stories about how he helped friends and family. He spoke of a group of classmates to whom he often loaned money.

There are six classmates who studied together. They still meet up quite often and help each other. I give them money, but they give me none. –Bakir

Also, Alexei, in the rural friend group, talked about how both friends and family asked him for his help.

My friends and family often ask me for help, mostly about their finances. A lot of the time, they don't have any money, and they need loans. Mostly these are friends who ask. –Alexei

Arif, in the urban friend group, mentioned how he was the person to whom friends and family went for help with technical issues.

Family and friends often ask me for help, especially with technical stuff. I like to take apart equipment and put it back together. Gradually, all my family came to realize that I am good at this, and they call me to ask for help. –Arif

When we reflect on the data from the Kyrgyzstan study, it is clear that reciprocity is key both because of the cultural norms of Kyrgyzstan and because reciprocity is necessary to overcome the challenges of daily life.

### **Reciprocity in the Seattle design ethnography**

In the Seattle design ethnography, the role of the social network and issue of reciprocity were more complicated. Study participants spoke less of family and friends as resources that helped them overcome challenges. In addition, several of the groups

in the study mentioned that their social networks were either splintered or small. This was especially the case for the two groups who were living in transition housing or were homeless.

I'm kind of out of touch with everyone; I'm just trying to get myself together. –Shawn

I'm from Cali; I have no family here. –Eddy

In other groups, there was very little mention of how family and friends helped overcome challenges. A few exceptions came about when people were in situations in which they had to ask for rides from other people they knew.

I spent my last two dollars to board my bus; I had to call [my] daughter to pick me up, because I couldn't get there from here. –Tim

Some of the transit-dependent riders in our study were seen by others as sources of information. Adam, who was one of the riders motivated by environmental concerns, mentioned how he and Rachel were seen as experts; yet there was also a stigma associated with not owning a car.

Friends will reach out to us because we know the bus. It's funny how much people pity us for taking the bus. –Adam

It is important to point out two elements of the theme of reciprocity in the Seattle design ethnography. First, in contrast to the Kyrgyzstan study, there were cultural and contextual differences in social networks and expectations of reciprocity. The U.S. is known to have a culture that values individualism and self-reliance. Second, the people within the study tended to have smaller, less stable, or less visible social networks. Therefore, the opportunities for reciprocity were not readily available.

Third, unlike Kyrgyzstan, participants living in Seattle had more access to and trust in institutional resources that provide support: for example, social services or non-profit organizations that helped to subsidize bus fare.

The theme, or challenge, of reciprocity for the participants in the Seattle group was clear during the interviews, when participants were asked to consider the possibility of ride-sharing or casual carpooling. As mentioned in the design ethnography, I concluded that ride-sharing would be challenging for this population. A central factor was the concerns participants had about reciprocity. Again, obvious cultural factors are in play, mainly the value placed on self-reliance. When asked about the possibility of ride-sharing, participants were concerned about being a burden to those who were driving. They did not want to be seen as taking and not receiving. There did not seem to be an opportunity to offset the perceived imbalance of the relationship.

When we reflect on the data from the Seattle design ethnography, it is clear that the value of reciprocity is not as evident as it is in the Kyrgyzstan design ethnography. Nevertheless, reciprocity does arise as a design opportunity if we consider how systems or services can be designed either to support the existing notions of reciprocity or to supplement a lack of reciprocity when the social network is small or splintered.

In summary, using the theme of reciprocity to reflect upon the two design ethnographies provides a way to consider how to design for these settings and challenges. In the next section, I will demonstrate how agency and reciprocity can be used to discover design implications or critique existing structures and systems.

## **Design considerations**

In this section, I will demonstrate how the themes of agency and reciprocity can be used when considering the design of ICT systems. First, I will demonstrate how the themes can be used to critique existing systems. Second, I will show how the data from the design ethnographies and the associated themes are manifested in the designs that resulted from the research. Third, I will show how the themes can be used to generate ideas and research questions for future systems.

## **Evaluating existing systems**

In this section, I will discuss how the themes of agency and reciprocity can be engaged to evaluate how well an existing system works for users, particularly those who may be under resourced. The examples in this section are specific to the Seattle design ethnography, but the lessons from these two examples can be applied more broadly.

### **ORCA fare system**

Currently, the transit agencies in the Puget Sound region are transitioning to a new fare system. In place of cash, riders purchase and fund a regional pass called ORCA (One Regional Card for All), see figure xxx.

Figure xxx. ORCA card

The intent of this new system is to streamline fares across seven transit agencies in the Puget Sound region. The system includes local and express buses, light rail, commuter rail, and ferries. While the transit agencies still accept cash, they encourage riders to use ORCA cards instead. The ORCA system represents a growing trend, and,

many urban transit systems are adopting similar smart-card systems. While some participants in our study talked about the ORCA card, most of the transit dependent riders did not use it. When new systems are introduced, one has an opportunity to evaluate how the transition impacts the agency of the systems' existing users. The transition to the ORCA system posed a variety of challenges for transit-dependent riders we interviewed and, in many cases, reduced their agency.

First, the ORCA card costs \$5, which can be a barrier for poor riders, who often do not have the additional money to purchase the card. Second, because riders add funds to the ORCA card instead of paying with their loose change, the exact fare is deducted when the rider taps the card on the card reader. As mentioned above, some riders cannot always afford to pay the full fare; instead, they pay what they can, and then rely on the driver's compassion to settle the difference. The ORCA card hampers this kind of negotiation, disempowering, or limiting the agency, of both the rider and the driver. Whereas with loose change, riders could pay some of their fare, with the ORCA card, they must pay the entire fare or none of it.

The largest implication of the adoption of the ORCA card system is the movement away from paper transfers to an electronic transfer system. Currently, when riders pay cash they receive a paper transfer that specifies how long they can ride other buses before they must pay a new fare. The results of our study show that paper transfers play an important role for transit-dependent riders. They use them in resourceful ways. For example, riders use transfers to organize their time: If they have a generous transfer with time to spare, they might explore the area or run extra errands.

With the new ORCA card, transfers are recorded electronically, and riders no longer receive printed receipts that say when a transfer expires. Although transfer information is available online, it is not always accessible or accurate. Moreover, the ORCA system does not always record transfer information in real time. To access their ORCA accounts, riders must have access to the Internet during their ride. This requirement excludes many transit-dependent riders. In addition, because the website itself is poorly designed and not optimized for a mobile experience, a variety of usability problems arise.

Without the paper transfer or access to the ORCA system, riders do not have a reminder of how much time they have left to transfer without paying for another ride. The new system therefore removes a valuable cue that had helped riders be resourceful. When using the ORCA card, riders tap a card reader each time they enter the bus. They only know a transfer has expired when they are charged a new fare. Because they are unable to know how much time is left on a transfer, riders lose some of their agency: They cannot make informed decisions about their travel plans and are not given a chance either to choose not to ride or to appeal to the driver's compassion. We heard from riders that paying an additional \$2.25 fare is not always possible. Given the choice between paying a new fare and walking, some riders would prefer to walk to save money; other riders would see walking as their only option.

Using structuration as a lens, we can see the interplay between the structure of transit—that is, the policy makers, the transit agencies, and the drivers—wanting to correct or reduce fare evasion. Understandably, those who make up the structure of

transit are invested in reducing fare evasion in order to maintain services and staffing, especially as local governments face unprecedented deficits in the current economy. For example, the King County Department of Transportation estimates that Metro, the King County Transit Agency, estimates that they lose up to \$3.4 million per year, or 2.4% of total revenue, because of fare evasion (*Report on Fare Evasion on Metro Transit*). Looking at fare evasion in the light of structuration, we see that when riders evade fares, their actions can lead to increased fares, which can lead to additional evasion. We strive to look for solutions that can continue to promote riders' agency without exacerbating fare evasion. The ORCA card addresses fare evasion, but at the expense of riders' agency: By demanding an exact fare and obscuring transfer information, it limits the choices that riders (and drivers) can make.

To give riders the information that they need, the ORCA card could support SMS messaging. Instead of requiring that a rider use an Internet connection to look up transfer information, the system could be set up to send the rider a text message 15 or 30 minutes before a transfer expires. As was mentioned earlier, transit-dependent riders rely heavily on mobile phones and tend to use text messaging. Among poor riders, as was also noted above, small amounts of money are important. Instead of paying a full fare to travel only a few miles, riders could send a text message to the ORCA system in order to purchase an extra 30 minutes for \$0.25. Creating an SMS system to access ORCA information would be helpful not just for transfers, but for other transactions, including checking balances and adding money to an account, when linked to mobile banking capabilities.

In this example, we considered how the ORCA system supports or limits riders' agency. While I am not arguing that fare evasion, at the levels currently practiced, is sustainable or desired, I do believe that the ORCA system could have been designed in a way that recognizes the needs of transit-dependent riders, particularly those who are poor. Creating a system that provides incremental purchases, supports mobile (specifically, SMS) access, and gives users access to more information to help them make decisions that allow them to leverage their resourcefulness are all design opportunities for ORCA in the future. The transit agencies hope to gain wider adoption of the ORCA card. Creating features that support the needs of transit-dependent riders can help increase adoption and, therefore, achieve the goals of both the transit organization and the riders.

### **ICTs that support transportation systems**

In Seattle, Washington, the setting of the design ethnography, transit agencies provide transit information through web sites, trip planners, telephone hotlines, and information booths. Also, a user-generated tool called OneBusAway provides real-time, location-sensitive transit information via the web, SMS, and mobile applications for iPhone and Android devices (Ferris, et al.). Finally, Google Transit, a third-party system, provides location-based information over the Internet [web link]. Each of these systems has been developed to make transit information more accessible; however, each could be improved for the transit-dependent audience and support a wider variety of agency. Improvements to the design and discoverability of these systems could increase riders' resourcefulness.

Transit agencies have the opportunity to provide smarter and more meaningful information to riders. Integrating information about walking routes and bike paths, and including relevant topographical details such as hills, would also help riders plan alternative ways to travel when the bus is not available or when money is tight. In a city like Seattle, where the terrain can be hilly, providing topographical information would help riders decide whether they want to walk, bike, or ride.

Systems like OneBusAway provide contextual transit information, including the real-time location of buses. This up-to-date information is valuable to transit-dependent riders, who require accurate information about schedules to plan their events. Although participants in the study requested the features that OneBusAway provides, none of the people in our study had heard of it. OneBusAway can be accessed via the Internet and by SMS, but most of its current users access the system with application-enabled devices like the iPhone and Android phones. This leads us to wonder whether a digital divide exists around these devices. This divide, or “App Gap,” refers to the diminished access to information based on a lack of ownership of a smart phone. This gap has implications for design and diffusion. First, how can we provide information to users who do not have application-enabled phones or who have limited data plans? We know that many transit-dependent riders rely on texting to send and receive information. One recommendation is to design SMS systems that work like applications.

OneBusAway is available via SMS, but none of our research participants had heard of it. This raises the question, How do people discover information tools? We

know that technology diffuses by word of mouth and via social networks. As a follow-up study, then, it would be interesting to explore how technologies are diffused over social networks that cross class and social boundaries. As mentioned, transit-dependent riders overwhelmingly rely on “official” sources, such as the transit agencies’ websites, phone numbers, and information booths, for transit information. To promote user-generated applications like OneBusAway, organizations could advertise them on buses or promote them at bus stops; that is, they could promote their applications wherever the “official” sources of information are found. This would act to incorporate user-generated systems into the broader structure of the transportation system.

In addition to the “App Gap,” there might be an “App Glut” to consider. Aside from word-of-mouth recommendations and published reviews, it is difficult to know whether one application, amid many similar applications, might be helpful. A transit agency’s endorsement of an application could help riders find other trustworthy information sources (Riegelsberger, Sasse, & Mccarthy, 2005).

As we learned from our findings, transit-dependent riders base their travel decisions on specific priorities, such as cost and reliability. Less important is time or the length of the trip. This may be in contrast to “choice riders,” who are less concerned with cost and more concerned with the length of the trip and number of transfers. Trip planners and transit information systems could be designed to give transit-dependent users more flexibility when choosing a trip. For example, similar to websites designed for planning air travel, bus-trip planners could highlight or sort

information by the cost of a trip, the number of transfers, arrival and departure times, and peak traffic periods.

As part of a trip-planning tool, designers could allow users to leave feedback for particular bus routes and services. Feedback could mention routes that include student riders or indicate the numbers of buses that are overcrowded because of special events. “Social navigation” provides suggestions based on behaviors of riders who have similar routes or preferences (Dieberger, Dourish, Hook, Resnick, & Wexelblat, 2000). In addition, ratings could mention a favorite driver or identify routes that offer scenic views.

The bus is a site of a variety of social activities. Strengthening the opportunity for people to connect with one another while on transit could improve the transit experience, strengthen existing social networks, and create new ones. For example, some transit agencies are already promoting mobile social software applications, such as Foursquare, a tool that lets you broadcast your location to others in your network. It can also let you discover new people who are in close proximity. It is helpful to consider how reciprocity could be built into systems that support social interaction on the bus. It would be a way to have technology support the “bus buddy” phenomenon described in our findings. How might you connect with your informal bus buddies and how might technology be used to strengthen this relationship and reciprocity? In addition, mobile social software and other location aware tools can leverage system infrastructure information (such as the unique 4 digit code) to provide more precise, location specific information. This expert practice could also be deployed by riders to

communicate with other riders via social network software, such as Facebook or twitter.

### **Resulting systems**

As a result of the research conducted in Kyrgyzstan, two systems were identified, designed, and piloted in the region. I will briefly describe each and how they were conceptualized based on the data gathered in this design ethnography. In addition, I will point out ways the systems were designed to support findings related to the themes of agency and reciprocity. The first system, Starbus, is an information system to help marshrutka riders. The second system, Mobile directory is a socially built phone directory.

#### **Starbus**

The Starbus project emerged as a solution to provide transit riders, specifically in Kyrgyzstan, with information about bus arrival times (Anderson et al.). The system was designed to be technologically appropriate; it is designed for mobile phones that support SMS. The system was developed to be implemented in a grassroots fashion, meaning it does not rely on the participation of a transit authority or government body. Starbus was developed by a cross-disciplinary group of undergraduate and graduate students at the University of Washington. It supports agency in several ways. First, it allows users of the system to be resourceful by querying their particular bus to see when it will arrive. The system works by sending signals from GPS transponders that can be queried with SMS. In addition, because Starbus does not rely on a

government's approval, those who want to implement the system can do so in a way that allows them to demonstrate resiliency in the face of constraints.

