After Access – Challenges Facing Mobile-Only Internet Users in the Developing World

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ABSTRACT

This study reports results of an ethnographic action research study, exploring mobile-centric internet use. Over the course of 13 weeks, eight women, each a member of a livelihoods collective in urban Cape Town, South Africa, received training to make use of the data (internet) features on the phones they already owned. None of the women had previous exposure to PCs or the internet. Activities focused on social networking, entertainment, information search, and, in particular, job searches. Results of the exercise reveal both the promise of, and barriers to, mobile internet use by a potentially large community of first-time, mobile-centric users. Discussion focuses on the importance of self-expression and identity management in the refinement of online and offline presences, and considers these forces relative to issues of gender and socioeconomic status.

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Developing world, Mobile Internet, HCI4D, ICT4D.

ACM Classification Keywords
H5.m. Information interfaces and presentation (e.g., HCI): Miscellaneous.

General Terms
Human Factors

INTRODUCTION

With over 4 billion mobile subscriptions [7], mobile telephony has surged worldwide, bringing access to telecommunications to billions of first-time users. Buoyed its increasing ubiquity, researchers and practitioners are deploying mobile telephony to support social and economic development initiatives ranging from disease surveillance to increasing access to financial services [4].

Enthusiasm for "mobiles for development" (M4D) has come in waves: the first focuses on the usefulness of the basic voice call, with India's new mobile-toting fishermen

as a marquee example [8]. The second wave, still underway, focuses on leveraging the ubiquitous text message (SMS) [4].

A third wave in M4D is emerging, focused on the mobile internet. Many might associate the mobile internet with 'smartphones', which offer fast data connections, diverse applications, and relatively large screens, and might further assume that smartphones are used mostly by business people to compliment traditional PC based internet access.

But that is not the only mobile internet story – a growing proportion of the world's "feature phones" also support data connections. For as little as $70, individuals can purchase a GPRS (General Packet Radio Service)-ready handset allowing them to access premium content from operators, to download applications, or to browse the web, all via mobile-specific technologies such as WAP2.0, XTML, or Opera Mini. In many cases, individuals accessing the internet via such midmarket handsets will have no access to a traditional PC-based internet connection. This is a potential paradigm shift, and promises a new surge of digital inclusion. However with the exception of IMode in Japan, the research community has not explored the mobile-only internet experience in detail. This paper contributes to the CHI community and addresses a significant gap in the research literature by describing the results of a study exploring the technical challenges facing would-be mobile only internet users in a developing-world setting.

After Access: Challenges Beyond the First Hurdle
Our study participants were first-time mobile internet users in an economically disadvantaged neighborhood of Cape Town, South Africa. In a separate and more extensive paper, [5] we describe participants successes finding jobs and in integration the mobile internet into their daily lives. In this brief note, we focus exclusively on the on six technical obstacles that would-be users encounter without the complementarily of a PC-based internet experience.

The challenge is not access. The internet was already "there"—accessible via the handsets of each of the participants. It was also relatively affordable—data costs around 12 US cents per Mb., and is available prepaid, without a data plan or contract. However, in practice, a gentle push was required, without which affordable access had not translated into effective use. We were interested in exposing why this push was required as presumably the

handsets were being used successfully in the developed world: why is it then that a barrier exists for users in the developing world?

BACKGROUND AND RELATED WORK

There are descriptive studies of mobile-centric internet use [2, 10]. Other germane related work follows first-time mobile phone or PC users from resource-constrained settings in the developing world, exploring textual and/or digital literacy as a barrier to mobile use [11]; assessing the impacts of providing free access to local content; or following first time PC users as they discover the internet [14]. Another related thread involves first-time internet use in more prosperous settings; exploring the usefulness of internet training [3]; describing internet use by the elderly [1]; 'domesticating' (adopting) the mobile internet [12]; or contrasting browsing by novice and experienced users [6]. However, we are unaware of any studies focusing specifically on the HCI implications of mobile-only internet use; our study addresses this significant gap.

METHOD

Simply put, we elected to provide a 'gentle push', training people with *no* previous exposure to the internet to access it via their mobile handsets. The overall study, as described in [5], led to the methodological choice to approach this training as Ethnographic Action Research [16], combining exploratory, evolving and collaborative intervention with undirected listening. Over thirteen weeks, one of the authors immersed herself in the participants' environment through frequent half-day visits, and was able to gather insights about the technology in context, exceeding those we could have gathered via structured interviews or usability assessments. At the same time, the long, relaxed interactions with participants also uncovered the specific technical obstacles we report below. If one were looking only at usability factors one might not design a 13 week ethnography to find them; but we were able to uncover them nevertheless.

