Research Article

Internet Use in Uzbekistan: Developing a Methodology for Tracking Information Technology Implementation Success

Beth E. Kolko
bkolko@u.washington.edu

Carolyn Y. Wei
cwei@u.washington.edu

Jan H. Spyridakis
jansp@u.washington.edu

University of Washington
Department of Technical Communication
Loew 14
Box 352195
Seattle, WA 98195

Abstract

This article reports on an ongoing investigation of Internet development in Central Asia. Begun in 2000, the research currently focuses on recent developments in Uzbekistan, including changes in legislation governing telecommunications. The results of two surveys conducted in November and December 2002 in Tashkent and Bukhara, Uzbekistan, are presented. These surveys of managers at Internet access points and information technology professionals provide a detailed picture of the current state of Internet infrastructure in Uzbekistan, particularly in contrast to official government figures. The article argues that effective survey research must incorporate an understanding of how culture, policy, and infrastructure affect patterns of Internet development.

Introduction

Information and communication technologies have altered business, education, research, medical, and governmental practices. Additionally, expanded information storage and retrieval abilities, as well as broadened communication channels, affect cultural practices in both transparent and invisible manners. Acknowledging the wide-ranging transformation that new technologies have on contemporary life, researchers are using numerous analytical approaches to examine the scope and magnitude of such effects. Indeed, developing an understanding of how information technology (IT) affects culture and communication practices is crucial if such technologies are going to fulfill their broad-based promise of transforming transactions from small to large. However, current modes of analysis have yet to account for specific patterns of IT use, including a persistent digital divide, populations that resist going online, users who go online initially but then drop out, and users whose online experience of the technology is at variance with expectations and planned applications. Additionally, present modes of analysis do not account for culturally variant patterns of technology adoption and usage. This latter point is particularly important when conceptualizing how IT can assist development efforts in diverse societies.

As a response to current modes of analysis, and in an attempt to prioritize how culture affects technology diffusion and usage, this project examined IT in cross-cultural contexts, with a particular focus on IT development in Central Asia, specifically in Uzbekistan. This article describes the exploratory research stages of the project in Uzbekistan that include surveys and interviews. The focus of this stage of the research was

on developing a view of technology infrastructure and usage in Uzbekistan today in an attempt to generate an understanding of how culture operates as a variable in IT adoption and usage. One goal of this project was to develop a methodology that is situated within local cultures and that draws on qualitative and quantitative research approaches to demonstrate how to study effectively the potential and future impact of IT in a region that is currently technologically less developed.

The work began in 2000 with 5 months of initial exploratory work in the region and continued throughout 2002 to 2003 with extensive fieldwork. In November 2002, members of the research team traveled to Uzbekistan to obtain accurate and up-to-date information that could subsequently be used to develop an appropriate sampling method and a large-scale survey for administration in the region in spring 2003. This article discusses the preliminary research that drove the November trip and two surveys that were administered in autumn 2002.

As mentioned, our overall research question focuses on an ongoing effort to understand how culture and policy affect patterns of IT adoption and adaptation. What makes Uzbekistan a particularly productive research site for such inquiry is the combination of early stages of Internet adoption coupled with the cultural isolation of the region. The disjuncture between cultural isolation and rapid growth of cultural artifacts of technology results in specifically situated resistances to the Western metaphors that drive technology production, design, and implementation, and thus make it easier to identify what components of IT are most culturally situated and need to be most dramatically altered to be cross-culturally meaningful. In addition, the region still holds the promise of significant numbers of novice users whose attitudes and usage patterns in the early stages can be examined to understand better how new users approach information and communication technologies.

Relevant Literature

Studies that acknowledge the different factors influencing gaps in IT use make it clear that understanding local conditions, including the specifics of how people gain access, is crucial for the success of a program. Recent research shows that integrating IT in diverse settings requires flexibility and an understanding of local needs; however, these studies focus more often on analyses that strive to make sense of usage patterns rather than using information about cultural differences and other factors to guide implementation plans for IT projects. For example, dealing with impoverished populations can require different models of access, such as the community access model proposed by the M. S. Swaminathan Research Foundation (Arunachalam 1999). Distance education initiatives in poor areas have had to grapple with specific challenges that have necessitated changing designs to meet local needs (Rubens and Southard 2000; Damatin 2000). Particularly with respect to health initiatives in both national and global contexts, this becomes an essential component of Internet access (McCloskey 2000; Bishop, Bazzell, Mehra, and Smith 2001). What becomes increasingly interesting, as well, are the studies that investigate various conceptual levels of infrastructure such as the effect of locally generated or locally meaningful content on patterns of Internet use (Bishop, Bazzell, Mehra, and Smith 2001; Chon 2001; Carvin 2000; Davis and Trebian 2001; White and Lester 2001), whether related to a burgeoning national population like China (Chon 2001) or attempts to make the Internet meaningful to inner-city youth by using the schema of hip-hop music to increase a population's awareness and acceptance of technology (White and Lester 2001).

As researchers have begun to consider diverse factors within debates about how IT can be effectively integrated into diverse communities, various methodologies have been developed. Indeed, there are numerous quantitative and qualitative approaches to measuring IT development that have been field-tested around the world. Research such as e-readiness reports measure factors like IT infrastructure and economics to determine the extent to which a country or region is wired. Most assessments seem to rely on quantitative methods and preexisting statistics such as government-reported gross domestic product, number of telephone lines, and literacy rates. Of the many tools that fall into this category, it is worth considering the Networked Readiness Index, an e-readiness assessment from the Harvard Center for International Development, that incorporates an exhaustive list of criteria to produce metrics measuring a county's likelihood to succeed in the IT development realm. Such criteria include information on telephony infrastructure, policy, busi-

ness models, and literacy rates: all preexisting data. In fact, 77 countries (including the Central Asian region) were excluded from the Center for International Development's 2001–2002 study because of the difficulties in finding data for them (Kirkman, Osorio, and Sachs 2002). Thus, although the Harvard method has been used in numerous countries, and the results have provided important blueprints for policy makers, such an approach is of limited value in a region such as Central Asia.

Other approaches include the UN Development Programme's Technology Achievement Index, which uses preexisting statistics such as number of patents, telephone lines, and mean years of schooling. This methodology allows for a broad overview of international diffusion of technology, but incomplete data for dozens of countries make it difficult to see even this broad picture (*UNDP Human Development* 2001).

The Mosaic Global Diffusion of the Internet Project studies Internet diffusion in several countries, developing an evaluation framework for studying Internet adoption that considers six dimensions: pervasiveness, geographic dispersion, sectoral absorption, connectivity infrastructure, organizational infrastructure, and sophistication of use (Wolcott et al. 2001). As part of its evaluations, the Mosaic Group sends in region-specific research teams to conduct contextual research in the countries; however, its core statistics are from other sources such as local governments, government-controlled agencies, or private consulting groups (*The Global Diffusion of the Internet Project* 2002).

These and other approaches have been used by academics, policy makers, and businesses that are striving to understand the vastly complex web of interrelated factors that affect how a specific setting interacts with information technology. Although the methods developed in this area contribute significantly to the understanding of IT development, many issues remain unexplained by the research. One example can be seen in the problematic conclusion about France by the Harvard team. Although it meets many of the criteria deemed by the methodology to be crucial for IT development success, France still lags behind many other industrialized nations, and in fact, it is ranked at 24 and is flanked on the scale by Estonia and Italy for networked readiness. France drops on the Networked Readiness Index because its network use is relatively low (ranked at 27); however, considering its rank of 14 for enabling factors related to network infrastructure and policies, one would expect the country to be rated more highly. Clearly, there are other elements that account for differential rates of development and usage, elements that are not completely accounted for in the currently deployed methodologies. As a result of ignoring or deemphasizing culture as a variable, such approaches are ultimately unable to provide the level of analytic granularity necessary for complete understanding of issues related to a persistent digital divide.