### **Mobile directory**

A second design concept to come from the Kyrgyzstan study is a mobile social information directory. It is an SMS-based business rating and directory application that allows users either to access a public directory or to create and share password-protected directories with friends and family. This idea came directly from the design ethnography, which detailed the challenge of finding a phone number and showed how people relied on social connections or endured lengthy waits when they tried to consult the under-resourced official phone company. This data led to the design of a mobile social information directory that would allow individuals and social groups to build their own shared information directories. The system supports users' agency by allowing them to be resourceful using the tools at hand—again, a mobile phone with SMS capability—to access important information. The social aspect of the system was designed to leverage the highly integrated social networks that occur within the region. The hope was that the social directory would be used by those who sought information and that these same users would contribute to the directory by adding their information and encouraging others to do the same, which could result in higher levels of social capital and encourage reciprocity.

The two systems in this section were developed primarily as a result of the Kyrgyzstan study and highlight the ways in which the themes of agency and reciprocity were manifested in the designs.

## **Opportunities for future systems**

As a result of the research, I identified design considerations for future systems or applications. In this section, I will discuss one of these design considerations in more detail.

### **Casual Carpooling**

From the Seattle design ethnography, several design considerations were identified for future systems that could be developed to serve the needs of transit-dependent riders. At the outset of the research, one question was about how riders who were transit dependent could gain more autonomy and predictability. Therefore, we investigated the possibility of casual carpooling. Casual carpooling, commonly referred to as *slugging*, is a practice in which drivers pick up passengers who are going the same direction they are (Burris & Winn). Traditionally, slugging works well when both parties have something to gain and the relationship is a reciprocal one. The rider might gain a faster, more direct ride home than is available with public transportation and multiple transfers. With an extra passenger, the driver might gain access to the high occupancy vehicle (HOV) or commuter lanes, which provide quicker travel times. Sometimes, riders may be asked to contribute gas money; other times, the ride is free. Slugging is successful in densely populated environments that experience gridlock. Some successful examples are in the Washington D.C. area, Jakarta, and Houston. In some cities, slugging occurs at large companies, which leverage the trust of the larger shared-employer social network. In all of these examples, both drivers and riders benefit; the practice is reciprocal.

In this study, I wanted to investigate the possibility of casual carpooling for transit-dependent and poor riders. We discovered several challenges. First, our data showed resistance to casual carpooling by transit-dependent riders due to concerns about safety. Second, riders we spoke to were concerned about the imbalance that could be created by accepting rides from strangers or even from friends or coworkers. No one wanted to be a burden to someone else.

In the U.S., successful slugging systems capitalize on the typical heavy commuting patterns of morning and evening. For people working in lower wage jobs, the commuting schedules can be more varied, and therefore, there may be less incentive to pick these riders up. Accommodating a wider variety of commuting schedules may be a challenge. While there are several tools on the market that support casual carpooling, such as Avego and Pick up Pal, these are designed as applications for smart phones. There is an opportunity for the HCI community to think about facilitating casual carpooling for transit-dependent riders. We predict that urban environments will continue to see an increase in traffic, more congestion, more toll roads, and perhaps funding cuts to areas of public transit. It would therefore be beneficial to look at a ride-sharing system that includes a wide swath of the population, such as the transit dependent. To overcome fears about ride sharing, designers could focus on locations of trust where people with shared goals or destinations gather for rides, such as health care centers, schools, or temporary work centers. We also need to think about how we can transfer trust across social networks to more loosely affiliated people, and how opportunities for reciprocity could be built into these systems.

When attempting to enable reciprocity within a design, whether it is casual carpooling or a mobile directory, it is helpful to think about how to design for identity, or how people disclose who they are. While some systems allows users to keep their identity's private through the use of anonymous or pseudonymous log ins. Other systems require users to disclose details about who they are. For systems that hope to enable reciprocity, participation within a system should require or encourage users to disclose their identity, whether through actual details or pseudonyms. Identity should be persistent and visible within a system which allows users to individuals to seamlessly identify others who have been helpful or that they have helped in the past.

## **Summary**

In this section, I provided two analytic themes from the data in the two design ethnographies. First, I discussed the theme of agency, or the ability to act. Within agency, I presented three categories: resourcefulness, resiliency, and powerlessness. For each category I demonstrated that a reading of the data through this lens provides the ability to see the data in terms of how the system does and does not support people's ability to act. Resourcefulness refers to the ability of people to deploy their expert knowledge either to overcome or to exploit structural constraints in ways that are sanctioned and productive. Resiliency differs from resourcefulness in that the behaviors people deploy to bring about desired results are often unsanctioned or at least out of the bounds of existing structures. Finally, powerlessness captures the instances when people have little or no recourse to overcome constraints.

The second theme that crossed the two design ethnographies was reciprocity, which is a component of social networks used to describe the mutualistic exchange of tangible and abstract outcomes of social interactions. In the last section of this chapter, I looked at design considerations of existing, resulting, and future systems. I used the lens of agency and reciprocity to show how they could be improved by taking into account users needs.

## Chapter 7: Findings

---

### Introduction

The purpose of this ethnographic study is to explore ways to investigate resource-constrained settings with a view to identifying design implications that are specific and appropriate to the context and also instructive for other communities or settings. In Chapter 6, I presented two main themes based on the synthesis of the two design ethnographies: the theme of agency and its subcategories of resourcefulness, resilience, and powerlessness, and the theme of reciprocity. In this chapter, I will return to the research questions and answer each one based on the literature review, the data collected in the design ethnographies, and the analysis of the synthesis of the two design ethnographies in Chapter 6. This chapter is organized into four sections, each addressing one of the research questions, which are:

1. What are the particular challenges when researching and designing for resource-constrained populations? What are the implications of these challenges for methods? What are the implications of these challenges for design?
2. How can traditional inclusionary research methods in HCI be adapted to better understand the contexts of resource-constrained environments and the needs of diverse audiences?
3. Given two particular resource-constrained contexts (one in Bishkek, Kyrgyzstan, in Central Asia and the other in Seattle, Washington, U.S.A.), how can understanding

the ways in which people experience and overcome challenges in their daily lives inform design?

4. When researching with and designing for resource-constrained populations, what are some unique design considerations and areas for inquiry?

### **Challenges associated with researching and designing for resource-constrained populations**

In the first research question, I asked, “What are the particular challenges when researching and designing for resource-constrained populations? What are the implications of these challenges for methods? What are the implications of these challenges for design?”

There are a variety of challenges associated with researching and designing for resource-constrained populations. As a result of the literature review and data collected from the design ethnographies, I present the following findings to address the challenges of researching and designing for resource-constrained environments. Research in resource-constrained environments differs from other research in computer science in that it is “driven by the solving of a problem rather than by technological innovation” (Dias & Brewer). The four categories of problems or challenges that I identified in the literature review are *technical and infrastructural*, *methodological*, *cultural*, and *measuring success and sustainability*. In each category, I will provide some specific examples and then discuss the implications for design and the implications for research or methods.

## **Technical and infrastructural**

When designing for resource-constrained environments, some of the most visible challenges are technical or infrastructural. One example of a technical constraint is the state of electricity and connectivity, which can be limited, unreliable, and intermittent. As a result, designers should be careful to choose technological platforms and solutions that are appropriate to the context. That could mean that the designer chooses not the latest technology, but the one that is the best fit based on the existing use of technology in the region and the limitations of the infrastructure (Veeraraghavan, et al., 2007). Designers should also ensure that designs can sustain unpredictable environmental factors. To do this, they should check assumptions about electricity and connectivity early in the design process, and they should try to pilot and test in the target region as soon as is feasible. Because designers need to be flexible, their technical solutions for hardware and software should be easy to adapt. In turn, designs should be adapted based on the limitations of the infrastructure. Researchers, or those interested in methods for designing for resource-constrained populations, should prime themselves to be sensitive to local contexts by including assumptions about technical requirements early on in research activities and by consulting both local conditions and designers to verify assumptions. Researchers should also investigate the ways in which existing technologies--not just information and communication technologies--are being used to solve problems. Focusing on the daily challenges of people's lives can yield insights that can point to opportunities for existing or new systems. Technical conditions on the ground in resource-constrained

environments can look very different from circumstances that designers and researchers are used to. This challenge can be offset by devoting time and energy to understanding these constraints and experiencing them first hand.

### **Methodological**

Including end-users in the design process is a standard and required practice in the field of Human Computer Interaction (HCI). It becomes even more crucial when one is designing for contexts that are very different from one's own. When designing for resource-constrained populations, however, several methodological challenges arise. In particular, gathering feedback from users can be difficult. When there are gaps in technological literacy or culture, standard inclusionary practices, like those used in Western contexts, do not work well. This has several implications for design and research. First, designers should acknowledge that lower fidelity, or paper prototypes, may not be robust enough to gather feedback from users. Therefore, it is helpful to create for users functional prototypes that do not require a high level of abstraction. For researchers, the challenges involved in gathering feedback from resource-constrained populations can be offset by adopting a flexible approach, specifically acknowledging that methods and standard practices, such as usability testing, need to be adapted (Gorman, et al., 2011; J Sherwani, et al., 2009; Winschiers, 2007). In other words, researchers should trade strict adherence to methodological practice for a more flexible approach that is tolerant of the variations in other contexts and cultures. Also, researchers should be sensitive to the possibility that their research will expose unsanctioned activities or practices (Anokwa, 2009). Finally, researchers should take

care to contextualize the research for participants and clearly demonstrate the benefits and impacts of participation. In addition, researchers should communicate their findings to participants, whether immediately or, ideally, throughout the design process to demonstrate how participation and feedback is instantiated within the design. This can help build trust and understanding for the purpose of the research.

### **Cultural**

Linked to methodological challenges are the larger cultural challenges designers and researchers face when working for resource-constrained populations. One specific challenge in the cultural category is the issue of technical and language literacy, which is highly variable and impacts how people approach designs and give feedback (Donner), (Dearden), (Anokwa), (Gorman, et al., 2011). Designers should consider ways to embed local values into product design. When engaging with new populations and groups, researchers should consult local contacts to identify appropriate groups. Researchers should also show deference to local hierarchies and norms related to gender, age, and social status and should strive to understand local values and practices. They should investigate issues of existing literacies, such as language and technology, and consider how to accommodate these perspectives in the design. Similar to the other categories, the challenges of this section can be mitigated when designers and researchers work closely together.

### **Measuring success and sustainability**

A challenge for many projects that are focused on resource-constrained populations is that often pilot projects fail or their impact is fleeting. Also, projects tend

to be based on specific communities, which limits the possibilities for broader applications. While each project is unique, there are some standard ways in which designers and researchers can approach projects. One helpful strategy is to incorporate into the development process, as Donner et al. do an expectation of failure or set back (Donner, et al.). Realizing that your first attempt at solving a problem will rarely yield the right solution, but is instead part of a process, will lead to insights that offer new and better solutions. Most design processes emphasize the importance of iteration, but in these contexts, iteration is even more necessary and might happen on a much larger scale. Designers should design systems in a flexible way, so that they can be adapted or modified later in the design process and later in other settings. For researchers, adopting a value-based perspective can help to highlight the essential requirements for a specific system, which can also be re-imagined when applied to a new context. It is important for researchers, while adopting flexible strategies, as mentioned in the section on methodological strategies, to continue to collect metrics that can be used to evaluate the success of the system and to identify areas for continuous improvement. Finally, it is helpful for both designers and researchers to acknowledge that the introduction of a system does not mean that the project is over. Instead, consider the relationship between the system and the local practices as a recursive one. The interaction between the technology and how people use it, modify it, or do not use it, should continue to be the focus of evaluation and redesign.

In summary, although designers and researchers face a variety of challenges, numerous strategies are available to help mitigate these difficulties. In addition, both

designers and researchers benefit from spending time in the field and with the end-users of the design. Also, a close working relationship between designers and developers can bring about greater success when designing for resource-constrained populations.

### **Understanding challenges to inform design**

In the second research question, I asked, “Given two particular resource-constrained contexts (one in Bishkek, Kyrgyzstan, in Central Asia and the other in Seattle, Washington, U.S.A.), how can understanding the ways in which people experience and overcome challenges in their daily lives inform design?”

Focusing on the challenges of daily life was a productive line of inquiry in both design ethnographies. In particular, looking at challenges yielded a variety of opportunities both for improving existing systems and structures and for informing the design of future systems. In Chapter 6, I discussed in detail the daily challenges that occurred in each of the design ethnographies. In this section, I will revisit a selection of the challenges that cut across both design ethnographies and address how consideration of these challenges can help designers develop effective designs.

In both design ethnographies, economic concerns were primary, from the fees associated with getting the right permits for a building project in Kyrgyzstan to the price of bus fares in Seattle. People who are resource-constrained typically have limited finances. Being able to reduce costs is of high importance; therefore, people develop savvy methods for controlling spending. In Kyrgyzstan, participants told us of

the ways in which they made decisions about texting, calling via mobile, or calling by landline. Their main motivating factor was the desire to control costs. In Seattle, participants saved money on the bus by developing expert knowledge of routes and services, such as knowing which buses take transfers and where one ought to disembark between zones to save some money. They also shared ways in which they exploited some of the weaknesses in the system in order to save money by evading fares. Understanding the importance of saving money and the strategies people employ in order to do so can illuminate some design ideas. Systems should provide ways to make pricing visible and understandable for the people who use those systems. They should also allow for discounts and support existing practices, such as beeping for mobile phones and visible transfer times for buses.

In both design ethnographies, we also saw examples of how information resources are often scarce. In the Kyrgyzstan design ethnography, this included the challenge of trying to find a phone number. In the Seattle design ethnography, riders articulated the need for real-time travel information, not knowing that this information was available from a user-generated system. In both of these cases, the lesson for design is twofold. First, provide support to disseminate data even when the official sources or owners of that data are not able to host the information. In other words, provide open access to data so that others can leverage its utility. Official entities, such as the phone companies in Bishkek and the transit authorities in Seattle, should support user-generated content and facilitate access to it.

A third challenge that existed in both settings was related to the lack of reliability or predictability of transportation. In Kyrgyzstan, participants complained of the uncertainty related to schedules and room on the marshrutka mini buses. In Seattle, many transit-dependent riders told stories of how the limitations of taking public transport had resulted in the loss of opportunities in terms of work, housing, or social connections. There is an opportunity in both cases to consider how to make transportation more predictable for riders and, in turn, increase their autonomy and opportunities. The design recommendations that came from this finding led to the prototyping of a system in Kyrgyzstan called Starbus, which used GPS and SMS technology to help increase the predictability of marshrutkas. In the Seattle design ethnography, the findings led to a variety of implications when we considered how we might create ride-sharing opportunities for low-resource populations.

In summary, looking at challenges in daily life is a productive source of design ideas for resource-constrained populations. In addition, looking at two seemingly disparate settings can show the ways that challenges can be generalized and used to develop high-level design considerations, which can be used to help evaluate existing systems or to design specific solutions.

### **Adapting inclusionary methods**

In the third research question, I asked, “How can traditional inclusionary research methods in HCI be adapted to better understand the contexts of resource-constrained environments and the needs of diverse audiences?”

