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Notes from the Field

Stories from the Field: Reflections on HCI4D Experiences

Abstract

Human-computer interaction for development (HCI4D) requires considerable time in the field interacting with users. While this is true for most HCI work, fieldwork in developing regions presents unique challenges due to differences in culture, language, ethnicity, and socioeconomic status. As a group of nine HCI4D researchers, we have adopted a systematic approach to reflect on the challenges we have encountered in the field. Arising from this exercise are three contributions: The first is our research method itself, which uses a mix of qualitative and quantitative instruments to elicit and synthesize individual experiences. The second, intended for beginning researchers, is a set of lessons learned and suggested strategies for navigating the unique challenges of HCI4D research. The third, intended for the HCI4D community at large, is a critical reflection on the field itself, inspired by our findings. Topics covered include the incentives and agendas of the research world, the importance of managing expectations, the nature of "participation" in HCI4D, and the conflict between research and development more generally.

Introduction

The potential for information and communication technologies (ICTs) to play a vital role in international development has been recognized widely. The UN's Millennium Development Goals make specific mention of ICTs, and a flourishing body of interdisciplinary research has sprung up around the idea, often referred to as ICTD.

This paper sits within a newer subfield of ICTD research, often dubbed HCI4D (human-computer interaction for development). That subfield is concerned specifically with the relationship between humans and technology in the context of international development, ranging from lower-level interface design issues to higher-level social interactions. In fact, the true scope of HCI4D as a field is still being negotiated, as its literature and community both continue to evolve.

Nonetheless, it is safe to say that a large portion of HCI4D research is distinguished by the introduction of new technologies to developing regions as part of its research methodology. This is in contrast to much development research, which studies existing technologies and practices without intervening, and ICTD research, which does not necessarily study the users or the process. It is the former, interventionist style of research which focuses on users and process with which this paper is concerned. As we shall demonstrate, such an approach poses unique challenges.

These challenges may manifest as practical considerations. For example, one discussion in this paper suggests techniques for eliciting critical feedback, despite a tendency in some cultures to be overly polite, espe-

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cially to foreigners. But the need for such maneuvers may hint at deeper issues. Considering the same example, is it possible that the trouble in getting at the truth could be born of the distances in culture, socioeconomic status, ethnicity, and language between researcher and participant?

This is not to say that HCI4D is a doomed endeavor born of a tragically flawed model. Indeed, compelling research has been produced, and some modest successes have been reported. Still, the realities of the field suggest two explorations that must be undertaken at this early stage. The first is a practical discussion of how best to manage the unique challenges of working in the field, shedding light on techniques, methods, and best practices that can lead to better development outcomes. The second is a critical reflection on the field itself, including the relationships, practices, and motivations that underlie it.

This paper draws on the experiences of nine HCI4D researchers (who are also the authors) in making contributions to both of these explorations. What began as a search for practical techniques gave way to the sort of critical reflection described above, and the results of both are reported here. We submit that our findings are of interest to others working in the field: both new students seeking to improve their practice, as well as more experienced researchers interested in the evolving discussion to which we aim to contribute.

We also offer a third contribution in our methodology itself, which we believe to be novel. Having met at an international HCI4D workshop, the authors soon recognized that we had much to learn from each other by way of our diverse experiences in the field. Informal discussions led to a more systematic method for sharing and analyzing those experiences. The details of that method are described in this paper, and we encourage other groups of researchers to replicate our efforts and contribute to this important discourse.

This paper is organized as follows: We set the context by reviewing related work and describing the methods we used in gathering and analyzing a set of short stories representative of our field experiences. We then present the stories, which we have grouped into themes that emerged from our analysis. The subsequent discussion features a review of some of the most evocative stories, and a look at how they contribute to broader discussions in HCI4D. A critical review of our method itself is also offered. We conclude with a summary of our contributions.

Related Work

As a field of research, ICTD is relatively young. Within the body of work published in the area, we find that many publications focus mainly on the analysis of results, or on the characteristics and performance of finished artifacts, rather than on the experience of gathering or producing those results. The latter is the stated purview of this paper.

However, it must be noted that outside the field of ICTD, much has been written about the practice of research in developing regions, particularly in the social sciences. Several texts stand out as seminal. Devereux and Hoddinott (1993) offer advice on choosing partners, learning languages, interacting with governments, and compensating participants

ethically in the course of doing fieldwork in developing countries. Scheyvens and Story (2003) also focus on fieldwork, offering practical information, a review of ethical and personal challenges, and discussions on research design and methods. Meanwhile, Desai and Potter (2006) provide a more basic guide to development research, one that is intended for beginning students.