Although it may seem clear that there is a need for alternative perspectives to research IT as a development tool, it is less apparent why Central Asia provides a useful arena for developing such an approach. In the last decade, numerous studies on Internet technologies in post-Soviet countries have been conducted, but such work has not highlighted the kind of cultural issues central to this project (Daniels, Cronje, and Sokolowski 1998; Daniels 1999; Pakstas and Pakstiene 1993; Wheeler, Zlamalova, and English 2000; Lajos and Szucs 1998; Woodard 1995; Bollag 1994). Indeed, as preliminary research in the late 1990s demonstrates, Central Asia has a host of characteristics that make it a valuable site for researching patterns of IT development. First, because of geographical and political conditions, Central Asia has remained largely isolated from the West. Cultural influence in Uzbekistan has traditionally been from Russia, the East, and the Middle East. Users of IT in the region, then, were as of the early 1990s unlikely to have had considerable prior exposure to Western metaphors and cultural assumptions about IT. Unlike much of South America, for example, Uzbekistan does not have decades of vast exposure to mainstream American culture, and because technology is a cultural artifact, its shape is determined in part by the context in which it is developed; the dissonance between Western culture and Central Asia provides a cognitive gap that highlights effectively the culturally specific elements of IT.

Additionally, unlike other parts of the world that were similarly distanced from the West, by 1999, there was enough investment in Central Asia—due to natural resources and the strategic importance of the region in the wake of the dissolution of the Soviet Union—that there was a critical mass of IT presence. By 1999, reports on the region indicated that

initial attempts to bring Internet technology to countries such as Uzbekistan were taking hold. These early initiatives included programs that provided free e-mail accounts to families who had children studying abroad and small-scale attempts to build community networks. Reports of dial-up service being piloted in regional locations outside the capital contributed to a sense that a growing IT industry and consumer base were present.

Earlier stages of this project demonstrate that research in the region can contribute valuable insights into how one might best examine the patterns of IT adoption. In particular, culture and public policy were highlighted as crucial factors in determining IT usage. Research conducted in 2000 indicates that cultural issues associated with patterns of information seeking were a significant influence on people's attitudes toward the Internet—specifically, it was not immediately apparent to prospective users how IT could be useful as an information resource (Kolko 2002). In addition, such preexisting habits affected how people used the Internet once they got online in terms of communication versus information tasks (Kolko 2002). Concurrently, public policy—specifically, the gap between official policy and practiced policy—affected potential users' willingness to overcome barriers to entry and their sense of appropriate uses of Internet resources (Kolko 2001). For example, users revealed uncertainty about whether the Internet was either a benefit or a threat to society. Such discoveries informed the continuation of this study as our research team sought to develop an in-depth understanding of what issues need to be addressed to survey people's usage of and attitudes toward IT. Again, this work is designed to open a dialogue with existing methodologies that do not fully consider cultural context.

Survey research in the former Soviet Union carries with it a series of unique challenges. Coupled with local, pre-Soviet culture, such attitudes mean that acquiring survey responses requires a complex set of approaches that includes leveraging social networks and carefully constructing the survey itself. For example, measuring household income and expenses in Central Asia is problematic because of the mix of cash, in-kind, informal, official, or unofficial incomes that individuals may receive (Falkingham 1999). Similar research constraints are described in studies that depend on survey work in the former Soviet Union, including issues related to random versus stratified sampling (Finifter and Mickiewicz 1992; Ware 2002). However, we argue that such difficulties simply mean that it is doubly important to seek out multiple sources of information. Rather than rendering a large-scale research project impossible, such constraints require thoughtful approaches and vigilance regarding methodology and local conditions. Such methodological considerations will be discussed in detail in a subsequent article.

Overall, it does seem clear that there are limitations in current approaches that examine issues related to IT adoption and usage. In particular, infrastructure and cultural issues seem to be addressed in either cursory or counterproductive ways. Given what the literature in this area demonstrates, we hypothesize that a methodology that questions infrastructure elements more deeply than simply citing government figures would reveal a more realistic portrait of what everyday users encounter. In addition, we hypothesize that new methodological approaches can obtain different kinds of responses to questions asked across domains and across cultures. In particular, survey or interview approaches that are built on local expectations and customs are more likely to elicit reliable information and, in particular, may prove especially valuable during the exploratory stage of research when hypotheses generated are likely to be limited by the researchers' cultural backgrounds.

Finally, we hypothesize that anecdotes such as France's unexpected position on the Networked Readiness Index are indicative of systemic limitations of methodologies that categorize based on external values. To that end, then, an approach that draws information from multiple levels and allows for local conditions to inform responses is likely to provide more effective information. For example, as of late 2002, Tashkent, the capital of Uzbekistan, gave the appearance of being a technologically developed city. With a population of more than 2 million, the fourth largest city of the former Soviet Union is littered with signs for computer stores and Internet clubs (cafes). Government figures show that Internet users grew from 137,000 in 2001 to 275,000 users in 2002 ("Number of Uzbek Internet" 2003). And recent proclamations detail the availability of computers in all universities in the country. At the same time, however, our first-hand experience demonstrated that actuality differed from official characterizations—whether with respect to much smaller

numbers of Internet service provider (ISP) subscribers or the claims of multiple university students that they did not have access to computers. For example, as of November 2002, two of the major ISPs (of which there may have been 30 major companies) in the country claimed to have 1,200 and 2,500 subscribers. Such numbers provide a problematic basis for claims of 275,000 users. In addition, as of November 2002, members of Internet-related businesses and international organizations alike expressed doubt of an official statistic of 20,000 users in Uzbekistan. As more than one person noted, it is important to at least clarify how one defines an "Internet user" when describing such numbers. Such discrepancies in estimated users drove the design of the surveys discussed here so as to help document what gaps might exist.

In addition to the general value of examining a region in the early stages of IT development to gain insight into how local conditions affect the growth of such technologies, Central Asia has assumed a position of increasing importance for the West, and many international efforts in the region are looking at the possibility of IT to contribute to economic stability, educational opportunities, quality of health care, and growth of civil society. Although this project began in 2000, before much attention was focused on the region, recent developments provide even more of an exigency for the kind of study described here. If in fact IT can be used for development purposes, it becomes crucial to understand how to implement effectively technology in diverse local contexts.

Methods

To conduct a large-scale regional survey in spring 2003, we first needed to obtain up-to-date information on current policy and infrastructure issues. We acquired such information through on-site research in Uzbekistan in autumn 2002 that consisted of two surveys, the results of which are reported here, and two sets of interviews. One survey was designed for Internet access points to address the importance of infrastructure discussed by the literature. A second survey was designed for professionals in the IT industry to provide another avenue of insight into the reality of training and access in the region. Conceptions of the digital divide have expanded to consider issues besides economics and access; however, it remains important to have a detailed understanding of how infrastructure informs attitudes and patterns of use. It also became important to generate our own data about infrastructure as a companion piece to official accounts of Internet access.

In addition to the surveys, interviews based on grounded theory were conducted to understand further the importance of preexisting patterns of information seeking on usage habits. Although this article reports only the results of the surveys, it is important to note that the interpretation of survey results is informed by the data collected during interviews. In particular, the interviews conducted with policy makers and international organizations provided insightful observations into the disjuncture between official stories regarding infrastructure and policy and the more commonly described lived experience with respect to these issues. The surveys were designed to demonstrate the importance of considering local conditions and cultural factors in overall IT assessment. They also helped generate an appropriate sampling method and more accurately track the influence of policy on users' attitudes, which in turn will influence later stages of research.

The two surveys were administered in Tashkent and Bukhara, Uzbekistan, from mid-November 2002 to early December 2002. The first survey was administered to clerks or managers at public Internet access points, primarily Internet cafes that are commonly called Internet clubs. Some surveys were also distributed at universities and sites run by nongovernmental organizations (NGOs). The second survey was administered to IT professionals at their place of employment. As previously noted, both surveys were designed to provide an additional element in an overall research agenda that included interviews with IT policy makers and members of international organizations administering programs related to IT.

Internet Access Points Survey

The Internet access points survey sought to assess the state of Internet technology and its accessibility in Uzbekistan. Part of the goal of this survey was to assess how the presence of Internet technology had changed since December 2000 and demonstrate the value provided by situating a research project within local concerns. In addition, the survey was designed to obtain reliable information that could supplement official figures and statistics.

