Seamfully Interwoven: Piecing Together Havana's Internet

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Abstract
Drawing on the fields of HCI, ICTD, and Social Computing, my research explores how increasing internet access influences the lives of intended users and how we might leverage local information infrastructures to design more effective services for users in emerging markets. Through ethnographic research in Havana, my dissertation unpacks the ways individuals actively and creatively stitch together multiple information infrastructures to create their own versions of the "internet." Using Cuba as a case study, my work explores how future internet access initiatives might successfully map onto local information infrastructures to provide meaningful, sustainable engagement with the internet among under-connected communities in resource-constrained parts of the world.

Author Keywords
Social Computing, HCI4D, ICTD, internet access, social media, human infrastructure, Cuba

ACM Classification Keywords
H.5.3 [Group and Organization Interfaces]: Collaborative Computing

Context and Motivations
With nearly four billion people still lacking access to the internet [1], efforts to expand internet access are growing rapidly across the world, with massive initiatives being un-

Research Questions

RQ 1: How do individuals in Havana receive and engage with government sponsored internet access initiatives?

RQ 2: How have individuals co-created local information networks in Havana to reflect their values while navigating constraints?

RQ 3: How do internet access initiatives interoperate with citizen-created information networks to form the "the internet" in Havana? How do individuals experience this sociotechnical system?

dertaken by a variety of actors [5, 9]. Despite growing access initiatives, local barriers along political, economic, and social dimensions continue to limit meaningful internet engagement for individuals in resource-constrained communities [2, 13, 7]. Although barriers exist, studies of individuals in resource-constrained settings highlight the innovative and creative ways individuals negotiate constraints [11, 12, 7].

Similarly, in Cuba, newly-available internet access is further constrained by policy restrictions, high costs, trade embargoes, and legal ambiguities [10, 3]. In the absence of access to the World Wide Web (WWW), individuals in Havana have developed their own information infrastructures through content sold on USBs ("El Paquete") and an intranet custom-designed by citizens ("StreetNet"). At the same time, policy in Cuba is changing and access to the WWW is also becoming more prevalent, mainly through slow and expensive access at workplaces and WiFi hotspots.

My dissertation work seeks to understand the particularity of each of these parts, and the bigger whole that emerges during this time of transition. By focusing on the human infrastructure [8, 12], I unpack the ways human actors move in an across seams to weave multiple networks and, thereby, form the "internet" in Havana. My research asks, *how does increasing internet access influence the lives of those it targets* and *how might we leverage pre-existing, local information infrastructures to design more meaningful engagements for users in emerging markets?*[1]

Work To Date

In December 2014, Cuba and the U.S. announced a normalization of relations, with increased internet access in Cuba as an expected outcome. At this time, only 5% of the population had "full" access to the internet. Considering the potential for change, I set out to explore, first, current internet engagement in Havana, and, second, new government initiatives to increase access through public WiFi hotspots. The studies below address **RQ1**.

Study 1: *Semi-structured interviews and online participant-observation with early internet adopters living in Havana.* The purpose of Study 1 was to lay a baseline for current internet use by exploring Cubans' access limitations and the activities they do online, as well as what internet access means to them. My findings showed that access limitations and slow network speeds greatly restricted participants internet use. Similar to individuals in other contexts [12], participants used intermediated access techniques to counter limitations, often conducting online research and posting photos for friends with less access. Participants with lower access reported that they relied on others to help maintain their Facebook presence, further highlighting the importance of collaborative efforts to use internet tools. The findings from this study were published in CSCW '16 [3].