All these works are filled with indispensable information, and many readers of this paper are well advised to consult at least one of them. Absent from these volumes, however, is a specific focus on the introduction and study of technological artifacts into the field, an occurrence central to much HCI4D research. This paper takes that focus. At the beginning of our findings, we argue more specifically how our research moves beyond the reports listed above.

Other related writings can be found in the HCI literature. Early work in that community investigated *cross-cultural* interaction design. Nielsen has been a leader in this area, and his edited collection (Nielsen, 1990) is a foundational work. In other work, Russo and Boor (1993) present a checklist of considerations for cross-cultural design, including "suggestions for an effective international product development life-cycle." Chavan (2005) focuses on methods and tools used in the cross-cultural design process, describing several innovative evaluation methods developed for use in India.

There are also several notable works in HCI that discuss field experiences. One early design briefing reflects on the experience of designing a mobile health application for users in rural India (Grisedale, Graves, & Grünsteidl, 1997). Participatory design studies, such as those by Braa, Montiero, and Reinert (1995) and Korpela, Soriya, Olufokunbi, Onayade, Davies-Adetugbo et al. (1998), discuss how partnerships can be leveraged in the design process.

Later work by Parikh, Ghosh, and Chavan (2003) shares some lessons learned, remarking, for example, that "we soon found out . . . we would have to hang around long enough to no longer be novelties from the big city." Chetty, Tucker, and Blake (2004) describe the circumstances leading to their idea to establish "human access points" to facilitate interactions between developers and community members. In each of these works, the focus lies mainly with research results, with field experiences being mentioned only in passing.

More recently, several papers have specifically examined practical design issues. Ramachandran, Kam, Chiu, Canny, and Frankel (2007) present techniques for gathering requirements from local stakeholders in developing regions during the design process. They discuss five lessons learned during field studies in Uganda and India. Similarly, Kam, Ramachandran, Raghavan, Chiu, Sahni and Canny (2006) provide recommendations for carrying out participatory design with school children in developing regions. Maunder, Marsden, Gruijters, and Blake (2007) present several tools and techniques comprising a candidate UCD4Dev (user-centered design for development) methodology, based on a critical examination of traditional UCD methodologies as applied to developing world contexts. While of great utility to HCI4D researchers, these papers are concerned primarily with the design process, which is often only one component of a successful project. This paper takes a broader view.

Another body of work looks at challenges beyond the design process. For instance, Brewer, Demmer, Ho, Honicky, Pal, Plauché et al. (2006) describe a set of challenges of technology research in developing regions, including technical, environmental, and cultural challenges. This work serves as an excellent reference for a broad set of potential obstacles to research. It focuses mainly on technical and environmental challenges, though it does feature some discussion on so-called "cultural" challenges. Surana, Patra, and Nedevschi (2008) also focus on technical challenges. Chetty and Grinter (2007) report a series of practical lessons learned in the course of an HCI4D project in rural South Africa. Finally, Schwartzman and Parikh (2007) describe techniques for building rapport with rural stakeholders, designing relevant solutions, and overcoming evaluation challenges.

Our paper reinforces and builds on this latter line of work by examining the specific challenges of HCI4D in greater depth, and by employing a novel methodology to achieve a synthesis of a range of experiences.

Method

This paper is an account of the experiences of nine North American graduate students who self-identify as HCI4D researchers. We gathered by chance through a meeting at an HCI4D-themed workshop during the ACM CHI conference in 2008.

We all have significant field experience, with

durations ranging from a few months to a few years. Our field locations have included China, Ghana, Guatemala, India, Liberia, Mexico, Nigeria, Kenya, Pakistan, Rwanda, Tanzania, Thailand, and Uganda. Our research domains are as different as health care, education, agriculture, infrastructure, and peace and reconciliation.

Over five months, we participated in weekly discussions about our research activities via e-mail, telephone, and in person. Throughout these discussions, we shared anecdotes of our field experiences and remarked on the trends we saw in some of our reports, as well as on the surprises resulting from others. The ensuing discussions provided us with a rich qualitative background to frame our findings.

As we began to formalize our inquiry, a shared blog was created, and each author was asked to contribute a minimum of three short stories representing surprising or important experiences learned from our fieldwork.

Two qualitative coding exercises then followed. The first was carried out individually, and the second was conducted as a group during a teleconference. We coded the stories according to their salient features, drawing on principles of grounded theory (Glaser & Strauss, 1967). Several stories were then added in the process, as we were reminded of relevant experiences. In total, 55 stories were shared and synthesized into the 19 ideas.

To gain a deeper understanding of the relevance and applicability of these ideas, we issued an anonymous questionnaire to each author. For each idea, every author rated their agreement with the following statements on a five-point Likert scale, ranging from "strongly disagree" to "strongly agree." We also included an option for "not applicable."