Participants

Our initial sample included 55 Internet access points: 46 from Tashkent and 9 from Bukhara, a major secondary city in the country. Four Internet access points in Tashkent refused to participate, two locations no longer had Internet access, one location was a games-only establishment that did not have Internet access despite its sign that advertised access, and one signed Internet location was out of business. With the exclusion of these nonresponsive sites, the final sample in which surveys were successfully administered was 47, with 38 of these respondents in Tashkent. Uzbekistan provided a challenging environment for obtaining a representative sample of Internet access points. The country lacks reliable centralized information resources such as business directories or consumer agencies. Because many records are inaccessible because of bureaucratic policies, and not all businesses are officially licensed or legally registered and thus are not listed in official resources. Given the lack of a central listing of Internet access points, alternative methods for identifying these points were required.

Relying on minimal street-level advertising and word of mouth, the researchers worked with local guides to identify Internet access points in Tashkent. Two of the researchers (Kolko and Wei) relied on Kolko's previous familiarity with the city, which stemmed from her having lived and worked in Tashkent and having researched Internet development during the last 5 months of 2000. As a starting point in identifying the fall 2002 sample for Tashkent, Kolko used names and addresses of Internet access points that were operating in Tashkent as of December 2000. Further points were identified by suggestions from operators and patrons at those access points, knowledge of local guides and youth involved with technology, and focused drives and walks throughout the city. This last canvassing method relied on a city map, divided into two sectors, from which the researchers identified districts most likely to have viable commercial establishments. Sections were chosen for further investigation based on a mix of centrality and use. The researchers concentrated on neighborhoods with retail shops that seemed the most promising locations for Internet clubs. In addition, fashionable shopping districts and upper-middle-class residential neighborhoods were carefully combed for Internet cafes. The areas around major universities also received particular attention. The researchers' goal was to identify all businesses that displayed Internet or computer access signs. They then noted the location of such businesses on a city map for future reference.

A local research assistant used a similar method to identify Internet access points in Bukhara. The sample in both locales was deemed to be adequate. International agencies report extremely small numbers of Internet access points in Bukhara, and in interviews individuals claimed there were five to eight Internet access points in Bukhara, and this research team identified nine. The sample in Tashkent was also deemed successful. In 1 week, the research team visited 46 Internet access points. Although the latest official report published by the Uzbek government places the number of Internet cafes at more than 100 in Tashkent ("Number of Uzbek" 2003), it is impossible to say with certainty how many such businesses there are. However, the research team remains confident that the number of sites that it visited was significant given conversations with local guides and members of international organizations. The majority of sites ($n = 38$) were commercial Internet cafes; however, five were at educational institutions, one was at an NGO, and three were at hotel business centers.

Survey Instrument

The survey was designed to assess the level of technology and services at public Internet access points. The secondary purpose of the survey was to gather the impressions of operators of Internet access points about who their customers were and what they did with the computers. Specifically, survey questions addressed general operations, services, Internet connections, software and hardware, and attitudes about computers and the Internet. Other questions included estimates of customers' ages and gender. The survey was composed of multiple-choice questions, short open-ended questions, and Likert-scaled questions. The survey also included a consent form that told participants about the study and explained that their participation would help researchers understand Internet development in Uzbekistan. The survey stated that answers were anonymous and participants could stop at any point.

General Procedure

To administer the survey, usually only one researcher, sometimes with an interpreter, entered the Internet access point and asked the staff person on duty if

he or she would fill out a survey. The researcher read an oral consent form that discussed the stress of the study as that associated with filling out any survey. The researcher then gave participants the survey and waited for them to fill it out, noting their oral comments. In some cases, a survey was left with participants who were too busy to fill it out at the moment and the researcher returned later to retrieve it. Because no questions were compulsory, the sample size varied per question and is so noted in the results. Some open-ended questions were answered in Russian or Uzbek and were translated during data analysis by an Uzbek student at the University of Washington. As the survey was completed, the researcher also made brief notations about the location, including the appearance of the computers, furniture, aspects of clientele, and other related observational data. All quantitative data were analyzed in SPSS 11.5 for Windows and in Microsoft Excel XP.

IT Professionals Survey

The IT professionals survey sought to assess the mode and level of computer training available in Uzbekistan.

Participants

There were 29 participants: 10 in Tashkent and 19 in Bukhara. Participants were selected based on their work within computer-related businesses that were visited by the researchers, or because of their work as faculty in computer-related fields at universities. The respondents from Bukhara were primarily from local universities. Because of the limited time spent in Uzbekistan, priority was given to the Internet access survey rather than the IT professionals survey.

Survey Instrument

Survey questions addressed participants' history, training, and work with computers and the Internet. The survey also assessed attitudes of IT professionals—sophisticated computer users—toward IT and the possible benefits of IT to Uzbekistan. The survey contained mostly short-answer questions and a few multiple-choice questions. The survey included a consent form that told participants about the study and how their responses would help research about Internet development in Uzbekistan.

General Procedure

To administer the survey, usually only one researcher, sometimes with an interpreter, entered an access point where an IT professional was known to work and asked the IT worker if he or she would fill out a research survey. Participants were told their answers were anonymous and that they could stop anytime. The researcher also read an oral consent form that discussed the stress of the study as that associated with filling out any survey. Then the researcher gave participants the survey and waited for them to fill it out, noting their oral comments. Because no questions were compulsory, the sample size varied per question and is so noted in the results. Most surveys were answered in Russian or Uzbek and therefore were translated during data analysis by an Uzbek student at the University of Washington. All quantitative data were analyzed in SPSS 11.5 for Windows and in Microsoft Excel XP.

Interviews

Although results of the interviews are not reported here, because we relied on the interviews for interpreting some survey results we briefly review the scope of the interviews. Interviews were conducted with individuals from the UN Development Program, USAID, Open Society Institute, UzInfoCom (a government-organized NGO that is the mediating point between the Agency for Communication and Informaticization and international organizations), the heads of two of the largest ISPs (Naytov and BCC) in the country, Eurasia Technology Group, IREX/Internet Access Training Program, Internews, a district mayor of Tashkent, and the US Embassy Public Affairs Office. Interviews were open-ended and discussed both general policies about IT development in Uzbekistan and the particular agency's involvement in the field. Most interviews reviewed the history of Uzbek regulation of the Internet, specifically Decrees 52 and 352.

Decree 52, which had been established in 1999, officially declared that only the government telecom, UzPak, could operate as an ISP. Although smaller companies could contract connectivity through UzPak and operate as purportedly independent entities, the actual point of connectivity to the outside world would flow through UzPak. In 2000, it was commonly believed by users that this policy would facilitate censorship and, perhaps, monitoring of Internet activity. Approximately 2 weeks before the researchers' trip to Uzbekistan in November 2002, the government officially announced Decree 352, which repealed Decree 52.

The substance of Decree 352, announced October 10, 2002, declared that UzPak would no longer operate as the sole ISP in the country. Decree 352 promised to open the country to IT development by allowing competition, providing incentive for companies that want to develop new technologies, and loosening somewhat the hold on censorship of Web sites. Since the late 1990s, for example, it has been impossible to access the Web sites of the government opposition parties from inside Uzbekistan. Similarly, press censorship is significant, and although a similar late-2002 decree eliminated the need for journalists to clear stories with government censors, layers of censorship (including self-censoring) persist in the country. The establishment of Decree 352 and the reconfiguration of the Ministry of Post and Telecommunications into the Agency for Communication and Informaticization (which occurred in spring 2002) is part of the government's publicized efforts to nurture IT development in the country. For these and other reasons, it is a particularly intriguing time to track Internet development in the region. Indeed, it is likely that the continuation of this research project will yield valuable findings about how policy affects users' attitudes toward IT.

Results and Discussion

Quantitative results were deemed significant at an alpha level of .05 or less. In some instances, when standard deviations are extremely large, both medians and ranges are also reported. Where percentages add up to more than 100, multiple answers were allowed. Finally, sample sizes are reported per question and should not be confused with a specific number (*n*) for a given percentage.

Internet Access Points Survey

Internet Access Point Operations

The first series of questions about the general operations of the Internet access points concerned the amount of time Internet access points had been in business and the number of computers at the sites. These questions were designed to give background data on how the state of access opportunities has changed. Since Kolko's (2001) research shows that 2 years previously there were 12 commercial Internet access points in Tashkent, the researchers thought it would be valuable to understand the rate of change since that time. It seemed particularly interesting to examine whether there had been a recent explosion of site activity or whether there had been steady growth over the previous 23 months. In addition, the questions related to the number of computers at the sites were designed to add a level of granularity to understanding the scope of Internet access. In something of a nod to postmodern theory, the researchers had a significant interest in determining the levels of "truth" when it comes to access and infrastructure. Numerous Internet access points with very small numbers of working computers hooked to the Internet, for example, tell a different story from that of access points with multiple computers with constant traffic.