In selecting the research methods for the two design ethnographies, I chose methods that aimed at gaining a deep understanding of people who are living in resource-constrained environments. As I developed the methodology, I made deliberate choices that at times led me to diverge from traditional HCI methods in the hopes that these adaptations would yield productive results. I will revisit these modifications and reflect on their impact. The assessment will include consideration of three areas: contextual research, the unit of analysis, and methods that give users more voice.

Contextual research is often employed in HCI methods (Beyer & Holtzblatt, 1998; Courage & Baxter, 2004; Salvador, et al., 1999). It is seen as helpful, but not always necessary. In resource-constrained environments, where the context can be very different from the researcher's frame of reference, contextual research is a necessity. In both of the cases in this study, it would have been difficult to gain the depth of knowledge about people's lives without spending time in the field. I therefore did the contextual research for these design ethnographies by using the technique of design ethnography (Salvador, et al., 1999). I chose this method in order to gain the benefits of field research while working within a compressed timeframe. Design ethnography is a valid technique, which is strengthened by collecting and triangulating other data sources. It is also important to engage local experts as partners, both to gain entree into communities and to provide additional explanation and interpretation of findings. The data collected from the two design ethnographies presented here provided valuable insights by allowing me to see a completely new culture in the case

of Kyrgyzstan and engage in defamiliarization in what was a more familiar setting in the case of Seattle. In addition, the contextual research focused on identifying problems and barriers in daily life. This helped to uncover the ways in which people conceived of limitations and how they overcame them.

In traditional inclusionary research, the focus is on the individual. For this project, I focused more broadly on the social group as the unit of analysis. The groups of people were socially connected either as friends or family and consisted of “interacting individuals having a community of interests” (Goldman, 1962). The benefit of this approach is that it facilitates a broader consideration of social interactions. Because the social network was a crucial area of inquiry for the study, it made sense to examine the social network in action and to develop an understanding of the social relationships involved. In addition, in the Kyrgyzstan study, doing a combination of group and individual interviews with socially connected groups of people worked well. It helped me to gain the benefits of group discussion, while maintaining space for more private discussions.

Finally, the choice of methods was driven by a desire to give the participant a greater voice in the research relationship. Traditional HCI research is heavily weighted toward the perspective, voice, and focus of the researcher. In this study, there were several ways that the research was designed to give participants greater input and power than they would normally have in traditional research contexts. This input included simple logistical decisions, such as allowing participants to choose where the interviews would be conducted. Also, interviewing participants in groups of people

with whom they had social connections helped make participants feel more comfortable (Hight). Finally, participatory design activities, such as the video diaries in Seattle, gave participants more control over what the research agenda highlighted (C Wang, et al., 1998). They made decisions about what aspects of their lives to share and comment on.

In summary, conducting research in resource-constrained environments often requires that traditional methodology be adapted. The adaptations discussed here reveal the ways in which the research for the design ethnographies was modified.

### **Design considerations and areas for inquiry**

*In the fourth research question, I asked, "When researching with and designing for resource-constrained populations, what are some unique design considerations and areas for inquiry?"*

This research question was addressed in the analysis in Chapter 6, where I presented two analytic themes of agency and reciprocity. Within agency, I identified the three categories of resourcefulness, resiliency, and powerlessness. In this section, I position these two themes for use in future studies of resource-constrained populations, both for design and for inquiry. Using these themes can be a productive starting point for evaluating existing systems, making improvements to existing systems, or designing new systems.

## **Agency**

For the concept of agency, I drew from structuration theory (Giddens, 1984).

Agency is the possibility of taking action. In this context, this ability to act or 'act otherwise' means "being able to intervene in the world, or to refrain from such intervention, with the effect of influencing a specific process or state of affairs".

Although agency, or the ability to act, is possible within structuration, agency is not unbridled and not to be conflated with free will (Ahearn). The duality of structure in structuration is the discursive relationship between structures and actors. This relationship is a reciprocal one. Structures enable and constrain actors, meaning structures dictate what should or can be done. Therefore, although agency is the analytic theme, it cannot exist without the concept of structure.

Within agency, I identified three categories within the data, which were subsets of agency: resourcefulness, resiliency, and powerlessness. For each of the categories, I will present a definition and show these categories can inform research and design.

Resourcefulness refers to the ability of people to deploy their expert knowledge either to overcome or to exploit structural constraints in ways that are sanctioned and productive. Uncovering resourcefulness during research can be helpful in several ways. First, we can investigate how expert users overcome a system's limitations. Such an investigation can shed light on design opportunities by leveraging that expertise and making it more visible to all users. Second, we can seek to understand how expert users exploit their knowledge to bring about desired results from available resources. In terms of design, we can investigate the ways in which design can support the

accumulation and execution of expertise. An additional question to consider is how we can design systems that incorporate expert users' knowledge in order to improve the systems, while at the same time making that expertise visible to other users.

Resiliency differs from resourcefulness in that the behaviors people deploy to bring about desired results are often unsanctioned or out of the bounds of existing structures. Through research, we can look for areas of resiliency in system use in several ways. First, we can look at the strategies and tactics that users employ when a system does not meet their needs. Second, we can investigate the ways that users overcome a system's constraints in unsanctioned or unsupported ways. Third, we can aim to uncover the ways that users conceptualize unsanctioned acts, and we can identify the values that support or suppress these acts. Fourth, we are also compelled to investigate how people would be impacted if their resilient acts were prevented or disallowed by a change to the system.

Resiliency should be attended to in the design of systems in several ways. First, we should design systems that focus on helping people overcome constraints in ways that support their goals. Second, it is important that we take into account the ways in which design-related changes or decisions unearth or foreclose unsanctioned behavior, and we should consider the consequences of doing so. Third, designers should consider how systems can be designed to enable opportunities for users to make decisions that support key goals and values.

The term *powerlessness* captures the instances when people have little or no recourse to overcome constraints. Through research, we can look for moments of

powerlessness in several ways. First, we can investigate the ways in which existing systems reduce a person's ability to act. Second, we should consider the consequences when systems do not work in ways that match users' needs. Finally, it is important to consider how changes in systems impact users' abilities to achieve their goals. We can design in ways that provide users with a variety of options to choose from. Also, it is helpful to consider how it is possible to design systems in ways that empower users. Finally, we need to keep in mind that changes to the system can provide more (or less) autonomy for users.

In summary, agency, as conceived by Giddens' structuration, is a helpful lens to use when investigating the needs of resource-constrained populations, because it can focus our attention on existing practice in a way that privileges expertise and aims to support the choices of users. Looking at agency as a continuum across the three categories of resourcefulness, resilience, and powerlessness provides an opportunity for researchers and designers working together to evaluate how systems can better meet the needs of a range of users.

### **Reciprocity**

The second theme that the two design ethnographies had in common was reciprocity. A component of social networks, reciprocity is the mutualistic exchange of tangible and abstract outcomes of social interactions (R. Putnam, 1995; Resnick, 2002). I will present how this theme can inform research and how it can inform design. For researchers who intend to design for groups and social interactions, it is helpful to start by gaining a good understanding of current practices in the social network: namely,

the ways in which users engage others in their social networks and maintain the relations within the networks. Next, to understand the particular challenges faced by resource-constrained populations, researchers should investigate the ways that users leverage their social networks to overcome challenges. Finally, when researching systems that engage people across a social network, it is essential that researchers understand the particular rules and expectations of giving and receiving help, favors, or goods. Designers should consider how the system can support social networks, including the sharing and leveraging of information, expertise, and social capital. Additionally, designers should consider ways to support the norms of reciprocity, repayment of favors, and other aspects of the back-and-forth exchange between social connections.

Table 5 below summarizes the research and design considerations; these are organized by theme and category. I have separated the sets of questions by phase in the design process, that of research and design. However, presenting the questions side by side reinforces the need for researchers and designers to work closely through the design process in order to understand users and their context when designing for resource-constrained environments. In small teams, one person might fulfill both roles in the process. Therefore presenting the information in a table can help a person or team investigate the themes throughout the design process

Table 5. Research and design considerations by theme and category

	Questions for <b>research</b>	Questions for <b>design</b>
<b>Agency</b>		
Resourcefulness	<ol style="list-style-type: none"> <li>1. How do expert users overcome a system's limitations?</li> <li>2. How do expert users exploit their knowledge to bring about desired results?</li> </ol>	<ol style="list-style-type: none"> <li>1. How can the design support expertise?</li> <li>2. How can the expertise of others be designed into the systems or revealed to all users?</li> </ol>
Resilience	<ol style="list-style-type: none"> <li>1. What strategies and tactics do users employ when a system does not meet their needs?</li> <li>2. How do users overcome system constraints in unsanctioned or unsupported ways?</li> <li>3. How do users conceptualize unsanctioned acts? What are the values that support or suppress these acts?</li> <li>4. How would users be impacted if their resilient acts were prevented by a change to the system?</li> </ol>	<ol style="list-style-type: none"> <li>1. How can systems be designed to help people overcome constraints in a way that supports their goals?</li> <li>2. How will design changes or decisions unearth or foreclose unsanctioned behavior? What are the consequences of doing so?</li> <li>3. In what ways can systems be designed to enable opportunities for users to make decisions that support key goals or values?</li> </ol>
Powerlessness	<ol style="list-style-type: none"> <li>1. How do systems reduce a person's ability to act?</li> <li>2. What are the consequences when systems do not work in ways that match users' needs?</li> <li>3. How do changes in systems impact users' abilities to achieve their goals?</li> </ol>	<ol style="list-style-type: none"> <li>1. How can systems be designed to provide a variety of options for users?</li> <li>2. In what ways can the system be designed to empower users?</li> <li>3. How can changes to design provide more (or less) autonomy or freedom?</li> </ol>

## Reciprocity

Questions for **research**

1. In what ways do users engage others in their social networks?
2. How do users leverage their social networks to overcome challenges?
3. In what ways do users maintain their social networks?
4. What are the particular rules and expectations of giving and receiving help, favors, or goods?

Questions for **design**

1. How can the system support social networks, including sharing and leveraging information, expertise, and social capital?
2. How can the system support the norms of reciprocity, repayment of favors, and back-and-forth exchange between social connections?

**Summary**

In this chapter, I presented the findings of the study by revisiting the research questions I originally posed for the study. Each research question points to the findings that address the challenges of researching and designing for resource-constrained populations. The findings demonstrate the ways in which designing for resource-constrained populations poses unique challenges for researchers and designers. They also show how traditional inclusionary methods cannot be used without modification. Finally, looking at the particular challenges that span both of the design ethnographies provided two themes, agency and reciprocity, and how these themes can be used in future studies and designs focused on resource-constrained populations.

## Chapter 8: Conclusion

---

### **Introduction**

As mentioned in Chapter 3, a key component of rigor in qualitative research is the component of reflexivity (Nightingale & Cromby, 1999). Because reflexivity includes consideration of my role as a researcher in the project, I will conclude the dissertation by reflecting on my journey through this process. By clearly articulating my motivations and journey as a researcher, I provide transparency for the audience of this work, and can highlight key elements from the findings. When undertaking a qualitative research project, it is common to hear questions from more positivist scholars who question the subjective nature of qualitative research. I subscribe to the belief that all research has a subjective component and that one of the beneficial aspects of qualitative research is that it both acknowledges subjectivity and includes it within the frame of the research. Therefore, I will use this conclusion as an opportunity to reflect on the experience of the research project and my journey as a researcher. I will also detail some of the limitations of the study and some areas for future research. I will conclude with some final thoughts that crystallize some of the main contributions of this work.

### **Motivations for embarking on this study**

I first want to return to my motivations for embarking on this particular research project. In my job as a user-experience consultant, I do a great deal of work for government organizations. Through this work, I have had the opportunity to connect

with a variety of people who interact with government. Specifically, I have worked with the Department of Social and Human Services and the Department of Labor & Industries in Washington State. As part of my work with these organizations, I participated in research that included people who were poor, who were un- or underemployed, or who had been hurt on the job. Many of these people struggled to make ends meet. Exposure to this diversity piqued my interest in some of the inequities that exist in the use of and access to technology. As I started my doctoral studies, I was drawn to issues related to investigating the digital divide. Much of the work on digital divide issues, however, was focused primarily on the issue of access. While this issue is important, it seemed limited to me. In addition, and in contrast to my experience, much of the focus in the user-experience industry was on designing for e-commerce and on discovering how design could increase business and sales. Not to be critical of this emphasis, but in my experience, it seemed that in most of these conversations, the needs of more vulnerable populations were overlooked or dismissed.

My experience working with government reinforced the idea that the user experience community often does not consider the needs of a broad spectrum of users. As much as methods like user-centered design, advocate for focusing on the needs of users, we tend to design for people who are like us. My suspicion was that overlooking the needs of vulnerable populations adds to the gaps we see in society, that the inequities of society are reflected in the design of systems and services. With this hunch that vulnerable populations might have different or often competing needs, I was eager to learn about the growing field of ICTD (information and communication

technologies for development). ICTD is ultimately an inspiring and, at times, frustrating field. Aspects of ICTD echo the digital divide conversations I found limiting; that is, people often assume that if you add technology to the equation, people's lives will be improved. The beauty of the ICTD field as a whole is that the results require local engagement and a process of trial and error. Many of the leaders in the ICTD field both acknowledge the challenges and are humbled by them. I continue to find their work inspiring.

### **The research process: choosing a theory and the design ethnographies**

This process of research is not a linear one, although it sometimes appears to be so after the fact. During my doctoral studies, I had been taking classes in a variety of disciplines across the university, including anthropology, communications, and woman's studies, and in my home department of Human Centered Design & Engineering. This multi-disciplinary focus was a strength, because it exposed me to a variety of different perspectives, theories, and practices. It was also in some of these other departments that issues of power and inequity were addressed directly, which contrasted with much of my training in engineering. This instruction was insightful, but discussions of power also, at times, felt like limitations (in that it was not possible to resist or to make changes). Whether it was due to my perspective as an engineer or my perspective as an optimist, I still felt compelled to ask what we could do in terms of design to make improvements that would offset these inequities or empower those who are traditionally marginalized. Along this journey, I encountered Giddens'

structuration theory, which turned out to be my main theoretical frame for the dissertation. Structuration provided me with the ability to discuss technology as a factor and structure in society, but not the only factor. It acknowledged the many influences on both people and systems that contribute to the ways that society changes over time. Also, *structuration provided the space for individual action and agency*, which was another reason I was drawn to it as a theoretical frame.

This interest led me to the opportunity to conduct research in Kyrgyzstan as part of the CAICT project and to collect data there for the first design ethnography. It opened my eyes in many ways, but I had several profound revelations during my time in Kyrgyzstan. The first of these was the same thought I have anytime I travel: Even though there are fundamental differences between people—based on religion, culture, race, gender, and geography—there are some universal qualities the world over. We all care deeply about those we love. We want to be safe. We want our children to do well. We want to provide for ourselves and for our families. While these concerns play out differently depending on the context, they recur again and again during both research and travel.