The statements were:

1. I agree with this idea.

2. This idea has been or could be applicable to my HCI4D project(s).

3. This idea has been or could be useful to my HCI4D project(s).

4. This idea has been or could be important to the overall success of my project(s).

5. This idea is widely applicable to HCI4D project(s).

For each idea, we also asked ourselves if and how we would express the idea differently, what experiences we had to support or discount each

idea, whether this idea was a surprise, and whether or not we considered the idea to be standard methodology. Additional comments were allowed.

Three of the authors where charged with collating the anonymous results. Each idea was categorized as one of the following:

A. Most Agree—Responses agree, with up to 2 undecided

B. Most Disagree—Responses disagree, with up to 2 undecided

C. Most Undecided—Responses undecided, with up to 2 differing

D. Divided—Half agree, while the other half disagrees

E. Outliers—One or two responses vary from the other responses

F. Ignore—Half agree, while the other half are undecided, or half disagree, and the other half are undecided

The "Most Agree" ratings were mostly unanimous. There were no "Most Disagree" or "Most Undecided" ratings.

Ratings were brought back to the group, where they were used as guides to qualitative data that was interesting fodder for discussion and reflection. We examined contentious (Divided or Outliers) ideas, as well as those that were universally considered "important to overall success," "useful," and "widely applicable" for common themes.

Finally, the results of the questionnaire were combined with the 19 ideas in identifying the dominant themes in our data.

In the next section, we describe the ideas and themes we identified, and we recount the stories that define them.

Findings

Five themes emerged from our coding and grouping exercise. In this section, we present a synthesis of our stories, organized by those themes. Where appropriate, we discuss differing opinions of each idea in our conversations.

We distinguish the findings in this portion of the article from previous work as follows: The first section covers challenges encountered during actual user studies and is most obviously unique to HCI4D research. The second section consists of stories related to choosing users for HCI4D research pro-

Figure 1. In Pakistan, user studies with female users were conducted with the assistance of a female facilitator .

evaluate systems to meet and successfully alleviate a technological need. HCI4D researchers have the same responsibilities, but with more constraints. Differences across user groups come in all shapes and sizes, so scaling user studies to larger populations is hard, even without introducing new, confounding factors. It is often impossible or undesirable to find any sort of lab-like setting for interviews, and background noise, interrupting bystanders, and technical problems due to power and other failures are practically guaranteed. There are also cultural challenges that can prevent access, understanding, or appeal to users.

For example, one author emphasized being mindful of local cultural norms when in Pakistan.

Pakistani communities, as well as many other communities in the developing world, are very conservative. Therefore, it was decided early on that all user studies would be conducted with at least one female facilitator to help female users feel comfortable in the presence of the male researcher.

This author (shown in Figure 1) found that, given the limited availability of HCI female practitioners in Pakistan, working with women from within the community was a good choice.

In the same story, the author found that the local facilitators were not only beneficial in making study subjects more comfortable, they also proved useful in generating some of the content of the study themselves.

We purposefully left parts of the user study design (e.g., the introduction text) partially incomplete, and asked the facilitators to help complete them—this helped build ownership of the user study process.

The author would further explain some of the methodology and reasoning behind certain questions, but the author would then allow the facilitators to word the questions as they saw fit. Since facilitators speak the local language both literally

jects. While any research with human subjects involves the selection of participants, the stories we report revolve around the specific challenges of user-centered design.

The third, fourth, and fifth sections deal with complications arising from the introduction of new technologies as part of our research. The prospect of new technology can raise the expectations of research partners, also heightening the chances of disappointment. We discuss strategies for dealing with this in the third section. Many of the systems we study need localized content, such as voice recordings, translations of text, or iconic imagery, and producing that content is often one of the most difficult aspects of the research. The fourth section presents stories related to that challenge. Meanwhile, successful systems are sometimes deployed for use beyond the life of the study. The fifth section reviews complications arising from that eventuality. We feel that none of these issues is adequately treated in previous fieldwork literature, which, as we have argued before, lacks specific focus on the introduction and study of technological artifacts and their impact on users.

Studying Users
User studies are at the heart of HCI research. Researchers need users to help design, pilot, and

and figuratively, their participation improved the understanding and effectiveness of the interviews.

As noted earlier, much of the daily work in studies happens in open, public spaces, where every spectator is free to participate, creating challenges for HCI4D researchers. One of our authors, when conducting a study of mobile phone usage in rural Liberia, was fortunate to have a way to manage the disruptions.

The research inevitably attracted large crowds, which for the most part were cooperative, but often an outspoken onlooker would demand to know what the study was about, what the motivations were, or what was in it for them or their community. Thanks to the presence of the two university students that I hired as assistants, I was able to speak to such inquisitors off to the side while the study continued, thus avoiding damaging interruptions.