We began with individual 'benchmark' interviews and a group training performed via a translator in the participants' first language, isiKhosa, which was followed-up with ad-hoc one-on-one refresher sessions. Over time, a dynamic of peer-to-peer knowledge exchange emerged as participants shared their successes—finding job leads or weather information or gospel music—with each other. With participant's consent, most conversations were recorded. Most of the hurdles were encountered in the midst of peer-to-peer conversations and interactions which would move off topic for an hour or more at a time, before returning to respondents' experiences with the mobile internet. The six challenges we describe were synthesized from daily post-interaction field notes.

Participant Profile

All eight participants in our study work as seamstresses at a skills development NGO in Khayelitsha, a large and historically economically disadvantaged township just outside Cape Town. We selected the women based on our prior relationship with the NGO. Of the eight women, five are in their twenties, two in their thirties, and one in her fifties. Four are married. Their households have a median income of 3000 Rand per month ($400), which is above the poverty line for South Africa, but nevertheless quite resource-constrained. Six of the women had moved to Khayelitsha from rural communities in the Eastern Cape. Only three had completed their last year of high school. Each participant owned a handset with GPRS capability and WAP 2.0 (five Samsungs, two Nokias and a Motorola). Some had heard of the internet, but most did not know their phones could access it. None had used a PC.

Neither middle class nor destitute, illiterate nor proficient, the women belong to a large community of potential mobile internet users throughout the developing world. In corporate parlance [13], they are at the top of the bottom of the world's income pyramid, or at the bottom of its middle.

RESULTS: "AFTER ACCESS" HURDLES

The training was successful, with many participants using the mobile internet for job search or for self expression [5]. However, through our observations and interactions with the participants, we uncovered six significant hurdles which may have been insurmountable if not for the training and the group support.

Handset/Mobile issues

1. GPRS Settings

The first challenge that a would-be mobile internet user comes across is the need to match her handset's GPRS settings to the requirements of the mobile operator. This can be accomplished using multi-step menu-based USSD (Unstructured Supplementary Service Data) commands. However the menus provided by South Africa's three main operators were not clear and required prior knowledge of the correct steps in order to activate the devices' internet facility. Users were required to have knowledge of the phone specifications (manufacturer, model number), and in several instances, the operator returned an error that the phone was not supported. A second method is to call or visit a customer service centre which can send the GPRS settings to the phone via SMS. This was less error prone but also required prior knowledge of the phone's specifications.

2. Security Settings

The cellular operators in our study have made it impossible to navigate beyond their 'home' page without agreeing to their terms and conditions. This is tedious exercise that distracts the user from their initial navigation goal. Although put there ostensibly for the good of the users, it is a distraction to using mobile internet, especially for users who are unfamiliar with concepts such as an End User Lease Agreement (EULA). Further, one of the operators in South Africa has added their own branded banners both as a header and footer to all websites accessed through their network's premium services. Some participants did not realize that they needed to scroll further down the screen below the banners to find the site they were looking for –

this is a common issue even amongst experienced users [9]. Some users learn how to bypass the banners by launching a third-party browser; the rest view pages on a subsection of an already-small screen.

3. WAP / Menu Confusion

There is a great deal of inconsistency between how handsets present the mobile internet, even within handsets from the same manufacturer. The most common handset brand amongst the women was Samsung. On one participant's handset, the browser was located within a folder named 'Fun', which also contained games and other applications. On another, one could access the browser from the menu by directly selecting a globe labeled 'WWW'. On others, a menu item said 'Internet'. Even the use of the globe icon was confusing – on some phones it represented network applications, on others it invoked the browser directly. On some Samsungs, the hot key for internet access was placed at the centre of the navigation pad, yet was unlabeled. The users discovered this by accident whilst engaged in normal menu navigation.

In the Nokia phones, the browser could be found either in the 'Services' menu (Nokia 6600) or in its own 'WAP' menu (Nokia 6610). The menu icon associated with the browser was a globe, yet the hot key to start it was an ⓘ placed on the '0' key. The symbol ⓘ, standing perhaps for 'internet' or 'information', evoked little comprehension. Regardless of the icon, to select the hot key to open the operator's home page and then to navigate away from this page was a complex task.

Systemic issues

Even if the problems with the handset and the settings could be resolved, other challenges emerged, having more to do the communications ecosystem than with the handset itself.