The other revelation that I had while in Kyrgyzstan was that technology and its use, while sometimes seemingly simple, is complicated by a variety of factors that move beyond hardware and connectivity. Issues that impact technology are the same ones that exist in many of the complex systems we face, from economic systems to education. Systems are impacted by a myriad of stakeholders, business interests, intended and unintended consequences, and chance. I felt that talking about

technology as the starting point, or even the ending point, was too limited a perspective.

After the Kyrgyzstan design ethnography, I returned home looking for a dissertation topic. While I would have liked to do more research internationally, I had my own personal constraints. I was expecting my first child at the time and knew that it would have been difficult to do extended fieldwork overseas. While the field of ICTD was blossoming, there was very little work being done on vulnerable populations in more resourced contexts. I was still interested in learning more about vulnerable populations closer to home, which had been my initial interest. I was also inspired by what we had learned about the challenges of transportation, both in Kyrgyzstan and in other developing countries (Bradbury). The challenges of transportation were clear from our interviews with participants, but experiencing the challenges first hand, as an outsider, made them even more explicit. When I was attending a conference on qualitative research in Vancouver, B.C., I read an editorial in the local paper that talked about the link between the lack of access to reliable transportation and poverty. Upon further digging, it became clear that a wealth of research in the field of public policy touched on this challenge (Brabo, et al.; Hanmer, et al., 2000; Sanchez, Shen, & Peng, 2004; Taylor, 2009). This is what prompted me to turn to this topic in the Seattle design ethnography. I wanted to understand the particular challenges people face when transportation is a scarce resource and then brainstorm ways that ICTs could be used to help offset these challenges.

In conducting the Seattle design ethnography, I chose the neighborhood of White Center as my research site because it had unique challenges and the issue of transportation was especially crucial. The rationale for choosing White Center is explained in detail in Chapter 3: *Methodology*.

After collecting the data from the Seattle design ethnography, my research team and I analyzed the data for themes. This is where the original construct of agency arose. The overarching question was: How could technology or ICTs empower those who are transit dependent? Looking at the data yielded the variety of ways that people enacted their agency while dealing with constraints. As a concept, however, agency was too broad, and the three categories therefore emerged to facilitate discussion of the ways in which agency was enabled or constrained by the system. After the data from the Seattle design ethnography had been analyzed, I revisited the data from the Kyrgyzstan study. I recoded the data collected from the Kyrgyzstan study to specifically look for issues of agency. The recoding led to the findings, some which were unique to each design ethnography and others which were similar across the two studies.

### **Areas of uncertainty**

As my topic of choice emerged, I was somewhat uncertain about both the focus of the research and my role in conducting the work. Early in my doctoral program, I took a contemporary ethnography class in the Department of Anthropology. I had discussed my general area of interest with my professor, Dr. Rachel Chapman, who was encouraging, but who also provided some questions for consideration. As was the

case with many other doctoral students in her class, the broad focus of my topic was the study of people who have little power, those who are vulnerable or marginalized. Dr. Chapman encouraged us to consider studying the other end of the power imbalance as well: the institutions and structures that had helped to create and sustain the inequities in society. She called this “studying up.” This advice stayed with me during my research design and was also one of the reasons that structuration theory was a helpful framework: It accounted for an understanding of the interplay between individuals and institutions. In addition, Dr. Chapman’s caution also helped me articulate both the language for and the reasons why I was interested in studying the people who were in my study. It led to the deliberate choice of the term *resource-constrained populations*, rather than standard alternatives, such as *vulnerable* or *poor*. The term *resource-constrained* applies to what people do not have or do not have access to. This makes it a more fluid category, in contrast to the fixed quality implied by the terms *poor* or *vulnerable*. In addition, this perspective of studying up and the influence of structuration allow me to focus on my participants as knowledgeable agents and experts, both in terms of their experience and in their presence in the study. I believe this helped me approach participants in a way that honored their expertise. Acknowledging their expertise and making that the focus of the research also allowed me to be humble and open to their contributions.

Additionally, I had concerns or feelings of uncertainty about my role in the research process and my position of power. In my training as a qualitative researcher, I knew that my status in the research relationship was imbued with a variety of aspects

of power. First, being the one asking the questions immediately creates an imbalance. Second, being white marks me as belonging to a power structure that is the status quo. In both of my design ethnographies, this was relevant. Also, working with people who were oftentimes economically disadvantaged and who therefore contrasted with my status as someone who was economically comfortable and privileged, was also a factor. Within the research context, I found Aanerud's concept of critical whiteness to be helpful (Aanerud). Aanerud critiques white liberalism and shows how it fails to adequately address the problems of racism and often antagonizes tensions by exhibiting paternalistic practices that can be patronizing and condescending. Aanerud's concept of critical whiteness challenges whites to be aware of larger historical contexts and structural forces of racism and to engage in discussions about race in a critical way. The concept of critical whiteness, in addition to other readings in feminism and anthropology, has helped me acknowledge my place within the existing hierarchies. It has also helped me to contemplate the ways in which I could acknowledge and potentially diffuse these issues in my work. Instead of ignoring the aspects of my status that were brought into the research context, I attempted to embrace and reflect upon my motivations, pre-conceived expectations, and position within the research context.

These reflections impacted the studies' methodology. I chose methods which would help to create more space for the participants to contribute to the research effort: specifically, group interviews with socially connected individuals, participatory methods such as video diaries, and ethnography. Also, while enacting these methods, I

aimed to listen more than speak and to reflect upon and check my pre-conceived notions about what I would find.

Other aspects of my identity actually helped me connect with participants in meaningful ways. In two of my groups in the Seattle design ethnography, the primary contacts were women. We shared a variety of experiences related to motherhood. It felt entirely natural to speak with other mothers about motherhood and children, and I did not engage in these conversations with any particular end in view. Nevertheless, I believe that by sharing my personal experiences in this way, I was able to establish a greater level of trust and a deeper bond with these participants.

An additional ethical challenge in the study was related to some of the data that came to light in the interviews, particularly in the Seattle design ethnography. Several of the participants shared their experiences related to fare evasion. Although I had taken steps to ensure anonymity, thereby protecting these particular participants from some sort of punishment, I had concerns about reporting on this data for two reasons. First, these practices, while often acceptable within the participants' own communities, could be criticized by a larger audience that lacks a full understanding of the circumstances that brought these practices into play. Second, bringing unsanctioned or illegal activities to light could expose these practices to authorities who could, in turn, try to curb these types of activities and thus reduce the agency of those involved in the study. After consideration, I decided to report on the data, but to do so in a way that placed these practices in a larger context, that of economic constraints. My aim was to talk about the conditions of people in the study, thereby providing the context and

reasons why these actions were taken. I also aimed to present the actions in a way that is value neutral and does not criticize these practices, but instead reports on them in the broader sense of how people deal with structural constraints. Another consideration I had was that the ORCA system was being implemented in a way that was already attempting to curb this unsanctioned activity; therefore, as King County Metro's report on fare evasion showed, my reporting on fare evasion was not a revelation to the transit authorities (*Report on Fare Evasion on Metro Transit*).

## **Limitations**

Like all research projects, several limitations are evident in this work. First, this research was conducted with a small sample size of two design ethnographies. Although each case was a rich research project, it would be helpful to conduct additional design ethnographies to see how the framework, particularly the findings on agency and reciprocity, holds up—or is expanded—based on additional data from other contexts. A limitation of the Kyrgyzstan study was uncertainty about the precision of the translators. As mentioned in the methodology section, we chose to use translators who were students studying social science at the local university. These researchers spoke the language and provided adequate translation. However, that was not their primary training. Therefore, we privileged a research perspective over a precision with translation. This may have limited some of the data collection. Ideally, it would be beneficial to have local partners who have translation training in addition to interviewing skills and experience.

In the Seattle design ethnography, my aim was to recruit from the specific neighborhood of White Center. However, my recruiting methods ended up drawing participants from further afield. This was primarily because my recruiting method, in line with recommendations from the University's IRB, consisted of posting flyers. I posted flyers in and around White Center, including at local community centers, libraries, and bus stops. It was clear that many of the people who responded had seen the flyers at the bus stops. As White Center is a transportation hub, many people transfer to other buses there. So instead of getting community residents, we ended up getting participants from a much wider geographical area—people who had been passing through White Center on their way to somewhere else.

*An additional limitation of the recruiting method was that the flyers were posted in English and were therefore not accessible to many of the people who live in this diverse area. We attempted to rectify this by locating translators, resubmitting the materials to the IRB, and trying to recruit in other ways. After discussion with the IRB, however, I determined that changing the recruiting protocol in this way and working with a more vulnerable population, such as immigrants, would have led to delays in the data collection. I made the decision to move forward with the sample of participants we had recruited. I would still like to return to other communities in the future and collect more data on their experience with transportation.*

## Further Research

My hope is that other researchers will find this work helpful. In terms of future research, I see several opportunities for additional inquiries. The first is the concept of resource-constraints. There is overlap and difference between developed and developing contexts, but the conceptualization of resource-constrained populations can help researchers see commonality among universal challenges. This concept also allows for more learning across individual cases and sites. The ICTD field already has demonstrated the ability to reflect on challenges, failures and design, it would be helpful to broaden the perspective of ICTD researchers by including resource-constrained populations in the developed contexts. A natural bridge for these two fields is to look at immigrant populations in developing countries and how they face and alleviate constraints. Along the lines of constraints, it would be helpful to investigate the ways in which using a constraint, such as transportation, as the unit of analysis can yield cross-case analysis and help us to examine what works and what does not across a variety of individual studies in particular settings.

Another area for further research is the use of agency and reciprocity as *heuristics for evaluating and designing ICT systems*. Are the three categories of agency included in this study exhaustive or are there further nuances that can help designers and researchers understand and create systems that meet the needs of those who use them?

## Contributions

The motivation for this study was based on my desire to uncover strategies and tactics to contribute to design practices that consider the needs of a wider diversity of users of technology, particularly those who have been traditionally excluded from design. In this section, I provide a summary of the main contributions of this work. The research in this study contributes to the emerging design space of resource-constrained environments (C. Putnam, 2010). Resource-constrained environments offer a way to conceptualize the practices of design that help to solve fundamental human problems and also help to focus on the needs of vulnerable or poor communities. A resource-constrained environment is a productive design space because it encapsulates a wide range of communities in different settings.

*The contributions of this work fall into three categories: methodological, theoretical, and practical.* From a methodological perspective, this dissertation contributes to the field of Human Computer Interaction (HCI) by demonstrating that designing for resource-constrained populations requires different strategies from traditional design and including a more diverse set of people within design research can reflect the broader contexts of use of technology. Including a broader audience requires a reconsideration of our design methods, particularly in cases where designers and researchers are outsiders. When designing for diverse audiences, we learn that people's lives are often very different from our own. Therefore, our approach to this research requires reflection. We need to reflect upon our own assumptions and aim to generate questions that yield unexpected results. By looking for ways in which

traditional inclusionary research methods in HCI can be adapted, we can better understand the contexts of resource-constrained environments and the needs of diverse audiences. A better understanding of resource constraints can yield designs that are more appropriate and well suited to the audience, thereby making the technologies more able to help people overcome the challenges they face. Contributions related to specific methodologies, include the practice of design ethnography and participatory methods like video diaries.

This research also makes several theoretical contributions by positioning constraints to uncover ways in which technology can be used to overcome challenges in daily life. Understanding how people experience challenges helps consider the challenges they face are how these challenges are both enabled by and embedded in their current context, choices, and technologies. By using structuration as a lens, this work examines the notion of agency and how the design of a system can both enable and constrain the agency of the users of that system. Looking specifically at agency as a research agenda can yield unexpected and productive outcomes. The findings in this work point to broader questions about how we as designers and researchers embed not only our values, but the values of the predominant power structures around us, into the design of the technologies we create.

Finally, this dissertation provides some practical considerations for designers and policy makers interested in resource constrained settings. By examining a category of constraints, such as transportation, this research provides a framework to look for commonality across diverse communities struggling with similar challenges. Using a

category of constraints as a boundary mechanism, researchers, designers, and academics can see design problems in a way that allows more collaboration and transparency, which can help generate ideas for resource-constrained communities.

### **Final thoughts**

As the dissertation draws to a close, I am left with several conclusions about the research reported in this work. The first is that methodology is and should be fluid, especially when one is working with inclusionary methodology. The ICTD field has demonstrated that simply transferring technologies from a highly resourced context to a context with fewer resources, such as a developing country, simply will not work. It seems, however, that this realization about technology has not expanded to methodology. Taking methods that are developed in a Western and highly resourced context and simply enacting them in other different contexts is also problematic. Therefore, methodology should not be adhered to dogmatically, but should instead be adapted thoughtfully to suit the context and setting in an appropriate way.

The second takeaway from this work is that understanding the ways that people enact agency in concert with or in spite of existing systems is a rich area of focus for people interested in developing design solutions. Finally, this research demonstrates that looking at different audiences, especially those who are traditionally seen as excluded or marginalized, privileges a different set of design considerations. As inclusionary methodology continues to grow and become the status quo, it is imperative for us to constantly interrogate the ways in which we segment or select

audiences. As researchers and designers in highly resourced environments, we need to question our own ingrained bias—a bias that leads us to make choices and create designs geared towards those who are similar to us. By broadening who we design for, we can create designs that are markedly different from the status quo and can, potentially, improve the conditions of people's lives.

## Appendices

---

### **Appendix A: Recruitment Text for Interviews (Kg)**

The following text was used to recruit participants for the interviews in Kyrgyzstan. It was translated into both Russian and Krygyz.

Would you like to participate in a research study about how people in [name of country] communicate with each another?

The University of Washington in Seattle, USA, invites you to participate in a research study about how people communicate with each other, get information, and use technology to aid in these activities. We are looking for men and women between the ages of 18 – 65 who are willing to be interviewed about communicating with friends and family, how often they talk to family and friends, and how they get information to help them in their daily lives. We will also ask participants to make drawings about how they get information. The interview would take about 2-3 hours, and it would be conducted in either [local language], Russian, or English based on your preference. Interviews will be confidential. You may choose where you would like the interview to take place. We would like to audiotape the interviews, but this is optional. We will also ask if we may photograph or videotape you during the interview, interacting with a cell phone, telephone, or computer, or conducting other activities in your daily environment, but it is not necessary to be photographed or videotaped in order to participate in the study.

We will pay you \$40 for your participation in this study.

If you are interested and would like to learn more, please contact [name of local contact or UW researcher] at [local phone number] or [e-mail address] by [date]. We cannot assure the confidentiality of any information sent by e-mail.

Participation in this study is voluntary.

## Appendix B: Interview Consent form (Kg)

### University of Washington Consent Form The Effect of Information Technology on Society: Using Central Asia to Provide a Global Perspective

**Investigators:** Beth E. Kolko, Professor, (1.206.685.3809, bkolko@u.washington.edu)  
University of Washington, Department of Technical Communication  
Jan Spyridakis, Professor, (1.206.685.1557, jansp@u.washington.edu)  
University of Washington, Department of Technical Communication

*The confidentiality of information sent by e-mail cannot be assured.*

#### **Investigator's Statement**

We are asking you to participate in a research study. The purpose of this consent form is to give you the information you will need to help you decide whether or not to be in the study. Please read the form carefully. You may ask questions about the purpose of the research, what we would ask you to do, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this form that is not clear.