In addition to disruptions by curious individuals, one might also experience disruptions due to power outages, noisy environments, and a variety of other unpredictable factors. Therefore, one cannot be prepared to handle all of these in advance. One author suggested that maintaining a flexible attitude about interruptions and learning to persevere in new situations is possibly the more valuable idea.

A few of the stories touched on the difficulty of ascertaining truth and the importance of gathering data from multiple sources. During a study, some users were often eager to please researchers, both because of their perceived difference in status, and because of their curiosity about the various gadgets being tested. As one author discovered, it was not always advisable to take what participants said at face value.

My collaborator finally took me aside and explained that because I was a woman, and especially because I was a "white" woman, regardless of whether they were actually listening to me, understanding what I was saying, or anything, they would always tell me exactly what they thought I wanted to hear (which was generally "yes").

The author clarified that there seemed to be a mystique to being labeled a "technologist," which only added to the assumed status of being a "rich white woman from America." To that end, there was a limit to the value of the feedback participants shared.

Figure 2. In a group, users can enthusiastically help walk each other through difficult tasks, and their discussions can help the researcher understand how better to design the device or user interface for the next iteration.

The quest for accurate feedback led to stories about less orthodox methodology. For example, one of the authors found it difficult to get honest feedback from participants, and so advocated eavesdropping.

During a user study, I was being followed by a group of coffee producers that were curious to see the system in action, when I overheard a lady coffee producer say "everything now is made using machines instead of paper." I really wanted her to expand on that comment. However, the minute that I got closer to her she stopped talking and went into polite mode.

While all authors agreed that this might be a useful source of information, many raised concerns that this would be a breach of ethical behavior.

Another strategy for eliciting feedback was to get groups talking as shown in Figure 2. One of the authors realized she was getting positive feedback from two users during a private interview. They felt the device she was proposing was great and they would use it exactly how she wanted them to, but upon leaving the study, she discovered something far more interesting.

I returned back to the porch where a very opinionated husband was observing his wife trying out the device. He didn't want to actually use the device but he had a lot of questions about the study, my intentions, and what the device would

Figure 3. Remoteness of users can create difficulty. One author had to drive and walk for eight hours to get to her test site. Another idea drawn from the stories was the notion that, even while fixing one variable (e.g., literacy), users still demonstrate a large range of abilities within that variable. In this story, a system was being designed for doctors, but the author soon came to realize other significant variables.

ever be used for. People started gathering and the opinions started spreading like wildfire. My hosts were asking and answering questions, small groups were talking, people wanted to try out the device. I was gathering data without even having to ask any questions. I became an observer of an honest group discussion about technology.

By conducting the study in an open environment and being open to spectators, this author was able to gather more opinions about the technology under question.

Choosing Users

Before users can be studied and interacted with, they must be recruited. This section presents several stories related to that task.

For the sake of time and expense, authors have tried different strategies (with limited success) to circumvent the inaccessibility of international users. One tried interviewing illiterate children from California's Central Valley instead of India, while another worked with immigrant African doctors in the United States instead of those in Ghana.

While these [African-American] doctors did make a significant contribution to our understanding of

the medical practice and to the evolution of our design, at the same time it became clear after our first round of fieldwork that there were distinct differences between the American-Ghanaian medical community and the Ghanaian medical community. Many of the barriers faced by the Ghanaian doctors in Ghana were not anticipated by the American doctors, despite the freshness of their experience in-country.

This "substitution" extended even within-country: working with secondhand data from more accessible research partners and expatriates instead of first-hand data garnered directly from rural health workers or school teachers. Ultimately, the authors all agreed that, while substitution could guide some high-level decisions, most design decisions were best made working directly with the target community.

A similar story suggested changing users entirely, rather than substituting. One author was able to alleviate her accessibility problems after she began a project with an organization in a remote area of Guatemala.

Every trip took four days of traveling, most of which was spent under stress either due the road conditions or the crime rate in and around Guatemala City.

The author later realized that, in her case, remoteness (as seen in Figure 3) was not a prerequisite to accessing her target user community. She switched to a closer partner, allowing her to visit every few weeks, far more frequently than with the remote partner.

The ideal approach of working directly with users in context was not without its problems. One author shared a story of a shifting user base while designing an education application.

We came home and designed for a particular literacy level and then when we returned, [we] had to work with other users that had a completely different baseline. We ended up doing a whole

lot of rapid prototyping and iterative design that we might have avoided if we had really "known" our users and planned to meet them again.