4. Unfamiliarity with Passwords

For example, all participants were familiar with PINs, having used them to activate their SIM cards, or on ATMs. But when prompted for a password, the new term was confusing; many entered their existing PINs in response. Password and PIN requirements vary in terms of character string length and character types.

5. No Mobile Version of Web Site

Practitioners stress the importance of locally-relevant and/or local language content online [15]. Although, conditions take regular "steps forward", as more organizations get online. But the arrival of the mobile internet may represent "two steps back". All the mobile websites our participants found were in English only.

Further, many websites do not have a WML version of their content. For this reason, Opera Mini became popular as the study progressed. It did a reasonable job of scaling the full version of the website onto the handset, allowing the participants to zoom in and out of the various pages and access the links. This provided a workable solution for mobile access to sites that were not available in WML.

6. Web-mail: Chicken or the Egg?

As part of the training process, we wanted the women to sign-up for an email address. It is the cornerstone of an online presence, and without it, other services, such as Twitter, can be nearly impossible to access. An exception is Facebook, which allows users to register a profile with their mobile phone number. This option helped make it the participants' social media site of choice

We found that the majority of the web-based e-mail operators do not support mobile-only origination of email addresses. For example, when trying to sign up for a Gmail account, we were instructed "Want a Gmail account? Go to www.gmail.com on your computer" To circumvent this obstacle, we prompted the participants to use Opera Mini to access to the full version of the website. However, even this presented some challenges; one of the participants' applications for an email addresses was blocked when they could not use the image-based authentication employed by the registration system. The following message was displayed: "*If your mobile does not correctly display the image below please login successfully on the desktop to enable your mobile login again. Enter the correct password above and then type the characters you see in the picture below.*" Of course, the handset did not display the image correctly, but she could not access a desktop device.

DISCUSSION

We are not suggesting that any provider has made a deliberate choice to exclude or confuse mobile-only users. However, our experience during the study leads us to believe that many elements of the mobile internet have been deployed with the assumption that would-be users would have access to a PC, and/or previous experience with the PC based internet. How else can we explain messages referring to "the desktop", or worse, "your computer"?

The obstacles we have discussed may seem trivial, or similar to the problems experienced in the developed world. However, the distinction lies in both the magnitude and impact of these impediments. Someone in the developed world might be forced to delay their GPRS configuration until they could visit an outlet of their cellular operator, and meanwhile would access the internet at home or work or school. In much of the developing world, there are no alternatives; if you are unable to configure the handset yourself, you may never get on-line. Like much of the infrastructure in the developing world, there is little or no redundancy—if one's primary access method fails (using a mobile) there is no alternative channel (no local internet café).

Mobile-only internet users would benefit from an alternative to the practice of using an email address as authentication. Besides using the SIM number as an identifier, cellular operators could provide their users with an email address, even as basic as phone_number@serviceprovider.com.

Beyond the idea of providing a basic email addresses with each SIM card, other services could be of use to mobile-only users. For instance, as the participants grew in confidence, they started searching for services that they hoped to find on the internet. Chief among these was the search for jobs in on-line classified sites. Whilst one cannot create a CV on a mobile device, it is possible to imagine a service which asks applicants a series of questions and constructs a CV for them.

CONCLUSIONS

We set out to discover challenges that prevent mobile-only users from making full use of the internet. Given the amount of attention dedicated to increasing access to the internet via the mobile, we wanted to explore more subtle problems that lay beyond providing initial access.

We discovered six impediments that would not be obvious to those who have multiple ways to access the internet. Seemingly arbitrary decisions about where to place banner advertisements; what symbols should be used to denote internet functionality; and the requirement of an email address created obstacles for the participants in this study. None of these problems are (technologically) insurmountable; indeed Nokia's Ovi and Microsoft's OneApp have recently begun offering mobile-originated email addresses. As more people access the internet through mobile-only means, web designers need to bear these lessons in mind; in particular, be conscious of when their metaphors, requirements, and or interfaces assume prior access to and familiarity with the internet. This finding in particular is not new [9] but we urge our fellow HCI researchers and practitioners to take into account the fact that their designs will be used by people with different mental models and constraints than the countries in which they are based; usability problems that seem trivial in one context are show-stoppers in another. If we take seriously the potential for mobiles to help in addressing development issues, and if the work to provide connectivity to the previously marginalized is not to be in vain, we need to understand and design for mobile-only access; otherwise, many will remain excluded from the internet for the most trivial of reasons.

ACKNOWLEDGMENTS

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