When all your questions have been answered, you can decide if you want to be in the study or not. This process is called 'informed consent.'

#### **Purpose of the Study**

We are studying information technology in Central Asia. By participating in this study, you will help us better understand attitudes and behavior related to technology and Internet access in Central Asia. We are trying to understand how technologies can be developed to better meet the information and communication needs of people in your community.

#### **Procedures**

If you choose to participate in this study, I would like to interview you about how you get information to help you in your daily life, and the people you communicate with in your life. I would like to audiotape your interview so that I can have an accurate record. You have the right to review and delete any portion of the audiotapes. Only the research team will have access to the audiotapes, which will be confidential. We will transcribe your interview tape within 16 weeks of your interview. The tape will be destroyed within a month of transcription.

I would also like to take pictures during your interview so that I can have an accurate record of you and your surroundings. You have the right to review and delete any of these photographs. By indicating your consent on this form for us to take pictures, you

are only agreeing to let us use these photographs for our research. In this case, the photos will only be seen by the research team. Another consent form will allow you tell us if you give us permission to use the photographs in research presentations, publications, etc. We will destroy these photographs ten years after their collection.

I would also like to take some video recordings during your interview so that I can have an accurate record of you and your surroundings. You have the right to review and delete any of these video recordings. By indicating your consent on this form for us to take video recordings, you are only agreeing to let us use these video recordings for our research. In this case, the video will only be seen by the research team. Another consent form will allow you tell us if you give us permission to use the video recordings in research presentations, publications, etc. We will destroy these video recordings ten years after their collection.

Any audiotapes, photographs, and video recordings will be stored separately from the other subject data, linked by unique study codes, and a master list of codes will be kept in a separate, secured location. The master list of codes will be destroyed by August 31, 2008.

I will also ask you to make some drawings that represent your life and how you get information for different purposes. I will not put your name on the drawing, and no one else's name will be on it. I would like to keep your drawings indefinitely for research purposes. I will give you an opportunity to review the drawing before you give your written permission to keep it. If you do not give us your permission to keep the drawing archived, we will destroy it in five years.

#### Risk, Stress, or Discomfort

Some people feel that providing information for research is an invasion of privacy. I have addressed concerns for your privacy in the section below. Some people feel self-conscious when they are audiotaped, photographed, or videotaped. Some people feel self-conscious when they are making drawings.

#### **Benefits of the Study**

You will not directly benefit from participating in the study but we hope that the results will help promote the growth of technology in Central Asia.

#### **Other Information**

Taking part in this study is voluntary. You can stop at any time. Information about you is confidential. We will code the study information. We will keep the link between your name and the code in a separate, secured location until August 31, 2008. Then we will destroy the link. If the results of this study are published or presented, we will not use your name.

University and government staffs sometimes review studies such as this one to make sure they are being done safely and legally. If a review of this study takes place, your records may be examined. The reviewers will protect your privacy. The study records will not be used to put you at legal risk of harm.

We will give you a \$40 honorarium for participating in this study.

I may want to re-contact you in order to clarify information from your interview. Please indicate below whether you give us permission to re-contact you to ask if you would be willing to agree to additional surveys or a possible audiotaped interview. Please indicate below whether or not you give your permission for me to re-contact you. Giving your permission to re-contact you does not obligate you in any way.

Yes    No    I give my permission for the researchers to audiotape my interview.

Yes    No    I give my permission for the researchers to take photographs during my interview.

Yes    No    I give my permission for the researchers to take video recordings during my interview.

Yes    No    I give my permission for the researcher to re-contact me to clarify information or for a future interview.

---

Signature of researcher

Printed name

Date

### **Subject's Statement**

This study has been explained to me. I volunteer to take part in this research. I have had a chance to ask questions. If I have questions later on about the research I can ask one of the investigators listed above. If I have questions about my rights as a research subject, I can call the University of Washington Human Subjects Division at +1.206.543.0098. I will receive a copy of this consent form.

---

Signature of participant

Printed name

Date

## Appendix C: Photograph and Video Usage Informed Consent Form (Kg)

### University of Washington Consent Form The Effect of Information Technology on Society: Using Central Asia to Provide a Global Perspective

**Researchers:** Beth Kolko, Emma Rose, Erica Johnson

**Investigators:** Beth E. Kolko, Professor, (1.206.685.3809, bkolko@u.washington.edu)  
University of Washington, Department of Technical Communication  
Jan Spyridakis, Professor, (1.206.685.1557, jansp@u.washington.edu)  
University of Washington, Department of Technical Communication

*Please note that we cannot ensure the confidentiality of information sent via e-mail.*

#### Researchers' statement

#### USES OF THE RECORDINGS AND PHOTOGRAPHS

We are studying information technology in Central Asia. By participating in this study, you will help us better understand attitudes and behavior related to technology and Internet access in Central Asia. We are trying to understand how technologies can be developed to better meet the information and communication needs of people in your community. We want to record how you interact with information sources in your surroundings. We would like to take photographs and videorecordings so that we have a better record of how you interact with your surroundings. We would like to keep the photos and tapes for ten years.

We may want to use the videotapes, audiotapes, photographs, and drawings for educational presentations or in academic presentations.

It is possible for someone who knows you to recognize your voice or image from the videotape, audiotape, or photograph.

We ask your permission your permission to use the recordings, photographs, and drawings taken today in academic public presentations, educational settings and publications such as journals, magazines, newspapers, and online multimedia publications, and web sites:

---

I give my permission for the research team to use the above videotapes, audiotapes, photographs, and drawings in the following way:

- Academic public presentations
- Educational settings

- Scientific or educational journals, magazines, newspapers
- Online multimedia publications
- Web sites

---

Printed name of researcher  
Date

---

Signature of researcher

**Subject's statement**

I have had an opportunity to review the recordings, photographs, and drawings referenced above. I give my permission to the researchers to use the items as I have indicated above in this consent form. I understand that my name will not be published in connection with any such presentation or publication. I will not receive any compensation for the use of the recordings or photographs. I will receive a copy of this consent form.

---

Printed name of subject  
Date

---

Signature of subject

## Appendix D: Interview Script: (Kg)

The following script was used as a guide in the group interviews in the Kyrgyzstan design ethnography.

### Introducing yourself and the study

*Introduce yourself and describe your background and training.*

I'm interviewing you today as part of a larger study of how people in [name of country] and elsewhere in Central Asia communicate with their family and friends. We are especially interested in learning how people accomplish their day to day tasks by the help of others.

Before we begin, I'd like to explain to you about how I'll ensure the confidentiality of the information you share with me.

*Present and explain the interview consent form; ask interviewee to sign it.*

I would also like to know if you would be willing to have us take some photographs of you in your daily life. We can do the general interview without the photographs if you prefer.

*Present and explain the interview consent form; ask interviewee to sign it.*

Some of the questions I'll ask may seem silly or difficult to answer. There are no right or wrong answers. I'm only interested in your personal opinions and experiences.

Please feel free to interrupt me, ask for clarification, or criticize a line of questioning.

### Interview questions

1. Please tell me a bit about what you did yesterday. I'd like for you to remember some of the people you talked with and what you talked about. Start with the first person you talked to yesterday.
  - a. How did your conversation start? Did you call the person on a phone, did you see them at a café? At work? At the bazaar?
  - b. Did you start the conversation or did the person you were talking to start the conversation? What was the reason you started talking?
  - c. How often do you see this person? How similar are your lives? Do you both have families? *[repeat for other individuals]*
  - d. Do friends and family often come to you for help? If so, what kind of help? If not, do you think there are other people they go to for advice or assistance? If so, tell me about these people, how they know them, why you think they are good sources of help, etc.

2. Tell me about the last time you went to the bazaar.
  - a. When was the last time you went to the bazaar?
  - b. What was the reason to go? What did you want to buy?
  - c. Did you go the bazaar alone or did you go with someone else? If with someone else, who was it?
  - d. Tell me what happened on your way to the bazaar. Did you see or talk to anyone that you know? If you did, what did you talk about?
  - e. When you got to the bazaar, how did you find what you were looking for? Did you talk to anyone? Did anyone help you find what you were looking for?
  - f. What did you do next?
  - g. Did you see or talk to anyone else while you were at the bazaar?
  
3. Think back to last week. Please tell more about the different people who you talked to last week.
  - a. Can you tell me more about what the reasons why you were talking to each person?
  - b. What did you talk about?
  - c. How did your conversation with each person begin? Did you call them on the phone, see them at work,
  
4. Can you think of a specific event in the past week where you were trying to accomplish a task and had difficulty? Maybe think about trying to pay your phone bill or find something specific at a store.
  - a. What were you trying to do?
  - b. Why was it difficult?
  - c. How did you try and get help to get the task accomplished?
  
5. Telephone use
  - a. Do you have a telephone at your home? Do you use a telephone somewhere besides your home?
  - b. Think back to the last time you used your phone. What was the reason, who did you call? What information were you trying to find?
  - c. Do you have a mobile phone? Why did you get a mobile phone? Who do you call on your phone? What do you talk about when you call that person on the phone?
    1. Do you have a mobile phone with you now?
    2. Would you be willing to show me your phone call logs?
    3. (If yes), tell me more about who called you or who you called. What did you talk about?
  - d. Do you always answer the telephone when it rings? If no, why not? How do you know who called? Do you call them back right away?

- e. Generally speaking, what is the purpose for most of the calls you make on the telephone? What about the calls you receive?
6. Do you have concerns about your health? Think back to a time in the past year when you were sick or did not feel well.
  - a. What did you do when you were feeling sick?
  - b. Who did you talk to about your health?
  - c. What did you do as a result of talking to someone about your health?
7. Think back to an example where you were trying to find information about the news. In what ways would you try to find that information? Who would you talk to? If that person could not get you the information you needed, what would you do next?
8. For this next part of our conversation, I would like you to draw a picture for me. I will ask you to draw several things then I will ask you to tell me more about what you drew and why.
  - a. Please draw pictures of the most important people in your life. I am especially interested in the people who help you get things done in your life, people you trust, who have good information that is valuable for you, etc. It's not important for us to know their names, but I'm interested in where you would put them on this diagram. Are they very close to you – do you seem them very often? Are they people you do not see often but who you rely on frequently? If so, please draw them a little further out on the diagram.
  - b. Where do you talk to these people? Draw a picture of where you see or talk to them.
  - c. How do you talk to them? Draw a picture of how you communicate with them: using a telephone, a mobile phone, in person at work, in the neighborhood, at a friend's house, etc.
  - d. What do you talk about? Draw a picture of the last thing you talked about when you talked to these people.
  - e. How would you like to be able to talk to each person in the picture? Do you wish you could see them in person more frequently? Do you wish you could reach them on the telephone more frequently?
9. Now I'd like to ask you to tell me a little about your daily life and the things that are easiest and the things that are most difficult for you. For example, maybe it is easy for you to visit family, but it is more difficult to visit friends. Maybe it is easy to get to your workplace, but it is more difficult to get to a store.
10. Tell me a little bit about the technology you use in your everyday life. Which of these technologies are easiest for you to use? Why? Which are least expensive?

Why? Are there other technologies you would like to use or to use more if they were less expensive? If they were easier to use? Tell me more about this.

- a. How about in the future, in a year from now, or five years from now. What other technologies could you see yourself using or owning?

## Appendix E: Social network forms (Kg)

The following forms were used to capture the responses from participants during the interviews. The questions were designed to uncover details about how the social network played a role in daily life, specifically focusing on how people gave and received help.

### Section 1: Who helps you?

Who helps you to accomplish tasks or resolve issues in your daily life?

	To improve job or employment situation (finding a job, finding information about improving your business, etc.)	To improve ability to accomplish daily tasks (find good prices at shops, pay bills, locate businesses, get health advice, etc.)	To meet new people who are important to you either socially or professionally
Networks			
Closely related family members (siblings, parents, children)			
Nearby friends			
Neighbors			
Urban relatives			
Rural relatives			
Urban friends			
Rural friends			
Work colleagues			
Association colleagues			
NGOs			
Mosque			
Community elder (aksakal)			
Community-Razha (mutual savings/emergency aid clubs)			
Other:			

## Section 2: Who do you help?

Who do you help to solve problems or resolve issues in their daily life?

	To improve job or employment situation (finding a job, finding information about improving your business, etc.)	To improve ability to accomplish daily tasks (find good prices at shops, pay bills, locate businesses, get health advice, etc.)	To meet new people who are important to you either socially or professionally
Networks			
Closely related family members (siblings, parents, children)			
Nearby friends			
Neighbors			
Urban relatives			
Rural relatives			
Urban friends			
Rural friends			
Work colleagues			
Association colleagues			
NGOs			
Mosque			
Aksakal			
Community- <i>Razha</i> (mutual savings/emergency aid clubs)			
Other:			

**Section 3: To Whom Do You Give?**

Kinds of Transactions	Acquaintances	Work or school colleagues	Friends	Members of your extended family	Members of your nuclear family (siblings, grandparents, parents, children)
Gifts of money					
Loans					
Food					
Clothes					
Goods you no longer use (i.e., appliances, furniture)					
Health information					
Advice on schools					
News about community affairs					
News about social events					
Information on how to get around town (travel advice)					
Introductions to potential employers, doctors, school directors and other influential people					
News about arts, music, cultural, and religious events					
Investment					

Kinds of Transactions	Acquaintances	Work or school colleagues	Friends	Members of your extended family	Members of your nuclear family (siblings, grandparents, parents, children)
opportunities					
Advice on dealing with bureaucracy					
Gossip (i.e., news about mutual acquaintances)					

#### Section 4: Who Gives to You?

Kinds of Transactions	Acquaintances	Work or school colleagues	Friends	Members of your extended family	Members of your nuclear family (siblings, grandparents, parents, children)
Gifts of money					
Loans					
Food					
Clothes					
Goods you no longer use (i.e., appliances, furniture)					
Health information					
Advice on schools					
News about community affairs					
News about					

Kinds of Transactions	Acquaintances	Work or school colleagues	Friends	Members of your extended family	Members of your nuclear family (siblings, grandparents, parents, children)
social events					
Information on how to get around town (travel advice)					
Introductions to potential employers, doctors, school directors and other influential people					
News about arts, music, cultural, and religious events					
Investment opportunities					
Advice on dealing with bureaucracy					
Gossip (i.e., news about mutual acquaintances)					

## Appendix F: Ethnography Photo Release (Seattle)

### UNIVERSITY OF WASHINGTON PHOTOGRAPHY RELEASE

#### Investigating transportation challenges in resource-constrained environments

#### Researchers:

Emma Rose, PhD Candidate, Human Centered Design & Engineering  
ejrose@u.washington.edu 206-280-5873

Beth Kolko, Professor, Human Centered Design & Engineering,  
bkolko@u.washington.edu 206-685-3809

Sara DeGruttola, Student, Human Centered Design & Engineering,  
sdegruttola@gmail.com, 206-543-2567

Deidre Girard, Student, Human Centered Design & Engineering,  
deidre@aa.washington.edu. 206-543-2567

Travis Martin, Student, Human Centered Design & Engineering,  
tamartin@u.washington.edu. 206-543-2567

Robert Racadio, Student, Human Centered Design & Engineering,  
racadio@u.washington.edu. 206-543-2567

Joe Sullivan, Student, Human Centered Design & Engineering,  
jcs23@u.washington.edu. 206-543-2567

Please note that we cannot ensure the confidentiality of information sent via e-mail.