This author concluded that one must choose users available for the lifetime of the project, but in our discussions, that particular strategy was seen as often unrealistic. A number of authors reported having users come and go during the lifetime of their projects without adverse effects. Yet another author saw this idea as a symptom of a larger problem with rigid technology and poor study design, not a problem with the particular target group selected.

We found a significant divergence in issues surrounding access to equipment in urban versus rural areas. Doctors in rural hospitals typically shared one computer, but the shortage of doctors ensured that that computer was highly available. Doctors in larger hospitals, while they had more and better equipment, often had to compete with many other doctors for time to use that equipment.

Most authors found this idea an obvious obstacle to plan for. One went further and noted that while assuming homogeneity was a known problem, it still occurred and thus found the idea a useful reminder.

Managing Expectations

Throughout the life of an HCI4D project, it is tempting to over-promise to project stakeholders. Many authors spoke of similar experiences managing expectations with partners, the target community, and themselves. This section extends earlier work by Schwartzman and Parikh (2007) that only focused on users' expectations.

After speaking with a number of organizations about a promising idea, one author realized that his project scope was too large and the research contribution too small, so the idea had to be put on hold. Unfortunately, on his next research trip, when he had a more modest idea, he came across a partner from the previous project. The balance between building excitement with partners and being realistic was hard to maintain.

My heart sank when I heard him say, "Oh, I remember you from last time." It wasn't malicious but it reminded me how I had promised a lot that I could never deliver.

All authors agreed that researchers need to control the hype surrounding their projects and other HCI4D projects, as well.

Many of our authors mentioned the importance of clarifying the researchers' limitations, especially when it comes to the budget. Even if the partner agency has worked with research organizations before, the nature of that collaboration could still be fundamentally different, as one author discovered.

Our first partner was a research organization, and had dealt with research projects for a long time. Sounds like there should be no problem, right? Wrong! The research projects they worked with had much larger budgets, and involved large data collection from the community, employing local community members for this work.

In this case, the target community looked toward the research organization to provide jobs, while the research organization expected its partner to provide the manpower. This mismatch in expectations proved to be disastrous, especially because it took several months to understand, by which time expectations were already set.

In another case, the partner's expectations were kept low. This author's research group was unsure whether funding would be available to continue a summer project in Guatemala past the pilot stage.

From day one, my advisor told me to be very clear with what was needed to move the project forward. It is two years later and we haven't been able to come back. However, we communicate often and are just waiting to get enough resources to return.

In this case, setting clear expectations and maintaining open communication channels ensured ongoing support from the partner agency, even after two years of inactivity.

One author highlighted the fact that researchers needed to be aware of the limitations of their own small-scale projects, and that even if a product is well accepted, the resources might not be available to support immediate widespread adoption. Aside from keeping his partner's expectations under control, he wished he had managed his own, as well.

Our prototype was robust enough to deploy but now we have scores of installations around the country and cannot keep track of updates, feedback, or bugs from the field.

By allowing the prototype to be deployed much more broadly than originally planned, the author unwittingly increased his workload a great deal, yet

did so without the mechanisms in place to really learn from his scaling up experience.

Another author discussed the difficulties of doing work in a community that had already participated in a research project, as well as the importance of closing projects well, so as to keep the door open for future researchers. She discussed how partners who have had other, possibly negative, partnerships in the past may have some reservations and require greater encouragement.

We interviewed doctors about what their hopes were for "telemedicine" but found a few who were quite bitter about their previous experiences. Many of these consisted of one-off, short-term deployments that had subsequently broken down unannounced. These included closed systems with unpredictable availability, and even, in one case, a consultation network which specifically forbade the re-use of any information for research or further publication by the doctors.

Similarly, another author had to get her project approved by the entire board of directors because the social scientist that had worked with her partner previously had greatly misrepresented them in an important publication. This required translating all her articles and getting clearance prior to publication.

In these cases, authors stressed that simply being truthful was not enough; the authors and even their predecessors had to be explicit and clear about the benefits and risks the projects could involve. One author went even further, to argue that researchers have an obligation to be gracious, sending thank-you notes and being available for follow-up.

Developing Content

Ultimately, technology is a conduit for content—it is a means to an end, and not an end in itself. In the authors' collected and disparate experiences, the source, quantity, and kind of content vary tremendously in HCI4D projects. This wide range of experience also prompts a great divergence in the authors' views on this topic, yielding no clear consensus on many of the questions.

For example, one author felt that common-sense wisdom would dictate using only pre-existing content from domain experts. However, another pointed out that, sometimes, appropriate pre-existing content does not exist, and where it does,

it might not be enough, since new technology (as a new medium) often requires its own specific changes to the content for optimal presentation.

After many months of searching, we came to the conclusion that no one had designed textual health information for use by low literate community health workers, because no current technology existed which could make such content useful.