Study 2: *Semi-structured interviews, informal interviews, and participant observation with users and non-users of the first public WiFi hotspots in Havana (opened in March 2015).* This study explored the possibilities of internet access these limited and expensive hotspots present to individuals, many of who are experiencing the internet for the first time. Findings from this study reveal the reconfigurations that have resulted from this new form of access, as evolving internet users reconfigure their interactions with place, time, and individuals in their efforts to "locate the internet." First, having access to a physical space that is also online has shaped how the local Cuban people interact with this space. Second, given the limited access in these public settings, users have to carefully prioritize their time while they are online and offline, so that their internet needs are fulfilled affordably. Finally, as these Cubans go online to

[1] See sidebar for specific research questions.

connect with their families after long years of separation, they are finally in a position to reconfigure these relationships and regain communication with them. This work received a Best Paper Honorable Mention at CHI 2017 [4].

Ongoing and Future Work

While conducting the first two studies, I learned that the "internet" in Havana looked quite different from what I had initially anticipated. Instead of access to the WWW, participants interacted with internet content through the design and maintenance of grassroots information infrastructures. My ongoing and proposed work addresses **RQ2** and **RQ3** by exploring the co-creation of two grassroots information networks, "El Paquete Semanal" and "StreetNet."

Study 3: *Semi-structured interviews and participant observation of El Paquete (EP), an information-sharing ecosystem in Cuba that has emerged as the predominant means for Cubans to engage with local and foreign media and information on a weekly basis*. Through fieldwork in Havana, I am exploring the human infrastructure of this ecosystem, shedding light on the articulation work involved and the values that motivate it. My findings to date contribute an enriched understanding of the modes of information sharing that have emerged, creating a version of the "internet" in Cuba. This work complicates our understanding of the roles of human actors in information networks in resource-constrained environments. My current findings have been submitted for review at CHI 2018.

Study 4: *Semi-structured interviews and participant observation with users of StreetNet (SNET) – an intranet built by individuals in Havana that now has more than 9,000 users [6]*. Through ongoing fieldwork in Havana, I am interviewing and conducting participant observation with SNET users. Understanding this thriving network holds promise for connecting more individuals in Cuba to the WWW. Previous interviews with SNet administrators revealed that there are talks underway between admins and Cuban officials regarding the possibility of making SNet "legitimate." Exploring this space and working with users may allow for the opportunity to inform these efforts from a perspective that communicates individual values and goals.

With internet access still being severely limited in Cuba and participants expressing a desire to be able to explore and distribute more content online, is there room to develop a system that merges the local infrastructures with the current bits of access to the WWW to create a more enjoyable and productive online experience for Cubans? How might this model leverage already successful information networks to aid more people in utilizing services for business opportunities, social support, and information dissemination? These are some of the questions that I would like to unpack with other researchers.

Contributions

I aim to contribute to research on information access in Cuba. I will also draw implications for the design of information access initiatives in other resource-constrained regions, contributing to the fields of social computing and ICTD.

Contributions to Cuba research: The state of information access in Cuba is different from most others. My work will investigate how the rationed, public introduction of access to the web interacts with existing, information infrastructures. Given the pace at which Cuba's economy is embracing external influences, but also given the large sections of its population yet to engage online, more research is needed to inform responsible technological interventions for Cuba. My work aims to inform policy changes and future technological advancements in Cuba.

Contributions to information access initiatives across the

world: There currently exists synergy (and some tension) between business interests wanting to establish their presence in emerging markets and humanitarian interests wanting better information access for individuals. Considering the growing number of internet access initiatives, my research will contribute insights into what these efforts might focus on to provide access that holds meaning and value for new adopters. My work seeks to illuminate the importance of considering local values, care ethics, and personalization when building an internet for the people.

Contributions to the fields of social computing and ICTD: My work will also contribute to crafting a research agenda that builds out the intersection between the fields of ICTD and social computing. As more users get online, both in under- and highly-connected communities, it is critical that ICTD researchers consider long-standing issues in social computing, such as what happens *after* individuals gain access. Additionally, as services (*e.g.,* Facebook) developed in highly-connected contexts are increasingly adopted in socioeconomically disadvantaged communities, the nature of access by these new and evolving users must be considered. My work thus also has implications for the social computing community, highlighting the need for it to engage with diverse connected cultures and geographies.

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