#### Researchers' statement

#### USES OF PHOTOGRAPHS

We are investigating people's use of public transportation in the Puget Sound region. As part of this research we are taking pictures of public transportation stops and stations. These include pictures of people waiting for and using public transportation. Your image may appear in a photograph we have taken. We will give you the opportunity to review the photograph. With your permission, we would like to be able to use this photograph in our research.

We may want to use the photographs for educational presentations or in academic presentations. It is possible for someone who knows you to recognize your image from the photograph.

We ask your permission to use the photographs taken today in academic public presentations, educational settings and publications such as journals, magazines, newspapers, and online multimedia publications, and web sites.

I give my permission for the research team to use the photographs in the following ways:

- For the purpose of review by the research team only
- For presentation of the results of the research (academic public presentations, educational settings and publications such as journals, magazines, newspapers, and online multimedia publications, and web sites)

---

Printed name of researcher

---

Signature of researcher

---

Date

**Subject's statement**

I have had an opportunity to review the photograph referenced above. I give my permission to the researchers to use the photographs. I understand that my name will not be published in connection with any such presentation or publication. I will not receive any compensation for the use of the photographs. I will receive a copy of this consent form.

---

Printed name of subject

---

Signature of subject

---

Date

## **Appendix G. Statement for third parties (Seattle)**

### **UNIVERSITY OF WASHINGTON RESEARCHERS STATEMENT FOR THIRD PARTIES Investigating transportation challenges in resource-constrained environments**

We are University of Washington students investigating people's use of public transportation in the Puget Sound region. As part of our research we are observing how people use transportation. As part of this research we are taking notes and pictures of daily use at public transportation stops and stations. For the photographs we are taking, we are focusing on people in large groups and crowds. If we take a photograph of individuals or small groups, we will ask for permission to use these photographs in our research.

If you have questions or concerns, please contact the lead researchers:

Emma Rose, PhD Candidate, Human Centered Design & Engineering  
ejrose@u.washington.edu 206-280-5873

Beth Kolko, Professor, Human Centered Design & Engineering,  
bkolko@u.washington.edu 206-685-3809

Please note that we cannot ensure the confidentiality of information sent via e-mail.

## **Appendix H. Recruitment text for interviews (Seattle)**

Used for posting physical flyers at transportation hubs, stops and stations in Puget Sound

Do you use public transportation to get around? Are you 18 years or older? Would you like to participate in a study about how people make choices about the transportation they use?

A team of researchers at the University of Washington invites you to participate in a research study about how people use public transportation in and around Puget Sound. We are looking for bus, rail or train users who are willing to be interviewed about how they use transportation.

The interview will take approximately two hours to complete. The research will be conducted at a location convenient for you. We will ask you questions about how you make choices about transportation. The interviews are completely confidential and taking part in this study is voluntary. Participants will receive a gratuity of \$20 for their participation.

If you are interested in participating, please contact [name of researcher] at [phone number] or [e-mail address] by [date].

*We cannot assure the confidentiality of any information sent by e-mail.*

## Appendix I. Screening questions for interviews (Seattle)

We are conducting a research study about how people use public transportation in and around Puget Sound. May I ask you to answer several questions to see if you qualify?

1. Do you own a car?  
Yes  
No
2. Do you ever use public transportation?  
Yes  
No (Thank and end)
3. How many days a week do you use public transportation during the week (this can include: buses, light rail, trains)?
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7
4. How many days a week do you use shared transportation during the week (this can include carpooling, vanpooling or other shared)
  - 1
  - 2
  - 3
  - 4
  - 5
  - 6
  - 7

The following questions are optional and are for categorization purposes only:

1. What is your gender?  
Male  
Female  
Prefer not to say
2. What is your age?  
Under 18 (Thank and End)  
18-24

25-30  
31-40  
41-50  
51-60  
61-70  
Over 70  
Prefer not to say

3. Which of these best represents your ethnicity?

Asian/Pacific Islander

African American

Caucasian

Hispanic/Latino

Other: \_\_\_\_\_

Prefer not to say

## Appendix J. Interview Consent Form (Seattle)

### UNIVERSITY OF WASHINGTON CONSENT FORM

Investigating transportation challenges in resource-constrained environments

Researchers:

Emma Rose, PhD Candidate, Human Centered Design & Engineering  
ejrose@u.washington.edu 206-280-5873

Beth Kolko, Professor, Human Centered Design & Engineering,  
bkolko@u.washington.edu 206-685-3809

Sara DeGruttola, Student, Human Centered Design & Engineering,  
sdegruttola@gmail.com, 206-543-2567

Deidre Girard, Student, Human Centered Design & Engineering,  
deidre@aa.washington.edu. 206-543-2567

Travis Martin, Student, Human Centered Design & Engineering,  
tamartin@u.washington.edu. 206-543-2567

Robert Racadio, Student, Human Centered Design & Engineering,  
racadio@u.washington.edu. 206-543-2567

Joe Sullivan, Student, Human Centered Design & Engineering,  
jcs23@u.washington.edu. 206-543-2567

*Please note that we cannot ensure the confidentiality of information sent via e-mail.*

#### **Researchers' statement**

We are asking you to be in a research study. The purpose of this consent form is to give you the information you will need to help you decide whether to be in the study or not. Please read the form carefully. You may ask questions about the purpose of the research, what we would ask you to do, the possible risks and benefits, your rights as a volunteer, and anything else about the research or this form that is not clear. When we have answered all your questions, you can decide if you want to be in the study or not. This process is called "informed consent." We will give you a copy of this form for your records.

#### **PURPOSE OF THE STUDY**

We are investigating transportation challenges in the Puget Sound region. We are interested in learning about people's experience of public transportation and how they make choices about how to get from place to place. We are also interested to learn about how friends and family play a role in transportation choices.

### **STUDY PROCEDURES**

During this interview, we interview you about your transportation choices. We will interview you and the other people in this session as a group and then individually. The interview today will last two hours.

You have the right to refuse to answer any question at any time. We will be making an audio recording of today's session. This audio will only be used to capture the conversation. We will not share the audio recordings with any one else.

### **RISKS, STRESS, OR DISCOMFORT**

Some people feel that providing information for research is an invasion of privacy.

### **BENEFITS OF THE STUDY**

We want to better understand how people use transportation as part of the daily lives in and around Puget Sound. We hope the results of this study will help us design better transportation solutions. You may not directly benefit from taking part in this research study.

### **OTHER INFORMATION**

You may refuse to participate and you are free to withdraw from this study at any time without penalty or loss of benefits to which you are otherwise entitled. All of the information you provide will be anonymous. As part of your participation in today's interview, you will be given a \$20 gift card.

### **PHOTO RELEASE**

During today's interview, we may ask if we can take your photograph. With your permission, we would like to be able to use this photograph in our research. We may want to use the photographs for educational presentations or in academic presentations. It is possible for someone who knows you to recognize your image from the photograph.

We ask your permission to use the photographs taken today in academic public presentations, educational settings and publications such as journals, magazines, newspapers, and online multimedia publications, and web sites.

I give my permission for the research team to use the photographs

Yes

No

---

Printed name of study staff obtaining consent      Signature      Date

**Participant's statement**

This study has been explained to me. I volunteer to take part in this research. I have had a chance to ask questions. If I have questions later about the research, I can ask one of the researchers listed above. If I have questions about my rights as a research subject, I can call the Human Subjects Division at (206) 543-0098. I will receive a copy of this consent form.

---

Printed name of participant

Signature of participant

Date

## Appendix K. Interview questions (Seattle)

### UNIVERSITY OF WASHINGTON USER INTERVIEW SCRIPT

#### Investigating transportation challenges in resource-constrained environments

To be filled by interviewer

Date: \_\_\_\_\_

Time: \_\_\_\_\_

Participant Code: \_\_\_\_\_

Agreed to be interviewed

Agreed to be audio taped

Agreed to be photographed

### Interview questions

#### Group interview

The following questions will be asked to in a group format with everyone participating in a group discussion.

1. Who in this group owns a car?
  - a. How long have you owned it?
  - b. When do you drive it?
  - c. Where do you drive your car? How frequently do you drive there?
  - d. What are some places you drive to less frequently?
  - e. Do you share the car with others?
  - f. Do you give other people rides? If so, who do you give rides too and to where?
  
2. How often do you give each other rides?
  - a. How do you decide who drives?
  - b. What are the circumstances you would ride together vs. take the bus?
  - c. What are the circumstances where you wouldn't ride together?
  - d. Do you compensate each other for rides? Do you pay for gas? Or do something less formally?
  
3. Do you get/give rides to/from other people?
  - a. Who gives you rides?
  - b. Why?
  - c. Where?

- d. How do you arrange rides?
4. Please tell me a bit about the last time you took public transportation (bus, light rail, train, etc)
  - a. What form of public transportation did you take?
  - b. How did you find out schedules and fares?
5. What do you like about public transportation (aka taking the bus)?
  - a. What do you dislike about it?
  - b. What would make it better?
6. Do you work or go to school?
  - a. How do you typically get there?
  - b. Other ways?
  - c. What makes you choose one option over the other?
7. Can you think of a specific time in the past when you had a challenge getting somewhere you needed to go. Maybe think about having to be somewhere at a specific time (work, school etc) or if you had to pay a bill or had to move something?
  - a. What were you trying to do?
  - b. Why was it difficult?
  - c. How did you try and get help to get the task accomplished?
8. Technology use
  - a. Mobiles
    1. Do you have a mobile phone? What kind?
    2. Do you have a data plan? Do you use the internet on your phone?
    3. Do you text? With whom/when? Do you subscribe to any SMS/text messaging alerts?
    4. Do you ever use your mobile phone to access transportation information?
  - b. Web
    1. Do you use the web? What for?
    2. Where do you access the internet?
    3. How often do you access the internet?
    4. How long have you been using the internet?
    5. Typically, how long are you online at any one time?
    6. Do you ever use the web to access transportation information?
9. Where do you take public transportation?
  - a. School
  - b. Work
  - c. Doctor's appointments

- d. Going to friend's homes
- e. Going out for entertainment
- f. Grocery shopping
- g. Running errands
- h. Others....

10. Ride sharing

- a. Do you ever share rides with other people? If so, how, why or where?

11. What else is challenging about getting to where you need to go in and around Puget Sound? What other ideas do you have to make it better?

### **Individual interviews**

The following questions will be asked one on one with participants.

#### **Tell me about your daily commute**

1. Walk me through a typical daily commute?
2. How do you get where you are going?
3. What's difficult?
4. What do you like about it?

#### **For participants who own cars:**

1. Can you tell me a bit more about your car?
  - a. How long have you owned your car?
  - b. How would you describe your car to someone else?
  - c. What is it like to own your car?
  - d. How often do your friends or family rely on you for transportation?
  
2. If you were driving somewhere alone, which of the following circumstances would you be willing to give someone a ride?
  - a. A friend or family member looking for a ride
  - b. The friend of a friend (or family member) that you had previously met
  - c. The friend of a friend (or family member) that you had not previously met
  - d. Someone hanging out in the neighborhood who was looking for a ride
  - e. Someone posting for a ride on your company or school bulletin board
  - f. Someone posting for a ride on Craigslist or another web site
  - g. Someone hitchhiking at the entrance to the freeway
  
3. Are there other circumstances where you might give someone a ride?

#### **For participants who do not own a car:**

1. If you need to get somewhere and didn't have a ride, which of the following circumstances would you consider?
  - a. Hitchhiking at the entrance to the freeway
  - b. Posting for a ride on Craigslist or another web site
  - c. Posting for a ride on your company or school bulletin board
  - d. Asking someone in the neighborhood for a ride
  - e. Asking a friend or family member for a ride
  - f. The friend of a friend (or family member) that you had previously met
  - g. The friend of a friend (or family member) that you had not previously met
2. Are there other circumstances where you might give someone a ride?
3. Can you tell me more about the role of public transportation in your life?
  - a. How would you characterize your time taking public transportation?
4. What would you change about your transportation options if you could?

This is the end of the interview. Thank you so much for your time. We value your opinions on the questions we've asked today. We may have some follow-up research activities in the future. Would you be willing to participate in a follow-up survey/interview in the future?

- Yes
- No

If yes, Email: \_\_\_\_\_

## **Appendix L. Consent form (Seattle)**

### **UNIVERSITY OF WASHINGTON CONSENT FORM**

#### **Investigating transportation challenges in resource-constrained environments**

#### **Researchers:**

Emma Rose, PhD Candidate, Human Centered Design & Engineering 206-280-5873  
Beth Kolko, Professor, Human Centered Design & Engineering, 206-685-3809

*Please note that we cannot ensure the confidentiality of information sent via e-mail.*

#### **PURPOSE OF THE STUDY**

We are investigating people's experience of public transportation in the Puget Sound region. We are interested in learning how you experience transportation by creating a video diary.

#### **STUDY PROCEDURES**

We will ask you to take videos and/or still pictures of your transportation experiences over the course of a week. First, we will provide you with an overview and some instructions. Next, you will take videos and pictures of your transportation experience. Then, we will meet to watch the video and ask you some follow up questions.

You have the right to refuse to answer any question at any time or refuse to show the video to the research team.

#### **RISKS, STRESS, OR DISCOMFORT**

Some people feel that providing information for research is an invasion of privacy. Some people feel awkward taking video or photography in public.

#### **BENEFITS OF THE STUDY**

We want to better understand how people use transportation as part of the daily lives in and around Puget Sound. We hope the results of this study will help us design better transportation solutions. You may not directly benefit from taking part in this research study.

#### **VIDEO RELEASE**

The video will remain in your possession at all time. After viewing the video together, we may ask you to share the video with the research team. If you agree, we will provide a video release form for you to complete. You are under no obligation to share the video with the research team.

**OTHER INFORMATION**

You may refuse to participate and you are free to withdraw from this study at any time. As part of your participation in this activity, you will be given a video camera that is yours to keep.

---

Printed name of study staff obtaining consent

Signature

Date

**Participant's statement**

This study has been explained to me. I volunteer to take part in this research. I have had a chance to ask questions. If I have questions later about the research, I can ask one of the researchers listed above. If I have questions about my rights as a research subject, I can call the Human Subjects Division at (206) 543-0098. I will receive a copy of this consent form.