Another author thought it was important to look to the users as content developers. He shared a story about relying on local cultural elements in the classroom:

In our classroom instruction system, we have some default PowerPoint templates that teachers can overwrite to teach their class. We saw that . . . they . . . spend a significant amount of time making the content specific to their students' lives. For example, teaching English words for family members used photos of people who were from the local country. In a session where instructors could make content about any topic, there were a couple of decks devoted strictly to the local king.

Two authors felt that it was important for researchers to realize the difficulty in finding and working with qualified content development experts in HCI4D projects, and for researchers to budget time accordingly for this purpose in their research. One author stated:

By its nature, our content work had to be iterative and interactive—as the technologist, it was difficult for me to develop a shared vocabulary of concepts very quickly with the content developer as we had very different disciplines, and so this process took a significant amount of time, and notably, significant shared time.

Some authors found that the official language was not the optimal choice, while another author found that even languages suggested by the local NGO partner, or by end-users themselves, turned out to be sub-optimal:

I tested an information access system in Sindhi with health workers who natively spoke Balochi. When asked if they would prefer a Balochi-speaking system, each participant replied that Sindhi was fine. On deeper probing, each respondent revealed a different reason as to why they said this,

Figure 4. Two examples of branding. On the left, a data officer in Rwanda wearing a shirt, hat and lanyard for OpenMRS, an open-source medical records project. On the right, a community health worker in Tanzania wearing attire from BRAC, a multi-country development NGO.

The staff was proud to be associated with the system, and having a product with a concrete and unique identity made it easier to solicit cooperation from leadership in the judicial service. Another author deploying a medical record system in Rwanda, as well as yet another working with community health workers in Tanzania reported similar experiences after printing T-shirts and distributing baseball caps emblazoned with the product's name (see Figure 4).

What is interesting to note here is that the names and identities produced may have very little to do with the product's specific function; the focus is instead on fostering a progressive attitude toward process improvement, as well as on creating a sense of pride and unity among users. Users need not feel like the authorities are forcing strange new policies on them, but rather, that they are part of a social movement in which they and their friends voluntarily choose to engage.

Another deployment strategy involved design for appropriation and local ownership. Techniques to apply this method ranged from designing icons and avatars that users could customize to loading strings from a file that could be changed on the fly for easy localization. When one of our authors was scouting for local talent to customize and maintain his application, he found their choice of platform and languages to be outside the scope of local programmers.

The combination of Java, Tomcat, and MySQL was a bit much for the programmers. Tiered architecture, model-view-controllers, and object-oriented development were just out of the question.

In this case, the team worked to build a national training program that taught the necessary skills. Additionally, they created a programming interface to enable a more familiar scripting language.

One story demonstrates the potentially disruptive effects a new technology can have. While deploying a lab system in Ghana, one author reported that the system played an unexpected role in allowing the hospital management to better track fraudulent

ranging from peer pressure, to a misunderstanding of what Balochi dialect was being proposed, to a preference to learn Sindhi because of other advantages it brought.

Clearly, researchers need to consider carefully the choice of what language to use.

Deploying Technology

Managing relationships with stakeholders during the adoption phase encompasses practical considerations about the technology and deployment, as well as making the deployment relevant to the user's context and social identity. Because the goal of HCI4D research is development, HCI4D research must continue past evaluating the purely technical contributions. Planning for adoption, ownership, and long-term use of the proposed solution plays a critical role in ensuring that the technology addresses the development goals for which it is designed.

One strategy that all our authors found promising was to create a social identity around technology, drawing from the principles of product branding. For example, one of the authors produced a reporting system for the Ghanaian judicial service, which he jokingly called the "Judicialyzer." To his surprise, the name quickly took hold:

The staff would routinely refer to their work as "Judicialyzing." A "Judicializer" poster appeared at the office one day. . . . even the Chief Justice knew the word.

transactions. Users certainly did not mention their misconduct during the design exercises.

A few technicians, finding one of their sources of income blocked, started selling fake lab results to the patients, resulting in misdiagnosis and mistreatment. The fraud was exposed, and the technicians were fired, including one that was about to retire, who would now be retiring with no benefits.

This story is a poignant reminder of the need for sensitivity in our research practice.

Discussion

In the previous section, we presented a number of stories gathered from field experiences in diverse locations and domains. For us, sharing stories was a learning experience, invoking discussion about similarities and conflicts, as well as a reflection on our roles and relationships as researchers. This discussion was aided by an anonymous questionnaire, as described in our methodology section. In the following section, we present some of the more interesting ideas and trends that arose from our deliberations.

A Review of the Method

As stated at the outset of this paper, we hope that other groups of researchers will find the method used in this paper appealing, and adapt it to their own purposes. Here we offer some reflections on the method.