To that end, the first series of questions attempted to get past the surface report of infrastructure development communicated by the proliferation of Internet club signs throughout Tashkent. As became apparent during this research, walking through the doors of Internet access points provided a picture of commercial Internet access that was both more detailed than and at variance with official reports. For example, at least two clubs that had signs advertising Internet no longer had Internet services because of connectivity problems. One Internet sign was found for a club that had relocated or gone out of business some time ago. One club said that it did not have Internet at the moment but that a computer support person was scheduled to come by to turn it back on (this access point refused to participate in the survey). Another club had no electricity when the research assistant visited it. Another club advertised Internet but was a games-only facility.

As it turns out, most sites were relatively new: the Internet access points had been open for an average of 1.24 years ($SD = 1.30$, $n = 47$) with a median of 9.6 months and a range of 2 days to 6.08 years. The sites had an average of 10.26 computers ($SD = 10.73$, $n = 46$) with a median of 7 and a range of 2 to 57 computers. The median reveals that most sites had relatively few computers. About 72% of the sites' machines had Internet access: on average the sites reported having 7.35 computers connected to the Internet ($SD = 3.77$, $n = 43$). All sites were open Monday through Friday ($n = 42$) and most were also open on Saturday (97.6%) and Sunday (78.6%). Given the number of computers that could be connected to the Internet, even if all of these computers were connected at all times, less

than 75% of the patrons of the Internet cafes could use the Internet at any given time. In actuality, many users do not use the Internet when they pay for computer access at an Internet cafe, as later results illustrate. It is important to note that using public access points is the primary way that users gain access to the Internet because private computer ownership is extremely rare.

Internet access in Uzbekistan is expensive. The average cost per hour of access was 1,656 sum (SD = 2,457.37, n = 38), or about US$1.35 at the unofficial exchange rate in place when the survey was conducted. The median price per hour was 1,010 sum, and the price per hour ranged from 100 sum to 14,760 sum. The highest charge of 14,760 sum per hour was converted from the US$12 that one site (a hotel business center) charged. The sample included business centers in Tashkent because they are open to locals; however, they cater primarily to foreign visitors and charge high rates by local standards. A more accurate overall picture emerges when Tashkent hotel business centers are excluded from the analysis—the average cost per hour for Internet access was 1,068 sum (SD = 335.20, n = 35) or about US$0.87, and the price per hour ranged from 100 sum to 2,000 sum (see Figure 1). The cost remains extremely expensive by Uzbek salary standards, estimated at US$20 to US$30 per month (Degtiar 2000; US Embassy Tashkent 2001).

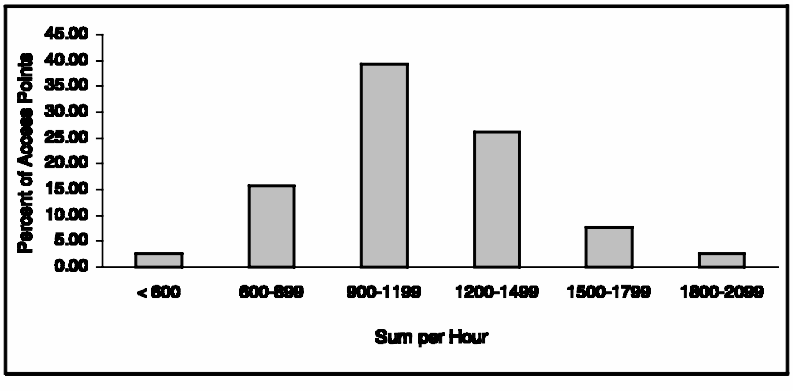

Figure 1. Sum per hour for Internet use (1 USD ~ 1,220 Sum).

The prohibitive expense for Internet access, at least according to official salary figures, indicates that using the Internet is a luxury for local citizens. It is also worth noting that, for a typical employee of an Uzbek company, significant use of the Internet at a commercial site would signal to one's peers that one has access to larger amounts of cash than would be generated by one's salary. Because Uzbeks tend not to use banking systems for their savings, it is important not to advertise to one's neighbors that one has large amounts of cash. For example, people who work with foreigners and thus have access to hard currency (the sum is nonconvertible) try to minimize or obscure the source of their income because it can make them a target for robbery. Additionally, signaling such wealth might attract attention from the local tax police. It is worth noting the cascade of effects generated by the use of IT, especially if the goal is to generate widespread interest in using the technology for a range of purposes.

Although access points had different, and sometimes multiple, fee structures for Internet access, the difference in fee structure is less important than the cost incurred for use. The majority of the sites (82.6%) charged by the hour for Internet access (n = 46). Given a price structure that depends on time spent online, and given that such fees are quite expensive, customers are likely to be sensitive to time spent online and this sensitivity may affect how users employ the technology. In addition, some access points had pricing structures that charged based on the megabytes downloaded or uploaded. Such a pricing structure can further affect usage habits by inhibiting casual downloads of information.

After an hourly charge, the next most common charge structure was free access: 15.2% of the sites charged nothing for Internet access; these sites were operated by one NGO, three universities, and three commercial organizations. A few of the commercial sites indicated they offered free access; however, those sites probably reflected special offers because they also indicated that they charged in other ways. Some sites charged a daily fee (4.3%) or a membership fee (4.3%). Other charge structures were used by 8.7% of the sites.

Internet access points in Uzbekistan usually also offer the use of computers separate from the

Internet. The opportunity to use computers without access to the Internet was available at 97.8% of the Internet access points ($n = 45$). Most sites (90.9%) charged by the hour for using computers without accessing the Internet ($n = 44$). The median price per hour for computer-only access was 600 sum and ranged from 400 sum to 14,760 sum. Again, the high figure of 14,760 sum is converted from the US$12 that one hotel business center actually charged. Excluding the Tashkent hotel business centers, the average cost per hour for computer use without Internet was 669 sum ($SD = 283.67$, $n = 36$) or US$0.54. Without the hotels, the price per hour ranged from 400 sum to 2,000 sum.

According to estimates by the Internet access points concerning customers' use of computers, 66.1% of the customers at the Internet access points use computers to access the Internet ($SD = 27.38$, $n = 43$) and 26.5% use computers without accessing the Internet ($SD = 24.72$, $n = 43$). The two questions were asked separately in different locations within the survey. There was a significant inverse correlation between the percentages of customers using the Internet versus those not using the Internet ($r = -0.731$, $p = 0.000$). In other words, sites that estimated they had many customers using the Internet also estimated that they had fewer customers not using the Internet. The inverse was also true: sites that estimated they had few customers using the Internet also estimated they had more customers who did not use the Internet. In telling the story of Internet development in Uzbekistan, a surface observation indeed reveals numerous Internet cafes with a significant customer base. However, it is important to acknowledge that closer analysis reveals that not all activity at Internet access points is in fact Internet-related.

Some Internet access points accepted reservations to use the computers. Of the 43 sites that answered this question, 9.3% always required reservations, 53.5% sometimes required them, and 37.2% never required them. Sites estimated that, on average, 15% of their customers make reservations ($SD = 28.47$, $n = 35$). The availability of Internet access for drop-in use encourages casual use and can be seen as an encouragement for nascent users who may be unfamiliar with a reservation process and may find being turned away from an access point a barrier to entry.

In trying to ascertain other ways that sites attempt to overcome barriers to entry, the survey asked whether sites offered any instruction for using computers or specific programs. The majority of sites (62.8%) reported they did not offer any classes. The minority of sites that did offer classes, however, offered an average of 3.63 classes and ranged from 1 to 11 classes ($SD = 2.58$, $n = 16$). Classes taught most commonly include e-mail (offered by 30.2% of the sites), word processing (27.9%), Web searching (25.6%), and Web design (14.0%). Other classes taught include HTML, chat or instant messaging, and online games (each offered by 7.0% of sites) and Web programming, programming, and newsgroups (each taught by 2.3% of sites).