---

Printed name of participant

Signature of participant

Date

## Appendix M. Video Diary Prompts (Seattle)

### UNIVERSITY OF WASHINGTON Video Diary Prompts Investigating transportation challenges in resource-constrained environments

#### Video diary exercise

For this research activity, we are asking you to create a video diary of your experience of public transportation. The following document provides some guidelines for this activity. If you have any questions about this activity, email or call:

Emma Rose, ejrose@u.washington.edu 206-280-5873

*Please note that we cannot ensure the confidentiality of information sent via e-mail.*

NOTE: Please do not take video if you are involved in the operation of any type of transportation (car, bike, bus, etc) Please keep safety in mind at all time.

#### Prior to transportation

Take video of you starting your day, what do you do before you leave your home, think about:

- How do you determine what mode of transportation you will take? Is it about the weather, time of your, what you need to take with you?
- How do you find out when it will arrive?
- How do you decide when to leave your home?

#### During the use of transportation

Take video of the time you spend using public transportation

- Waiting for the bus or light rail
- Checking the schedule (at the bus stop, on your computer or phone)
- Getting on or off the bus or light rail
- While you are on the bus or light rail
- If you are carpooling or ridesharing and someone else is driving, taking video of the time in the car or van

#### After the use of transportation

After you get to where you, think about:

- How the transportation impacted your day so far?
- What you might change about the experience?
- What you like about the experience?

## **Appendix N. Video diary debrief (Seattle)**

**UNIVERSITY OF WASHINGTON**

**USER INTERVIEW SCRIPT**

**Investigating transportation challenges in resource-constrained environments**

### **Video diary debrief**

Last week, we asked you to take some video of your experience using public transportation. We'd like to talk to you more about that experience.

General comments of taking video

In general, what was the experience of taking video like for you? What was difficult?

What was easy?

Did you capture any video you would like to share with us?

### **Specific questions on the video**

For each video segment:

Why did you share this with us?

What did this say about your experience?

What this a typical experience for you? Why or why not?

What does this show about your experience in general?

### **Video release**

Thank you for sharing these videos with us.

Are you interested in giving us copies of any of the videos you created during this project?

Are you interested in sharing these videos with other members of the community? If so, who?

Would you be interested in sharing these videos with people who make policy decisions about transportation (public officials, elected representatives, etc)?

## Appendix O. Video release (Seattle)

### UNIVERSITY OF WASHINGTON VIDEO RELEASE

#### Investigating transportation challenges in resource-constrained environments

#### Researchers:

Emma Rose, PhD Candidate, Human Centered Design & Engineering 206-280-5873

Beth Kolko, Professor, Human Centered Design & Engineering, 206-685-3809

*Please note that we cannot ensure the confidentiality of information sent via e-mail.*

#### Researchers' statement

##### USES OF PHOTOGRAPHS

We are investigating people's experience of public transportation in the Puget Sound region. We have asked you to create a video diary of your experience with public transportation. We would like to keep a copy of the videos you have created for five years.

We may want to use the photographs for educational presentations or in academic presentations.

*It is possible for someone who knows you to recognize your image from the video.*

We ask your permission to use the photographs taken today in academic public presentations, educational settings and publications such as journals, magazines, newspapers, and online multimedia publications, and web sites.

I give my permission for the research team to use the videos

- For the purpose of review by the research team only
- For presentation of the results of the research (academic public presentations, educational settings and publications such as journals, magazines, newspapers, and online multimedia publications, and web sites)

---

Printed name of researcher

---

Signature of researcher

---

Date

**Subject's statement**

I have had an opportunity to review the videos referenced above. I give my permission to the researchers to use the videos. I understand that my name will not be published in connection with any such presentation or publication. I will not receive any compensation for the use of the videos. I will receive a copy of this consent form.

---

Printed name of subject

Date

Signature of subject

## **Appendix P. Video diary statement for third parties (Seattle)**

**UNIVERSITY OF WASHINGTON  
RESEARCHERS STATEMENT FOR THIRD PARTIES  
Investigating transportation challenges in resource-constrained environments**

I am taking part in a research project being conducted by a team of researchers the University of Washington. They are investigating people's use of public transportation in the Puget Sound region. As part of this research, I am creating a video diary of my daily commute. I am taking videos and pictures and at times providing commentary as I commute today. If my videos include pictures of people waiting for and using public transportation, the research team will attempt to preserve the anonymity of anyone else in the video.

If you have questions or concerns, please contact the lead researchers:  
Emma Rose, PhD Candidate, Human Centered Design & Engineering  
ejrose@u.washington.edu 206-280-5873

## References

---

- Aanerud, R. (1999). *Now More Than Ever: James Baldwin and the Critique of White Liberalism*. James Baldwin Now New York City New York University Press.
- Abraham, R. (2007). Mobile Phones and Economic Development: Evidence From the Fishing Industry in India. *Information Technologies & International Development*, 4(1), 5-17.
- Ahearn, L. (2001). Language and agency. *Annual review of anthropology*, 109-137.
- Anderson, R., Poon, A., Lustig, C., Brunette, W., Borriello, G., & Kolko, B. Building a transportation information system using only GPS and basic SMS infrastructure. *Information and Communication Technologies and Development (ICTD), 2009 International Conference on* 3, 5.
- Anokwa, Y., Smyth, T., Ramachandran, D., Sherwani, J., Schwartzman, Y. Luk, R., Ho, M., Moraveji, N., DeRenzi, B. (2009). Stories from the Field: Reflections on HCI4D Experiences. *Information Technologies & International Development*, 5(4), 101-116.
- Antin, J. (2005). Cultural Assessment for Sustainable Kiosk Projects. Annual Meeting of the American Anthropological Association. November 2005, Washington, DC.
- Arnett, J. J. (2007). *International encyclopedia of adolescence: A-J, index, Volume 1* (Vol. 1): Routledge.
- Atkinson, P., & Hammersley, M. (1994). Ethnography and participant observation. *Handbook of qualitative research*, 248, 261.
- Bailur, S. (2007, May 28-30). *The Complexities of Community Participation in the ICT for Development Projects: The case of "Our Voices"*. Paper presented at the International Conference on Social Implications of Computers in Developing Countries, Sao Paulo, Brazil.

- Basha, E., & Rus, D. (2007, Dec 15-16). *Design of Early Warning Flood Detection Systems for Developing Countries*. Paper presented at the Information and Communication Technologies and Development, ICTD 07, Bangalore, India.
- Bernard, H. R. (2005). *Research methods in anthropology: qualitative and quantitative approaches*  
: AltaMira Press.
- Best, M. L., Thakur, D., & Kolko, B. E. (2009, April 17-19). *The contribution of user-based subsidies to the impact and sustainability of telecenters – the eCenter project in Kyrgyzstan*. Paper presented at the Information and Communication Technologies and Development, ICTD 09, Doha, Qatar.
- Beyer, H., & Holtzblatt, K. (1998). *Contextual Design: Defining Customer-Centered Systems*. San Francisco, CA: Morgan Kaufmann.
- Bias, R. G., & Mayhew, D. J. (2005). *Cost-justifying usability: An update for the Internet age*. (Second ed.). San Francisco, CA: Morgan Kaufmann.
- Blumberg, S. J., & Luke, J. (2010). Wireless substitution: state-level estimates from the National Health Interview Survey, January-June 2010. Retrieved from <http://www.cdc.gov/nchs/data/nhis/earlyrelease/wireless201012.htm>
- Bourdieu, P. (1986). The forms of capital *Handbook of Theory and Research for the Sociology of Education* (pp. 241-258). Westport, CT: Greenwood.
- boyd, d. (2004). *Friendster and Publicly Articulated Social Networks*. Paper presented at the Proceedings of the conference on Human Factors and Computing Systems, Vienna.
- Brabo, L., Kilde, P., Pesek-Herriges, P., Quinn, T., & Sanderud-Nordquist, I. (2003). Driving out of poverty in private automobiles. *Journal of Poverty*, 7(1), 183-196.
- Transport, mobility and social capital in developing countries, 159 Cong. Rec. 79-86 (2006).
- Brewer, E., Demmer, M., Du, B., Ho, M., Kam, M., Nedeveschi, S., et al. (2006). The Case for Technology in Developing Regions. *Computer*, 38(6), 25-38.

- Brewer, E., Demmer, M., Ho, M., Honicky, R. J., Pal, J., Plauché, M., et al. (2006). The Challenges of Technology Research for Developing Regions. *IEEE Pervasive Computing*, 5(2), 12-23.
- Slugging in Houston-Casual Carpool Passenger Characteristics, 9 Cong. Rec. 23 (2006).
- Byrne, E., & Sahay, S. (2007). Participatory design for social development: A South African case study on community-based health information systems. *Information Technology for Development*, 13(1), 71-94.
- Chambers, R. (2005). *Ideas for Development*. London, UK: Earthscan.
- Coffey, A., & Atkinson, P. (1996). Concepts and coding *Making Sense of Qualitative Data*: Sage Publications.
- Cooper, A., R. Reinmann, D. Cronin. (2007). *About Face 3: The Essentials of Interaction Design*. Indianapolis, IN: Wiley Publishing.
- Courage, & Baxter. (2004). *Understanding Your Users: A Practical Guide to User Requirements Methods, Tools, and Techniques*.
- Cresswell. (2003). *Framework for Design Research Design: Qualitative, Quantitative and Mixed Method Approaches*.
- Dearden, A. (2008). User-Centered Design Considered Harmful (with apologies to Edsger Dijkstra, Niklaus Wirth, and Don Norman). *Information Technologies & International Development*, 4, 7-12.
- Denzin, N., & Lincoln, Y. (Eds.). (2003). *Collecting and Interpreting Qualitative Materials* (Second ed.). Thousand Oaks: Sage.
- DeRenzi, B., Lesh, N., Parikh, T., Sims, C., Maokla, W., Chemba, M., et al. (2008). *E-imci: improving pediatric health care in low-income countries*. Paper presented at the Twenty-sixth annual SIGCHI conference on Human factors in computing systems, SIGCHI 08 Florence, Italy.
- Dias, M. B., & Brewer, E. (2009). How computer science serves the developing world. *Communications of the ACM*, 52(6), 74-80.

- Dieberger, A., Dourish, P., Hook, K., Resnick, P., & Wexelblat, A. (2000). Social Navigation: Techniques for Building More Usable Systems. *interactions*, 7(6), 36-45.
- Donner, J. (2005). *The rules of beeping: exchanging messages using missed calls on mobile phones in sub-Saharan Africa*. Paper presented at the International Communication Association, New York.
- Donner, J. (2008). Research Approaches to Mobile Use in the Developing World: A Review of the Literature. *The Information Society*, 24(3), 140-159.
- Donner, J., Gandi, R., Javid, P., Medhi, I., Ratan, A., Toyama, K., et al. (2008). Stages of Design in Technology for Global Development. *Computer*, 41(6), 34-41.
- Ehn, P. (1993). Scandinavian design: On participation and skills. *Usability: Turning technologies into tools*. New York: Oxford.
- Ellis, C. S., & Bochner, A. P. (2003). Autoethnography, Personal Narrative, Reflexivity *Collecting and Interpreting Qualitative Materials* (Second ed.). Thousand Oaks, California: Sage.
- Ferris, B., Watkins, K., & Borning, A. (2010). OneBusAway: results from providing real-time arrival information for public transit. *Proceedings of the 28th international conference on Human factors in computing systems*, 1807-1816.
- Frey, J., & Fontana, A. (1991). The group interview in social research. *The Social Science Journal*, 28(2), 175-187.
- Friedman, B. (1996). Value-sensitive design. *interactions*, 3(6), 16-23.
- Friedman, B., Kahn, P., & Borning, A. (2006). Value Sensitive Design and Information Systems *Human-computer interaction in management information systems: Foundations* (pp. 348-372). New York: Armonk.
- Gandhi, R., Veeraraghavan, R., Toyama, K., & Ramprasad, V. (2007, Dec 15-16). *Digital Green: Participatory Video for Agricultural Extension* Paper presented at the Information and Communication Technologies and Development, ICTD 07, Bangalore, India.
- Reconsidering social equity in public transit, 13 Cong. Rec. 6-27 (1999).

- Garside, B. (2009). Village voice: towards inclusive information technologies. *International Institute for Environment and Development (IIED)*. Retrieved from <http://www.iied.org/pubs/pdfs/17051IIED.pdf>
- Gaver, W., Dunne, T., & Pacenti, E. (1999). Cultural probes. *interactions*, 6(1), 21-29.
- Geertz, C. (2002). Thick description: Toward an interpretive theory of culture. *Culture: Critical Concepts in Sociology*, 173.
- Giddens, A. (1984). *The Constitution of Society*. Cambridge: Polity Press.
- Gitau, S., Marsden, G., & Donner, J. (2010). After access: challenges facing mobile-only internet users in the developing world. *Proceedings of the 28th international conference on Human factors in computing systems*, 2603-2606.
- Glaser, B. (1998.). *Doing Grounded Theory - Issues and Discussions*. : Sociology Press.
- Goldman, A. (1962). The group depth interview. *The Journal of Marketing*, 26(3), 61-68.
- Gorman, T., Rose, E., Yaaqoubi, J., Bayor, A., & Kolko, B. (2011). *Adapting Usability Testing for Oral, Rural Users*. Paper presented at the Proceedings of the 27th International Conference on Human Factors in Computing Systems, CHI 11, Vancouver, B.C.
- Gould, J. D., & Lewis, C. (1985). Designing for usability: Key principles and what designers think. *Communications of the ACM*, 28(3), 300-311.
- Gouldner, A. W. (1960). The norm of reciprocity: A preliminary statement. *American sociological review*, 25(2), 161-178.
- Granovetter, M. (1973). The strength of weak ties. *American Journal of Sociology*, 78(6), 1360-1380.
- Granovetter, M. (1983). The Strength of Weak Ties: A Network Theory Revisited. *Sociological Theory*, 1, 201-223.
- Greenwood, D., & Levin, M. (2006). *Introduction to Action Research: Social Research for Social Change*. London: Sage.