Perhaps the method's strongest feature is that the stories provided by the participants provide a succinct but concrete grounding for all the analysis and reflection that follows. Several authors found that simply writing their initial stories led to remembering others and stimulated insights, which they then offered for discussion.

The method is "mixed," in that it features both qualitative and quantitative elements. The qualitative stage of the method allows attention to all stories, no matter how unique or idiosyncratic, and prevents over-generalization. On the other hand, the quantitative survey stage ensures that dominant viewpoints are given their due emphasis.

On a more practical note, much of the process is carried out asynchronously, which accommodates the tight schedules and diverse time zones. This is especially attractive to those working in development where geographic dispersion of colleagues is

the norm. Also, the short format of the stories keeps the body of data rich, but manageable. Finally, we found that carrying out the process drew us closer as a group, because it offered us a chance to learn about each other's experiences and perspectives. Beyond plain nicety, we submit that this sort of bonding is important to the construction of a research community, especially one as young as HCI4D. We continue to meet every few weeks to discuss many of the issues we raise in this paper.

A potential drawback of the method's asynchronicity is the lack of face-to-face contact. However, we feel that we were able to minimize those effects by using a multi-modal communication strategy. All teleconferences were accompanied by text-based chat and a shared blog, to which all participants could make reference. Voice and chat were both recorded for later reference. We also used several channels to collect feedback and criticism, including the blog, a mailing list, the survey tool, and the collaboration features of Microsoft Word. Each of these communicative channels played an important role.

One aspect of the method that could have been improved in our particular case was the randomness and size of our sample. Our group was formed based on an incidental meeting at a conference workshop, and all the authors came from Western educational institutions. A future study could reach out to members of the growing HCI4D communities in other regions.

Incentives and Agendas

Two ideas from our exercise provoked thought and discussion on the motivations of the researcher in a typical HCI4D project. These were the suggestion that working with less remote users can save resources, and the preference to choose users who will be available throughout the lifetime of a project. Both ideas seem to be born at least partially of a desire for efficiency in the pursuit of research goals. In our questionnaire, this was problematic for some authors, who argued that an emphasis on efficiency might hinder the work from reaching its most interesting or deserving audiences.

Our field stories are also revealing in what they *do not* discuss. No stories dealt with the process of selecting a worthwhile problem to research or identifying the objectives of a project. Instead, our stories focused on issues that arise after the technological artifact is already under development:

choosing users to test it, developing content for it, managing expectations around it, and so on.

These issues—arguably emphasizing efficiency and technological innovation over the needs of stakeholders—seem to be a product of the exigencies of the research world. Our practical incentives as researchers, to publish papers and satisfy our funders, unavoidably dictate where we focus our activities. Since our research community emphasizes frequent publication and a technological focus, much of our work tends to adopt those priorities.

Expectations, Revisited

Earlier, we recommended managing our own expectations, as well as those of our project partners, to avoid disappointment. That recommendation engendered wide agreement among the authors—two of the ideas in that section were unanimously considered "applicable to all HCI4D projects" in our questionnaire.

But this begs the question: Why must expectations be controlled in the first place? The stories themselves suggest an answer. Most HCI4D projects must be limited in scope, short on resources, and modest in scale. These constraints produce small projects that are usually unsustainable. It is thus necessary to be clear with partners and other stakeholders on the differences between this breed of project and the more common style of development project to which they may be accustomed. This amounts to managing expectations. Even armed with the most promising idea, we may not have the resources to turn our projects into ongoing national deployments without strong support from our partners. The onus is thus on us to quash unnecessary hype and maintain humility.

In addition to this responsibility to our participants, we have a duty to the greater community of ICTD researchers to maintain good reputations with the communities in which we work. Managing expectations is an important part of this, as are staying in touch with partners after the close of a project and respecting local priorities. Many other ideas presented in this paper also apply. Failure to maintain this positive image and clear differentiation can only lead to greater difficulty for those wishing to do so in the future.

Participation and Control

The adjective "participatory" is common in the field of international development, and the ideas it represents inform much of our work, consciously or not.

But in reviewing our experiences, we noticed that there exists a tension with respect to the level of participation that our work has exhibited. Some ideas seemed especially supportive of participation and local ownership, such as the emphases on involving local facilitators and designing for local ownership, while others suggested a more asymmetric relationship between researcher and participant, such as considering the practical advantages of becoming an eavesdropper.

This inconsistency echoes a general ambivalence toward participation in much of contemporary development practice. Dearden and Rizvi have commented at length on this, stating that, "as participatory approaches have been adopted by the mainstream, recent dialogues have highlighted the complex, and often hidden, workings of power relations in the practice of participation" (2008, p. 89). We find that the stories in this paper have revealed some of this complexity in our own practice. We also claim that this paper forms part of the critical self-reflection that Dearden and Rizvi suggest.