Sites varied with regard to the fees they charged for such classes: 54.5% of the sites charged a fee, 36.4% did not charge a fee, and 9.1% used other charge methods. A few Internet access points hosted special Internet events such as network gaming parties (8.9%). This portion of the survey was designed to discover whether community-building activities were taking place at Internet access points. Given the communal nature of Uzbek society, it seemed possible that Internet access points could be developing as a kind of social center to supplement traditional meeting places.

In trying to ascertain the social function that Internet access points may be playing, the survey pursued additional questions to measure what kinds of subtextual encouragement or discouragement of participation may be practiced. Uzbekistan exhibits many characteristics of a post-Soviet country, including a general suspicion of authority. There is a significant police presence in the country, and residents are required to carry passports and registration papers (that provide documentation of what city or town they are legally allowed to live in) at all times. Showing identification is not a negligible issue in this country that is often cited by the international community for its human rights abuses. Thus, being required to show identification papers could reasonably be considered an obstacle for a potential user in Tashkent who, for example, was unable to receive official permission to live in the city. Therefore, the survey asked respondents to report whether their access point required users to show identification. The response rate for this question was 42 sites, and 14.3% reported they ask customers to show identification cards. Of those that ask customers to show identification cards, 50% reported recording the identification ($n = 6$). The

issue of recording identification information is especially interesting in light of later questions regarding whether the access points tracked or logged customer activity online. If these were officially registered businesses, one might expect that they would ask customers to show identification papers, in keeping with what one might expect government policies to be. Of interest, in the first five cafes surveyed, the researchers asked if they could photograph the layout and were refused in four of them.

Customer Demographics

Internet access points estimated that they had an average of 263.18 customers weekly ($SD = 211.49$, $n = 37$) with a median of 200 and a range of 15 to 1,000 customers. Most Internet access sites reported serving mostly young males. Sites estimated that 59.7% of their customers were male ($SD = 16.23$, $n = 45$) and 40.1% were female ($SD = 16.31$, $n = 45$). For comparison, the March 2001 longitudinal survey administered by Pew Internet and American Life Project reported that from the 1,039 respondents who used computers at least occasionally, 45.1% were male and 54.9% were female—a slightly more even distribution across gender than our survey discovered but also a reversal of usage per gender.

Sites also reported that 67.2% of their customers were below the age of 30 ($SD = 19.81$, $n = 42$), 28.2% were between the ages of 30 and 60 ($SD = 17.10$, $n = 41$), and 4.0% were over the age of 60 ($SD = 5.98$, $n = 41$). It appears that in Uzbekistan the majority of computer users are younger than US computer users. Of Pew's reported computer users, 15.9% were aged 18 to 29, 67.9% were aged 30 to 59, and 13.9% were over the age of 60. Our data and the Pew data are difficult to compare though because (1) the Pew surveys exlude people younger than 18 and (2) Uzbekistan has a very high proportion of young people. Specifically, 34% of the population of Uzbekistan is under the age of 15, compared with the United States where 21% of the population is under the age of 15 (World Population Prospects 2003).

Software and Computer Equipment

Most sites (97.9%) reported that they used some version of Windows for the computer operating system on their computers. The most popular version was Windows 98, run by 62.8% of the sites ($n = 43$), followed by Windows XP (32.6%), Windows 2000 (18.6%), Windows 95 (9.3%), Windows ME (7.0%), and Windows NT (2.3%). The high percentage of sites running Windows XP implies that their computers probably have at least the 300-MHz processor and 128 MB RAM that is recommended for running XP. One Web analyst estimates the global XP market share at 20% of all computers on the Internet ("Microsoft Internet Explorer 6.0" 2002). Although the high rate of Windows XP usage in Uzbekistan is curious given the economic situation in the country, having a penetration rate in Uzbekistan that is three times the global usage rate may reflect local practices regarding copyright. Generally speaking, a CD (music or software) can be purchased on the street for approximately US$3.00 to US$5.00.

Other operating systems that were reported in use in conjunction with Windows included Linux (8.5%) and Unix (2.1%). One Internet cafe reported using FreeBSD exclusively. That cafe was observed to have computers with adapter plugs, indicating that the computers were not local assembly. At least one of the computers at this site had a sticker from an Ohio vendor, further suggesting the machines were from overseas. The managers of the cafe were probably sophisticated computer users because they could support an unusual operating system and had connections with a foreign computer source.

All sites reported offering some kind of Internet access software such as Internet Explorer, Outlook Express, or FTP. On average, sites had 1.91 kinds of Internet access software ($SD = 1.02$, $n = 47$). All sites had Internet Explorer ($n = 47$). Outlook was available at 34% of sites, Outlook Express at 14.9%, FTP at 14.9%, Opera at 10.6%, Netscape at 6.4%, and Telnet at 4.3%. Other Internet access programs were available at 6.4% of sites.

Other kinds of computer-related services or equipment were reported as available at almost all Internet access points. Of the 46 responses to this question, 95.7% of the Internet access points had a printer, 80.4% had a scanner, 17.4% had a digital camera, and 15.2% had other computer-related services or equipment such as Web cameras. Only one site answered that it did not offer any computer-related services or equipment other than computers. Researchers did not verify the functionality of these peripherals. Very few Internet sites (4.4%) reported that special hardware or equipment was available for users with disabilities ($n = 45$); however, the response was slightly higher (15.2%) for sites report-

ing that they offered special software for users with disabilities ($n = 46$). These sites were all commercial sites and the one NGO site surveyed. No university sites reported having special hardware or software for users with disabilities.

Software and hardware upgrades were reported to occur fairly often. Sites stated that they upgraded their software once every 2.71 months ($SD = 2.31$, $n = 36$) and their hardware once every 5.75 months ($SD = 3.28$, $n = 32$). The reported frequency of software upgrades and the frequency of hardware upgrades significantly correlated ($r = 0.527$, $p = 0.004$), meaning that the sites that reported upgrading their software often also reported upgrading their hardware often. The software upgrade question received a 77% response rate, and the hardware upgrade question received a 68% response rate. The relatively low response rates to these questions could reflect the fact that the survey respondents themselves do not participate in the upgrade process at their sites.

Internet Connections

In response to a question about what ISP the sites used, of the 39 responses, the sites named 17 different ISPs. The ISPs that were named included national and regional ones, that is, some served all of Uzbekistan and others served only a local area such as Tashkent. The most frequently named were Uzpak (17.9%) and Sarkor (15.4%). Other frequently named ISPs included Intal Telekom (10.3%), Osiyo Express (7.7%), TPS (7.7%), and UzSciNet (7.7%). Other ISPs included BCC, Naytov, Osyolink, and TKT. One site declined to name its ISP, stating that the information was confidential.

The most common Internet connection method reported by sites was dial-up (65%) and some sites used more than one method. Some sites reported using ISDN (17.5%), cable (15%), digital subscriber line (DSL; 7.5%) and other methods such as radio Ethernet (5%). Reportedly, DSL technology is unavailable in Uzbekistan; therefore, respondents who indicated they connected through DSL may have confused it with another advanced connection method such as Integrated Services Digital Network (ISDN).

Connecting to the Internet can be problematic in Uzbekistan; the telephone lines are poor and relatively low bandwidth is available. The average connection speed reported was 111 kbps ($SD = 302.50$, $n = 42$), with a median of 49.5 kbps and a range of 2 kbps to 2 mbps. The average connection speed may be more accurately viewed when a few outlier data points are removed (the three sites that reported unusually slow speeds below 14.4 kbps, and the one site that had a 2 mbps connection through radio Ethernet). With outliers removed, the average connection speed was reported to be 70 kbps ($SD = 48.31$, $n = 39$). Sites reported experiencing an average of 3.16 Internet connectivity problems per week ($SD = 3.61$, $n = 31$) with a median of 2 problems per week and a range of 0 to 16. The question about Internet connectivity problems per week received a low response rate of 66%, probably because some respondents did not work at the site enough hours each week to be able to estimate the answer.

The relatively slow connection speed will also influence people's usage habits when they do go online. Image-intensive sites are less likely to be accessed by a customer base that is sensitized to a high per-hour access charge. On the other hand, users may choose strategies such as turning off images on Web pages to facilitate timely loading of pages and thus reduce the expense associated with browsing. However, the design expectation of Lynx-like image description seems to be falling away from common practice. This, of course, affects the quality of content that can be downloaded by a consumer in Uzbekistan who is paying more than an average day's wages for an hour of Internet access.