- Guo, S., Falaki, M. H., Oliver, E. A., Rahman, S. U., Seth, A., Zaharia, M. A., et al. (2007). Very low-cost internet access using KioskNet. *ACM SIGCOMM Computer Communication Review* 37(5), 95-100.
- Handrahan, L. (2004). Hunting for Women. *International Feminist Journal of Politics*, 6(2), 207-233.
- Hanington, B. (2003). Methods in the Making: A Perspective on the State of Human Research in Design. *Design Issues*, 19(4).
- Hanmer, L., Booth, D., & Lovell, E. (2000). Poverty and Transport. *report prepared for the World Bank in collaboration with DFID, Overseas Development Institute*.
- Highet, G. (2003). Cannabis and smoking research: interviewing young people in self-selected friendship pairs. *Health education research*, 18(1), 108.
- Kalra, N., Lauwers, T., Dewey, D., Stepleton, T., & Dias, M. B. (2007, Dec 15-16). *Iterative Design of A Braille Writing Tutor to Combat Illiteracy*. Paper presented at the Information and Communication Technologies and Development, ICTD 07, Bangalore, India.
- Kam, M., Kumar, A., Jain, S., Mathur, A., & Canny, J. (2009, April 17-19). *Improving Literacy in Rural India: Cellphone Games in an After-School Program*. Paper presented at the Information and Communication Technologies and Development, ICTD 09, Doha, Qatar.
- Kam, M., Ramachandran, D., Devanathan, V., Tewari, A., & Canny, J. (2007). *Localized iterative design for language learning in underdeveloped regions: the PACE framework*. Paper presented at the SIGCHI conference on Human factors in computing systems, SIGCHI 07, San Jose, California, USA.
- Karat, J., & Karat, C. (2003). The evolution of user-centered focus in the human-computer interaction field. *IBM Systems Journal*.
- Kendall, J., & Singh, N. (2007). Internet Kiosks in Rural India: What Influences Success? Retrieved from <http://mpra.ub.uni-muenchen.de/4320/>

- Kleinbach, R., & Salimjanova, L. (2007). Kyz ala kachuu and adat: non-consensual bride kidnapping and tradition in Kyrgyzstan. *Cent. Asian Survey*, 26(2), 217-233.
- Kolko, B., Rose, E., & Johnson, E. (2007, May 8-12, 2007 ). *Communication as Information-Seeking: The Case for Mobile Social Software for Developing Regions*. Paper presented at the World Wide Web, WWW 2007, Banff, Alberta, Canada.
- Kraemer, K. L., Dedrick, J., & Sharma, P. (2009). One laptop per child: vision vs. reality. *Communications of the ACM* 52(6), 66-73.
- Kuehnast, K., & Dudwick, N. (2002). Better a Hundred Friends Than a Hundred Rubles? Social Networks in Transition – The Kyrgyz Republic. *World Bank Economists' Forum*, 2, 51-88.
- Kumar, A., Rajput, N., Agarwal, S., Chakraborty, D., & Nanavati, A. A. (2008, April 21-25). *Organizing the Unorganized – Employing IT to Empower the Underprivileged*. Paper presented at the World Wide Web, WWW '08, Beijing, China.
- Kumar, R. (2004). eChoupals: A Study on the Financial Sustainability of Village Internet Centers in Rural Madhya Pradesh. *Information Technologies and International Development*, 2(1), 45-74.
- Kuriyan, R., Toyama, K., & Ray, I. (2006, May25-26). *Integrating Social Development and Financial Sustainability: The Challenges of Rural Computer Kiosks in Kerala*. Paper presented at the Information and Communication Technologies and Development, ICTD '06. , Berkeley, California, USA.
- Lamb, R., & Kling, R. (2003). Reconceptualizing Users as Social Actors in Information Systems Research. *MIS Quarterly*, 27(2), 197-235.
- Le Dantec, C., A., & Edwards, W. K. (2008). Designs on dignity: perceptions of technology among the homeless. Paper presented at the Proceeding of the twenty-sixth annual SIGCHI conference on Human factors in computing systems.

- Le Dantec, C. A., Poole, E. S., & Wyche, S., P. (2009). Values as lived experience: evolving value sensitive design in support of value discovery. Paper presented at the Proceedings of the 27th international conference on Human factors in computing systems.
- liu, L. (2005). *Making Conections: Data from the Community Perspective*. Paper presented at the Driving Change and Getting Results: Exploring Approaches to Performance Measures and Community Indicators in the Cascadia Region, Bellevue, WA.
- Luk, R., Ho, M., & Aoki, P. M. (2008). *Asynchronous remote medical consultation for Ghana*. Paper presented at the Twenty-sixth annual SIGCHI conference on Human factors in computing systems, SIGCHI 08 Florence, Italy.
- Martínez, A., Villarroel, V., Seoane, J., & Pozo, F. d. (2005). Analysis of Information and Communication Needs in Rural Primary Health Care in Developing Countries. *IEEE Transactions on Information Technology in BioMedicine*, 9(1), 66-72.
- Mathee, K. W., G. Mweemba, A. V. P., & Stam, G. v. (2007, Dec 15-16). *Bringing Internet connectivity to rural Zambia using a collaborative approach*. Paper presented at the Information and Communication Technologies and Development, ICTD 07, Bangalore, India.
- McPherson, M., Smith-Lovin, L., & Cook, J. M. (2001). Birds of a feather: Homophily in social networks. *Annual review of sociology*, 27, 415-444.
- Medhi, I., Sagar, A., & Toyama, K. (2007). Text-free user interfaces for illiterate and semiliterate users. *Information Technologies and International Development*, 4(1), 37-50.
- Medhi, I., & Toyama, K. (2007, Dec 15-17). *Full-Context Videos for First-Time, Non-Literate PC Users* Paper presented at the Information and Communication Technologies and Development, ICTD 07, Bangalore, India.
- Mills-Tettey, G. A., Mostow, J., Dias, M. B., Tracy Morrison Sweet, Belousov, S. M., Dias, M. F., et al. (2009, April 17-19). *Improving Child Literacy in*

- Africa: Experiments with an Automated Reading Tutor*. Paper presented at the International Conference on Information and Communication Technologies and Development, ICTD 09, Doha, Qatar.
- Mulder, S., Z. Yaar. (2007). *The user is always right : a practical guide to creating and using personas for the Web*. . Berkeley, CA, USA: New Riders.
- Muller, M. J. (Ed.). (2002). *Participatory Design: The Third Space in HCI*. Mahwah, NJ: Lawrence Erlbaum Associates, Inc.
- Nightingale, D. J., & Cromby, J. (1999). *Social constructionist psychology: A critical analysis of theory and practice*. Buckingham: Open University Press.
- Norman, D. (2006). Words matter. Talk about people, not customers, not consumers, not users. *interactions*, 13(5), 49-63.
- Ojo, T. (2005). Wiring sub-Saharan Africa for development. *International Journal of Education and Development using Information and Communication Technology (IJEDICT)*, 1(3), 94-107.
- Oliffe, J., & Bottorff, J. (2007). Further than the eye can see? Photo elicitation and research with men. *Qualitative Health Research*, 17(6), 850.
- Pal, J. (2007, Dec 15-16). *Examining e-literacy Using Telecenters as Public Spending: The Case of Akshaya*. Paper presented at the Information and Communication Technologies and Development, ICTD 07, Bangalore, India.
- Patton, M. Q. (1990). *Qualitative evaluation and research methods* (2nd ed.). Newbury Park, CA: Sage Publications.
- Pawar, U., Pal, J., & Toyama, K. (2006). Multiple mice for computers in education in developing countries. *International Conference on Information and Communication Technologies and Development*, 64-71.
- Pentland, A. S., Fletcher, R., & Hasson, A. (2004). DakNet: Rethinking Connectivity in Developing Nations. *Computer*, 37(1), 78-83.
- Plauché, M., & Nallasamy, U. (2007). Speech Interfaces for Equitable Access to Information Technology. *Information Technologies & International Development*, 4(1), 69-86.

- Prabhu, G., & Frohlich, D. (2005). *Innovating for emerging markets: Confluence of user, design, business and technology research*. Paper presented at the HCI International.
- Prahalad, C. K. (2010). *The fortune at the bottom of the pyramid : eradicating poverty through profits*. Upper Saddle River, N.J.: Wharton School Publishing.
- Pruitt, J., Tamara, Adlin. (2006). *The Persona Lifecycle*. San Francisco, CA: Elsevier.
- Putnam, C. (2010). *Bridging the gap between user experience research and design in industry. An analysis of two common communication tools: personas and scenarios.*, University of Washington, Seattle, WA, USA.
- Putnam, R. (1995). Bowling Alone: America's Declining Social Capital. *Journal of Democracy*, 6(1), 65-78.
- Quesenbery, W. (2004). Balancing the 5Es: Usability Cutter *IT*, 17(2), 8.
- Quesenbery, W. (2006). Storytelling and narrative *The Persona Lifecycle* (pp. 520-555). San Francisco, CA: Elsevier.
- Raman, B., & Chebrolu, K. (2007). Experiences in using WiFi for rural internet in India. *IEEE Communications Magazine*, 45(1), 104.
- Report on Fare Evasion on Metro Transit*. (2010). Seattle King County Department of Transportation, Metro Transit.
- Resnick, P. (2002). Beyond Bowling Together: SocioTechnical Capital *HCI in the New Millenium* (pp. 647-672). Boston, MA: Addison-Wesley.
- Riegelsberger, J., Sasse, A. M., & Mccarthy, J. D. (2005). The mechanics of trust: a framework for research and design. *International Journal of Human-Computer Studies*, 62(3), 381-422.
- Sahni, U., Gupta, R., Hull, G., Javid, P., Setia, T., Toyama, K., et al. (2008). Using digital video in rural Indian schools: A study of teacher development and student achievement. *annual meeting of the American Educational Research Association, New York*.
- Saif, U., Chudhary, A. L., Butt, S., Butt, N. F., & Murtaza, G. (2007, Dec 15-16). *Internet for the Developing World: Offline Internet Access at Modem-speed*

- Dialup Connections*. Paper presented at the Information and Communication Technologies and Development, ICTD 07, Bangalore, India.
- Salvador, T., Bell, G., & Anderson, K. (1999). Design ethnography. *Design Management Journal*, 10(4), 35-41.
- Sambasivan, N., Cutrell, E., Toyama, K., & Nardi, B. (2010). Intermediated technology use in developing communities. *Proceedings of the 28th international conference on Human factors in computing systems*, 2583-2592.
- Sanchez, T. (2008). Poverty, policy, and public transportation. *Transportation Research Part A: Policy and Practice*, 42(5), 833-841.
- Sanchez, T., Shen, Q., & Peng, Z. (2004). Transit mobility, jobs access and low-income labour participation in US metropolitan areas. *Urban Studies*, 41(7), 1313.
- Sawin, D. A., Yamazaki, K., & Kumaki, A. (2002). Putting the "D" in UCD: User-centered Design in the Thinkpad experience development. *International Journal of Human-Computer Interaction*, 14(3-4), 307-334.
- Schumacher, E. (1974). *Small is beautiful: a study of economics as if people mattered*. London: Abacus.
- Sherwani, J., Ali, N., Mirza, S., Fatma, A., Memon, Y., Karim, M., et al. (2007, Dec 15-16). *HealthLine: Speech-based Access to Health Information by Low-literate Users*. Paper presented at the Information and Communication Technologies and Development, ICTD 07, Bangalore, India.
- Sherwani, J., Ali, N., Rose, C., & Rosenfeld, R. (2009). Orality-Grounded HCID: Understanding the Oral User. *Information Technologies and International Development*, 5(4), 37-49.
- Sillito, J. (2010). Saturate: Simple Collaborative Qualitative Analysis Retrieved September 7, 2010, from <http://www.saturateapp.com/about>
- Smith, M. L., & Madon, D. S. (2007, May 28-30). *Structure, Agency and Causality: Three central assumptions in ITD Research*. Paper presented at the International

- Conference on Social Implications of Computers in Developing Countries, Sao Paulo, Brazil.
- Spinuzzi, C. (2005). The methodology of participatory design. *Technical Communication*, 52(2), 163-174.
- Sterling, R., O'Brien, J., & Bennett, J. (2007). *Advancement through Interactive Radio*. Paper presented at the IEEE/ACM International Conference on Information and Communication Technologies and Development (ICTD2007), Bangalore, India.
- Strauss, A. L. (1987). *Qualitative analysis for social scientists*. Cambridge, UK: Cambridge University Press.
- Streng, J. M., Rhodes, S., Ayala, G., Eng, E., Arceo, R., & Phipps, S. (2004). Realidad Latina: Latino adolescents, their school, and a university use photovoice to examine and address the influence of immigration. *J Interprof Care*, 18(4), 403-415.
- Taylor, P. (2009). The Road Out of Poverty: Lowering barriers to employment through automobile ownership. *Frontier Centre for Public Policy: Policy Series*(71), 1-25.
- Torpel, B. (2005). *Participatory Design: A multi-voiced effort*. Paper presented at the AARHUS.
- Veeraraghavan, R., Yasodhar, N., & Toyama, K. (2007, 15-16 Dec). *Warana Unwired: Replacing PCs with Mobile Phones in a Rural Sugarcane Cooperative*. Paper presented at the Information and Communication Technologies and Development, ICTD 07, Bangalore, India.
- Wang, C. (1998). Portraying stigmatized conditions: disabling images in public health. *Journal of health communication*, 3(2), 149-159.
- Wang, C. (1999). Photovoice: A participatory action research strategy applied to women's health. *Journal of Women's Health*, 8(2), 185-192.
- Wang, C., & Pies, C. (2004). Family, maternal, and child health through photovoice. *Maternal and Child Health Journal*, 8(2), 95-102.
- Wang, C., Yi, W., Tao, Z., & Carovano, K. (1998). Photovoice as a participatory health promotion strategy. *Health Promotion International*, 13(1), 75.

- Warschauer, M. (2003). *Technology and Social Inclusion: Rethinking the digital divide*. Cambridge, Massachusetts: The MIT Press
- Weiser, M. (1999). Some computer science issues in ubiquitous computing. *SIGMOBILE Mob. Comput. Commun. Rev.*, 3(3), 12.
- Williams, D. (2006). On and off the 'net: Scales for social capital in an online era. *Journal of Computer-Mediated Communication*, 11(2).
- Winner, L. (1980). Do artifacts have politics? *Daedalus*, 109(1), 121-136.
- Winschiers, H., Fendler, J. (2007). Assumptions Considered Harmful *Usability and Internationalization* (pp. 452-261). Berlin: Springer.
- Woelfer, J., & Hendry, D. (2010). Homeless young people's experiences with information systems: life and work in a community technology center. *Proceedings of the 28th international conference on Human factors in computing systems*, 1291-1300.
- Wolf, S. H., Johnson, R. E., & Geiger, H. J. (2006). The Rising Prevalence of Severe Poverty in America:: A Growing Threat to Public Health. *American Journal of Preventive Medicine*, 31(4), 332-341.
- Yates, J., & Orlikowski, W. (1992). Genres of Organizational Communication: A Structural Approach to Studying Communication and Media. *The Academy of Management Review*, 17(2), 28.

## Vita

---

Emma J. Rose earned a Bachelor of Arts in English at Duquesne University in 1995. After traveling extensively, she embarked on a career that combined her interests of communication, technology and issues of inclusionary design for underrepresented groups. In 2002, she earned a Masters of Science in Technical Communication at the University of Washington. In 2011, she graduated with a Doctor of Philosophy in Human Centered Design & Engineering from the University of Washington. Emma works as a consultant helping organizations with a social impact mission design user experiences. She lives in Olympia, Washington with her husband Jeremy and their children Oliver and Elsie.