Along a similar line, Michener (1998) presents a dichotomy in which participation is viewed as either *strong,* which involves partnership and shared control, or *weak,* which involves only consultation. While examples of weak participation abound in our work, it is arguable that none of it attains the stronger variant. We suggest that this is the case for much of HCI4D—the value of participation of the target user community is recognized (as in our idea emphasizing involving local facilitators), but, as alluded to previously, involvement of that community in the conception and design of the project is rarer. Even the oft-used phrase "target user community" is suggestive of an asymmetry.

However, that strong participation is not pervasive in our work is perhaps not surprising. Kimaro and Titlestad (2008) have argued that, in low-income countries, achieving meaningful participation in the design of computer systems can be challenging due to limited technical skills. They advocate an approach dubbed "participatory customization," in which, by focusing on the critique of an existing system instead of the design of a new one, the requirement for technical skills is softened. Unfortunately, this approach may not be suitable for HCI4D research agendas, which usually expect a greater degree of novelty.

While this article takes no specific stance on whether participation is an appropriate philosophy

for HCI4D, we submit that some of our ideas describe unique ways to support participation (albeit the weaker variety) in a high-technology context. Involving facilitators in the design of a user study is a good way to teach HCI principles. Assistance with the design of content for a system may be a stepping stone to more in-depth involvement in the development process for local enthusiasts. Finally, technical participation can be encouraged by choosing technologies, such as programming languages, that will enable those with moderate skills to engage with and maintain a system. All of these ideas suggest a bootstrapping approach, in which a part of the goal of early research is to build local capacity, hopefully leading to future autonomy.

Research vs. Development

The previous three sections have discussed issues arising from the stories we have presented: the importance of research incentives and agendas, the need to manage expectations of partners, and the challenge of achieving participatory ideals. Upon reflection, it seems that each of these issues results from a central conflict between "doing research" and "doing development."

Indeed, in our discussion of incentives and agendas, mention of research agendas was made only because they seem to conflict with the prevailing ideal of development, by which recipients are chosen based on need and projects are conceived of in collaboration with stakeholders. Managing the expectations of partners, as discussed in the Expectations, Revisited section, is only necessary because a typical partner will have come to expect a particular style of development project, which our research-driven style may not match, leading to disappointment. Finally, the ideal of strong participation described in the prior section is difficult to achieve, in part because offering a share of project control to a non-research partner risks seeing that project stray from the all-important research agenda. All these issues are clearly interconnected.

We see this conflict as a source of confusion for our field, and we believe that further discourse is required to resolve it. One perspective in that discourse sees HCI4D as basic research, claiming that, unlike typical development practice, the role of HCI4D is to experiment with new ideas, allowing successful ideas to be put into practice at a later date. This implies that early ideas may be unsustainable, as in much experimental work. This perspective

therefore plays down the expectation of near-term development outcomes.

The other, more hopeful position cites the action research tradition in sociology and expresses optimism about the potential to do development and research at once. But the mechanics of how this might be achieved are still being negotiated. Luk, Ho, and Aoki (2008) offer one potential model. Having chosen only their application area (health care) they performed a needs assessment, during which the goals of their project were "co-articulated" by both the researchers and the doctors with whom they worked. That "co-articulation" produced a project that satisfied a real need of the doctors, as well as an interesting research subject. But this approach was not without its costs. They stressed that multiple trips to the site of study are required to support such an approach. Shorter lengths of time in the field require that projects be ready for data collection as soon as a researcher hits the ground, making such co-articulation more difficult, and consequently lessening the chance that the project will address a real need.

There are surely more examples of projects and approaches in this spirit. Our findings suggest that more attention needs to be given to those that produce success, and that researchers need to be clear with themselves, their partners, and their research community about how their projects are positioned with respect to the dichotomy of research and development.

Conclusion

The field of HCI4D is young, distinct, and exciting. In this paper, through exploration of our experiences as researchers, we have identified challenges in doing HCI4D research and offered practical strategies for dealing with those challenges. We are confident that beginning researchers can learn from both our mistakes and our successes.

We have also taken time to reflect on our field and our work, and we have found that several things stand out. We have considered the incentives and agendas of the research world and how they relate to HCI4D, the importance of managing the expectations of our partners as well as our own, the nuanced nature of "participation" in HCI4D, and the conflict between research and development more generally.

We submit these lessons and reflections as a con-

tribution to the broader conversation about HCI4D that has begun in recent years. We are excited to continue participation in that discussion as our experience grows and we work toward a deeper understanding of our true role in the process of international development. ∎

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