Grouping Internet connection methods into two categories—dial-up and more advanced technologies such as ISDN or radio Ethernet—provides a clearer picture of connectivity problems in Uzbekistan. A two-tailed *t*-test revealed that significantly more problems ($M = 4.18$, $SD = 4.451$, $n = 17$) are experienced by sites that use dial-up connections than by sites that use a more advanced technology ($M = 1.31$, $SD = 1.306$, $n = 10$), $t(25) = 2.480$, $p = 0.022$. Those who depend on dial-up access may subscribe to more than one ISP to guarantee more consistent connectivity.

Internet Policies and Monitoring

One section of the survey focused on whether Internet access points regulated their customers' use of the Internet. Most of the sites (77.8%) reported having an Internet use policy for customers ($n = 45$). Of the 35 sites that reported how they publicized their use policy, most orally inform their customers of the policy (77.1%) or post printed in-

formation on a wall (57.1%). Other methods included posting a message on the computer log in screen (8.6%), on the Web browser home page (8.6%), or on the computer desktop (2.9%).

A majority of the Internet access sites (86.4%) stated that they monitored their customers' use of the Internet. The monitoring methods varied. At 71.1% of the sites ($n = 38$), site staff members were reported to monitor customer use. Internet use was also reported as being monitored through software (42.1%), customer self-monitoring (13.2%), and volunteers (5.3%).

Filtering software to block pornography, for example, was reported as being used by 42.2% of the sites ($n = 45$). The kind of material considered objectionable varies and thus the targets of such monitoring fluctuate, but pornography and anti-government or inflammatory activities are common targets. In some cases, patrons are cautioned against visiting illegal sites, which would include the sites of the opposition political parties Birlik and Erk.

Attitudes About Computers and the Internet

Respondents were asked to rate their level of agreement with a series of statements about policies and procedures at their establishment on a five-point Likert scale. A list of the questions and the response frequencies are shown in Figures 2 and 3. When asked their level of agreement with a statement that "customers are happy with the speed of Internet access at this site," two-thirds of respondents agreed or strongly agreed, whereas only 11.1% disagreed or strongly disagreed. When asked their level of agreement with a statement that "our ISP keeps logs of Internet activity," nearly half of the respondents agreed or strongly agreed, whereas 42.5% were neutral, and 10% disagreed or strongly disagreed. This low rate of disagreement with the statement indicates that very few users feel their browsing is anonymous. It is important to note that when these surveys were distributed, government policy had just changed with respect to allowing ISPs other than the government telecom to operate as the final connection point to external Internet material. The high rate of neutrality in the response, combined with the low level of disagreement, indicates that although not all users may articulate that logging is occurring, they are unwilling to say it is not happening.

Respondents' level of agreement with the statement that their "workstations/servers are safe from hackers" more distinctly split the respondents' answers: 38% agreed or strongly agreed whereas 38.1% disagreed or strongly disagreed. This almost equal split across the Likert scale provides interesting insight into general perceptions about security and the risk posed by hacking. We argue that the strong feelings on either side of the scale, rather than a larger response rate of uncertainty, reflect convictions that may be grounded in opinion rather than knowledge of actual risk. Part of the point of this section of the survey was to ascertain the level of awareness of government policy and other regulatory elements regarding IT.

Respondents' level of agreement with the statement that "the government monitors Internet activity at this site" revealed that 42.5% of respondents agreed or strongly agreed, 32.5% were neutral, and 25% disagreed or strongly disagreed. These numbers are particularly interesting in light of the responses regarding ISP monitoring. Because the ISP with which the sites contracted (with the exception of the one NGO-sponsored site) ultimately flowed through the government ISP, the discrepancy in these responses indicates some sort of lack of connection between the local sense of connectivity and the actual workings of government regulation in the country. Of course, such unfamiliarity with the minutiae of government regulations about Internet access and acceptable activity is hardly unique to Uzbekistan. Americans have similar difficulty understanding the byzantine regulations regarding file sharing, ISP responsibility for members' activity, and acceptable use of public library computers in the United States.

On the other hand, the level of agreement with the statement that the access point is "legally responsible for customer behavior on the Internet" was split in almost equal thirds among disagree or strongly disagree, neutral, and agree, or strongly agree. This split seems to portray a similar confusion regarding how regulations actually affect business. Again, government positions on such activity seem to change regularly, both in Uzbekistan and in the rest of the world; therefore, although the confusion may not be unusual, it is part of the general mood that affects people's willingness to use a technology. Particularly in a country with something of a reputation for rights abuses, engaging in activity that may or may not be considered illegal carries with it relatively high risks. It is possible that people's unfamiliarity with regulations and concurrent penalties

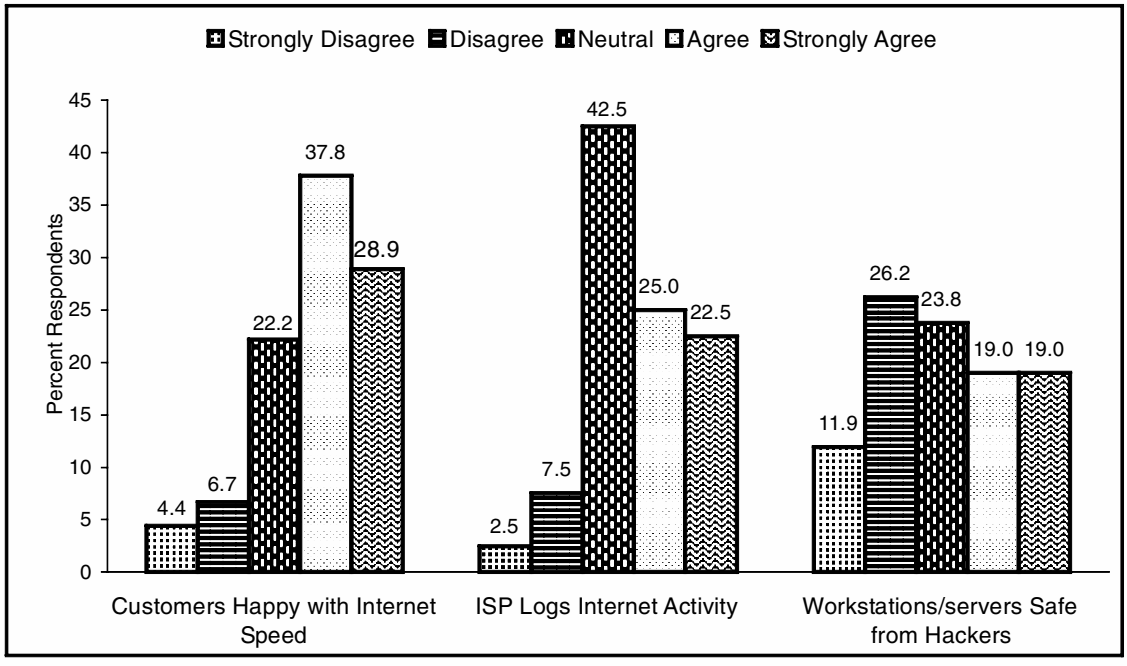

Figure 2. Agreement with statements concerning security and general use at Internet access points.

provides a barrier to entry: better to be safe than sorry.

Finally, the level of agreement with the statement that "customers cannot access some Web sites because of government policies" revealed that 46.4% agreed or strongly agreed, 26.8% were neutral, and 26.8% disagreed or strongly disagreed. Nearly half of the respondents agreed that the government outrightly censors Web sites. As we created this survey, we were wary of the wording of this question, especially given the risks associated with criticizing the government. In that sense, then, it seems reasonable to project that some of the neutral responses may have been from individuals who were uncomfortable expressing an opinion.

The level of agreement on these statements also revealed many significant correlations (see Table 1). The level of agreement concerning workstations being safe from hackers significantly correlated with the level of agreement about customers being happy with the Internet access speed at the sites and their level of agreement regarding their legal responsibility for customer behavior on the Internet. It is interesting that the level of agreement concerning customers' happiness with Internet speed at the site also significantly correlated with the level of agreement concerning ISPs keeping logs of Internet activity at the sites. And the level of agreement concerning the government monitoring Internet activity at the site significantly correlated with the level of agreement about customers not being able to access some sites because of government policies. This last correlation in particular demonstrates a consistency in response regarding acknowledgement of government control over Internet-related communications.

IT Professionals Survey

The IT professionals survey was administered to 29 IT professionals: 10 in Tashkent and 19 in Bukhara. Although the sample size was smaller than desired, the results paint a preliminary picture that can inform later work. Because of the space constraints, the results of this survey are discussed only briefly.

Respondents were asked about their history with computers. In part, this was to give us an idea of the depth of knowledge that people in the industry have about IT and whether that knowledge is the result of formal education or informal learning. In the United States, for example, programming experience is often gained through informal channels or as the result of individual effort (Batt, Christopherson, Rightor, and Van Jaarsveld 2001; Boston Consulting Group 2002). Especially when a technol-

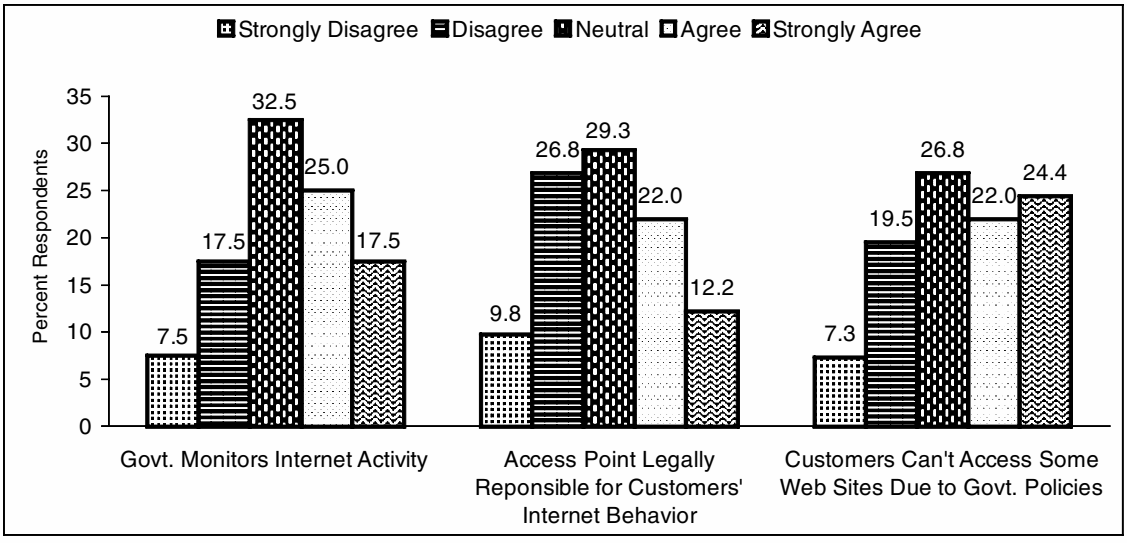

Figure 3. Agreement with statements concerning censorship-related activity at Internet access points.

ogy is relatively new, curricula are often slow to change and incorporate new materials; this pattern can be seen clearly in the history of computer science curricula in the United States and the slow arrival of courses on languages such as Java. Because IT is in its early stages of development in Uzbekistan, we hypothesized that workers in the IT industry would have gained some of their knowledge through informal channels.

On average, respondents first used the computer in 1993 (SD = 4.89, n = 26); the median year was 1994 and the range was from 1978 to 2000. For 51.7% of the respondents, their first computer use occurred at school (n = 29). Another 10.3% indicated they first used the computer at university or at an institute (a place of higher education). In other words, 62% of respondents used a computer for the first time in an educational setting. The second most common place where respondents first used a computer was at work (24.1%). The clear majority of respondents first used a computer in a school or university setting or at work, suggesting that computers in Uzbekistan are more common in those settings. Other places where respondents first used a computer included home (6.9%) and a pay public access point (6.9%). All respondents first used the computer in Uzbekistan (n = 29).

Of the 29 respondents who provided answers about where they learned about computers, 55.2% studied computers at school, 53.6% studied computer programming at school, and 75.9% reported knowing a programming language. We can infer that about 45% learned about computers and about one-third learned programming languages outside of a formal school setting.

The survey also assessed the respondents' history with the Internet. All respondents reported having used the Internet (n = 29). On average, respondents first used the Internet in 1999 (SD = 2.63, n = 27) with a median year of 2000 and a range from 1990 to 2002. The Internet was first used at work by 37.0% of respondents (n = 27). Other places where the Internet was first used include a pay public access point (22.2%), university or institute (14.8%), a free public access point (7.4%), and home (7.4%); 11.1% reported that their first Internet use was in another location such as a friend's house or at a computer center course. Unlike the responses for first computer use, there is no definitive majority for any location where the Internet was first used, suggesting the Internet is not uniformly located in any one kind of location at least in terms of how people in Uzbekistan gain their initial experience with the technology. For 85.7% of respondents, this first Internet use was in Uzbekistan (n = 28). Of the people whose first Internet use was outside of Uzbekistan, one first used it in Korea and another in Siberia.

Table 1. Significant Correlations Between Statements About Computer Attitudes

Statement 1	Statement 2	*r*	*N*	*p*
Our workstations/servers are safe from hackers.	Our customers are happy with the speed of Internet access at this site.	.425	42	.005
Our workstations/servers are safe from hackers.	We are legally responsible for customer behavior on the Internet.	.425	39	.007
Our customers are happy with the speed of Internet access at this site.	Our ISP keeps logs of the Internet activity at this site.	.339	40	.032
The government monitors Internet activity at this site.	Customers cannot access some sites because of government policy.	.324	39	.044

A majority of respondents (85.7%) stated that the Internet played a role in their jobs ($n = 28$). Of those who elaborated on how the Internet is used in their jobs, 81.3% ($n = 16$) reported that they used the Internet to gather information. The Internet is used for communication with others by 12.5% of the respondents. Another 12.5% indicated that they used the Internet for software, presumably to download it or install patches or updates. Some respondents reported more than one Internet role in their jobs; therefore, percentages total more than 100. On average, respondents' employment was reported to have involved computers since 1994 ($SD = 7.51$, $n = 21$) with a median year of 1997 and a range from 1976 to 2001. This question actually received 27 responses, but 6 of them were discarded because the respondents misinterpreted the question and gave the wrong kind of answer such as their hours of employment during the day.

Communication with other IT professionals was important to our respondents: 84.6% ($n = 26$) said they communicate with people in the computer industry. On a scale of 1 to 5, where 5 is most important, 78.6% ($n = 28$) said that it was most important to communicate with others in the computer industry. The other responses are as follows: 7.1% rated the importance as a 4, 7.1% rated the importance as a 3, 3.6% rated the importance as a 2, and 3.6% rated the importance as a 1.

Respondents were asked to estimate what percentage of people in Uzbekistan own a computer. The mean response was 21.37% ($SD = 21.79$, $n = 26$); the median response was 15.00% with a range from 0.05% to 85%. We also asked them to estimate the percentage of people who use the Internet. The mean response was 11.51% ($SD = 12.95$, $n = 26$); the median response was 6.50% with a range from 0.01% to 55%. Such discrepancy in reported figures contrasts even more starkly with government figures; these gaps motivated the survey component of this part of the research, and they point to the importance of conducting primary research to generate a picture that does justice to the complexity of actual infrastructure issues.

Conclusions and Future Research

Although the results from the two surveys reported here are still being assessed, some interesting patterns emerge. Although our survey shows that it is prohibitively expensive to use the Internet, the government of Uzbekistan is reporting that huge numbers of people going online. Also, a striking number of cafes report owning a variety of peripheral equipment. What also struck the researchers while performing the fieldwork was the number of cafe patrons who were using games, suggesting that later surveys could profitably investigate how gaming can function as an entry point to Internet activity.

These access points in a country as poor as Uzbekistan are not all bare-bones operations and they seem to be striving to build their customer base by being open 7 days a week, a few claiming to be open 24 hours a day. Notably, in a country with somewhat comprehensive censorship policies, a country that is often characterized as a police state,

few Internet access points report asking patrons to show ID. And when the operators of the Internet access points were queried about potentially invasive issues, they responded with more frankness than we had anticipated. Combined with the cafes' refusal to request IDs from patrons, this seems to place Internet cafe activity outside the conventions of mainstream cultural activity in which people may be willing to take more risks. The questions asked during these surveys were driven by attention to local cultural issues, and the responses provide a nuanced perspective on IT access and usage. For example, understanding how censorship policies are affecting everyday Internet use, how registration issues may contribute to barriers to use, and whether reservations policies prevent casual use of computers all provide information that generates a detailed version of Uzbekistan's readiness for further IT development, particularly with respect to getting people other than early adopters to use the Internet.

As the results of these surveys show, particularly the responses from Internet access points, infrastructure cannot be understood simply or easily as the result of number of ISPs or level of telephony development. Rather, the extent of access that is truly available to prospective users deals with issues related to cost, availability, risk of government enforcement of regulations that may or may not be understood, and other factors that may be hidden behind a proliferation of Internet club signs. To draw an accurate picture of IT development in a region, and thus accurately chart a path for development efforts that use IT, it is crucial to dig a bit deeper and ask questions that reflect an awareness of challenges faced by local citizens.

Ultimately, the survey results reported in this paper were combined with the two sets of interviews conducted in November 2002 and the results used to develop a survey that was distributed in March 2003. Although some of these interviews addressed Internet use specifically, they also were conducted to develop a better understanding of what cultural patterns are already in place that may influence how people use the Internet. The March 2003 survey tracked individuals' attitudes toward the Internet and their usage patterns of the Internet and built on the hypothesis driving this study—namely, that culture, public policy, and infrastructure all play a significant role in how IT develops in a specific setting. Although numerous surveys have been developed for distribution throughout the world, this project seeks to create survey content that balances the influence of policy, culture, and infrastructure. The responses of users and nonusers to the upcoming survey in this location of nascent IT development should provide insight into how these forces are influencing peoples' response to Internet and related technologies. ■

References

Arunachalam, S. 1999. "Information and Knowledge in the Age of Electronic Communication: A Developing Country Perspective." *Journal of Information Science* 25(6):465–476.

Batt, R., S. Christopherson, N. Rightor, and D. Van Jaarsveld. 2001. *Net Working—Work Patterns and Workforce Policies for the New Media Industry.* Washington, DC: Economic Policy Institute.

Bishop, A., I. Bazzell, B. Mehra, and C. Smith. 2001. "Afya: Social and Digital Technologies that Reach Across the Digital Divide." *First Monday* 6:(4). Retrieved February 7, 2003, from www.firstmonday.dk/issues/issueb-4/bishop/index.html.

Bollag, B. 1994. "The 'Great Equalizer': Users from Tokyo to Tashkent Meet in Prague to Discuss the Internet." *Chronicle of Higher Education* 40(43):A17–A19.

Boston Consulting Group. 2002. *OSDP Hacker Survey.* Retrieved February 1, 2003, from www.osdn.com/bcg/.

Carvin, A. 2000. "More Than Just Access: Fitting Literacy and Content into the Digital Divide Equation." *EDUCAUSE-Review* 35(6):38–47.

Chon, K. 2001. The Future of the Internet Digital Divide. *Communications of the ACM* 44(3):116–117.

Damatin, S. K. 2000. "The 'Digital Divide' Versus Digital Differences: Principles for Equitable Use of Technology in Education." *Educational Technology* 40(4):17–22.

Daniels, J. K. 1999. "Information Technology and Health Care Partnerships: Training Medical Professionals in Central and Eastern Europe and the New Independent States." *IPCC 99. Communication Jazz: Improvising the New International*

Communication Culture. IEEE IPCC Proceedings 1999:367–371.

Daniels, J. K., R. J. Cronje, and B. C. Sokolowski. 1998. "Exchanging Medical Information with Eastern Europe Through the Internet." *Technical Communication Quarterly* 7(3):301–317.

Davis, T. and M. Trebian. 2001. "Shaping the Destiny of Native American People by Ending the Digital Divide." *EDUCAUSE-Review* 36(1):38–46.

Degtiar, M. 2000, November 22. "Emigration of 'Russian-Speakers' from Uzbekistan." *Central Asia Caucasus Analyst.* Retrieved February 1, 2003, from www.cacianalyst.org/Nov_22_2000/Uzbek_Emigration.htm.

Falkingham, J. 1999. "Measuring Household Welfare: Problems and Pitfalls with Household Surveys in Central Asia." *MOCT-MOST* 9:379–393.

Finifter, A. and E. Mickiewicz. 1992. "Redefining the Political System of the USSR: Mass Support for Political Change." *American Political Science Review* 86(4):857–874.

The Global Diffusion of the Internet Project. 2002. Retrieved January 27, 2003, from mosaic.unomaha.edu/gdi.html.

Kirkman, G. S., C. A. Osorio, and J. D. Sachs. 2002. "The Networked Readiness Index: Measuring the Preparedness of Nations for the Networked World," in *The Global Information Technology Report 2001–2002: Readiness for the Networked World.* Retrieved January 28, 2002, from www.cid.harvard.edu/cr/gitrr_030202.html.

Kolko, B. 2001. "Virtual Education in a Global Context: Community Roots, Corporate Futures, and International Initiatives." Presented at the Second International Conference of the Association of Internet Researchers, Minneapolis, MN.

Kolko, B. 2002. "International IT Implementation Projects: Policy and Cultural Considerations." *Proceedings of International Professional Communication Conference:*352–359.

Lajos, T. and A. Szucs. 1998. "Universities, the Information Technology Challenge, and Open and Distance Learning in Central and Eastern Europe." *Higher Education in Europe* 23(2):177–185.

McCloskey, K. M. 2000. "Library Outreach: Addressing Utah's 'Digital Divide.'" *Bulletin of the Medical Library Association* 88(4):367–373.

"Microsoft Internet Explorer 6.0 and Windows XP Rank as Most Popular Browser-OS Combinations on the Web." 2002, October 29. Retrieved February 2, 2003, from www.websidestory. com/pressroom/pressreleases.html?id=174.

"Number of Uzbek Internet Users Rises to 275,000 in 2002." 2003, January 21. Retrieved January 30, 2003, from www.interfax.com/com?item=Uzb&pg=10&id=5616125&req=.

Pakstas, A. and S. Pakstiene. 1993. "**Computer Networks in Estonia, Latvia, and Lithuania.**" *Computer* 26(9):53–64.

Rubens, P. and S. Southard. 2000. "Using New Technologies for Communication and Learning." *Proceedings of 18th Annual Conference on Computer Documentation:*185–189.

UNDP Human Development Report 2001: Making New Technologies Work for Human Development. 2001. Retrieved January 28, 2003, from www.undp.org/hdr2001/.

US Embassy Tashkent. 2001, November 13. *Uzbekistan's Hardware and Software Markets Overview.* U.S. and Foreign Commercial Service and U.S. Department of State. Retrieved February 1, 2003, from www.bisnis.doc.gov/bisnis/isa/011114comps.htm.

Ware, R. B. 2002. "Why is Dagestan Moving Closer to Moscow?" Paper presented at the Caspian Sea Regional Policy Symposium, IREX and Woodrow Wilson Center, Sheperdstown, WV.

Wheeler, S., H. Zlamalova, and S. English. 2000. "Distance Education in Eastern Europe; Status Report: Distance Education in the Czech Republic." *Quarterly Review of Distance Education* 1(4):351–354.

White, S. D. and W. F. Lester. 2001. "Cultural Relevance: Hip-Hop Music as a Bridge to the Digital Divide." *Proceedings of the 34th Annual Hawaii International Conference on System Sciences:*9.

Wolcott, P., L. Press, W. McHenry, S. Goodman, et al. 2001. "A Framework for Assessing the Global Diffusion of the Internet." *Journal of the*

Association for Information Systems 2(6). Retrieved January 28, 2003, from mosaic.unomaha.edu/2001_GDI_Framework.htm.

Woodard, C. 1995. "Internet International." *Chronicle of Higher Education* 41:A21.

World Population Prospects: The 2002 Revision, Volume I: Comprehensive Tables (United Nations publication, forthcoming), supplemented by *Demographic Yearbook 2000* (United Nations publication, Sales No. E/F.02.XIII.1) and *Population and Vital Statistics Report,* Statistical papers, Series A Vol. LV, No. 2 (Data available April 1, 2003). Retrieved August 8, 2003, from unstats.un. org/unsd/demographic/social/.