Establishing Relationships for Designing Rural Information Systems

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Abstract
Designing for the developing world presents unique challenges. Establishing rapport with local partners is important to overcome contextual unfamiliarity and ensure the relevance of proposed solutions. In this paper, we discuss our experiences designing a CAM-based mobile data capture system for Asobagri, a rural coffee cooperative in Barillas, Guatemala. CAM is a camera-based mobile application framework designed based on fieldwork with rural microfinance groups in India. Our local partners in India are now using the CAM framework in a real application. We list some practices that have helped us establish and sustain both these design relationships.

Keywords
design practices, rural development, ICT

ACM Classification Keywords
H5.2. Information interfaces and presentation (e.g., HCI): User Interfaces.

Introduction
Designing and evaluating technologies for the developing world presents unique contextual challenges – such as limited time and resources in the field, lack of infrastructure and cultural differences that lead to misunderstanding and inefficiency. It is essential to

establish rapport with local partners to overcome this unfamiliarity and ensure the relevance of proposed solutions. This paper discusses our experiences designing a CAM-based mobile data capture system for Asobagri, a rural coffee cooperative located in the mountain town of Barillas, Guatemala. CAM is a mobile camera-based application framework that was designed based on fieldwork with rural microfinance groups in India, which is now being used as part of an accounting and loan monitoring software for such groups there.

Asobagri: The Coffee Cooperative

Asobagri was founded in 1989 in Barillas - a city in the Guatemalan highlands of about ten thousand people, accessible only by unpaved road, helicopter or a small airplane landing strip. The nearest major city is Huehuetenango, 8 hours away by local bus.

Asobagri is a producer/exporter cooperative. Namely, Asobagri is responsible from soil care and seeding until the *oro* (the unroasted coffee beans) leaves the port on its way to one of Asobagri's five international customers. Asobagri's coffee is certified *organic, fair trade* and *bird friendly.* Organic certification ensures that the coffee is produced organically, without the use of chemicals and making efforts to care for the environment. Fair trade certification ensures that producers are paid a fair rate. Finally, bird friendly is a certification that encourages farms to keep the naturally grown trees - to protect the soil and provide sanctuary to migratory birds.

Asobagri's goals are to provide market access to over 800 small coffee producers of the Barillas region, support education amongst its members, ensure farmers a living wage (in accordance with Fair Trade) and to promote maintenance and respect for the environment. The staff at Asobagri's office is almost all college-educated. The coffee producers live in the remote, mountainous areas around Barillas, where there is often no electricity or phone coverage. Many are illiterate. For them, access to schools and medical help can be hours away.

CAM Framework

CAM is a mobile phone software platform for developing rural applications[3]. The CAM user interface was designed based on fieldwork with microfinance groups in India, where existing paper data formats were found to be extremely important. Users navigate CAM applications by capturing barcodes printed on paper forms using the mobile phone's built-in camera.

We are designing two CAM applications for automating Asobagri's delivery and production monitoring processes. CAM DPS (Delivery Processing System) allows the cooperative to accurately and efficiently capture coffee deliveries and farmer payments. CAM RANDI (Representation AND Inspection tool) allows farm parcel inspectors to gather multimedia data from a multiple-choice inspection form.

CAM is also being used as part of a Management and Information System (MIS) for Self-Help Groups (SHGs) in India[2]. In this project, we have sustained a four-year relationship with our partner - the Covenant Centre for Development (CCD), a rural development NGO (non-govermental organization) supporting community enterprises in southern Tamil Nadu, India. In the following section we discuss the practices that have helped us establish these design relationships – both in Guatemala and India.

Establishing Rapport

Establishing rapport is the first and most essential step for the success of a design project. Local partners understand the local context and can achieve some results much more effectively then outsiders. Establishing rapport requires the design team to show they are committed and capable; and providing the local partner the freedom and respect to do the same.

"Show you are tough." We traveled regularly on the *chicken bus* from Guatemala City to Barillas and back (over 14 hours each way). We ate all the precious food the producers' families prepared for us. We walked in the mud for hours to coffee parcels, slept on wooden boards with a five-person producer family, rode in the back of trucks and lived in a 3 square feet guest room instead of a hotel room. This established the important precedent that we were working on equal terms.

Figure 1. Enjoying a meal at a producers' family home.

Figure 2. Walking in mud on the way back from a coffee producer village.

"Show you are capable." We arrived promptly at the office every day, and showed that we were committed to working as long as they were. We were careful to ask relevant questions, and stay focused on the task. We referred to our experience and success doing similar work in India. We backed this up with video documentation, which aroused further confidence and interest.

"Show you care". We brought food to field trips, invited Asobagri's staff out for beer, taught salsa dancing and played in friendly soccer matches. We were constantly showing interest in their work, history and culture. We had hour-long conversations about the latest town gossip, their hardships during the recent civil war, songs, Mayan words and sayings, their food, and *our food (*everyone was amused that the second author was a vegetarian). The first author played coffee

producer, weeding coffee plants and learning about worm-compost.

"Be willing to help wherever you can." The first author filled in as secretary for a week during Asobagri's busy payment season. The second author won over the staff by hooking the projector up to a broken VCR to watch the Champions League final.

"Being local." For the first author, who is from Mexico, speaking Spanish, the most common language in Guatemala, and having a native understanding of the Latin culture, was of great importance. That she was based "locally" in Mexico City improved the communications with Asobagri, and reinforced our commitment to the project.

"Clearly establish roles." During our first visit, it was a challenge to interact with the farmers at Maxbal, one of Asobagri's producer villages. In our first discussion, they listed every conceivable village requirement, probably because so many of their basic needs are not met (transportation, health care, electricity, shelter, etc.), and they are used to being visited by charity funders (such as the private donors from Canada that recently built the village school). When we more clearly expressed who we were and what we could do, it clarified the discussion. It is important to be realistic up front about what you can provide, what you expect local partners to provide, and what is the potential for benefit. Being open and honest is the best way to avoid unrealized expectations.

Designing Relevant Solutions

The next step is to leverage each stakeholder's inherent expertise, and their newly established relationship, to design appropriate and relevant solutions to local problems.

"Identify natural champions." After we gained the confidence of the internal control manager at Asobagri, the project proceeded much more smoothly. By identifying a village technology champion in Maxbal, who had earlier installed a "phone booth" on a nearby hill, and uses solar panels to power his retail store, he was able to mediate between the local producers and the design team, probing them for relevant information and framing our responses in context.

"Listen." The initial idea for CAM RANDI came through a conversation we had with an inspector during a tour through Maxbal's coffee parcels. He noticed our digital camera and said it would be nice to take pictures to provide evidence of parcel inspections. Later, the internal control manager said he wouldn't approve the new inspection form unless it was less than three pages per producer (to save paper, and to reduce the load on the inspectors while climbing the steep hills). During a field trial of CAM, one of the inspectors stopped writing on the paper version – he decided that entering data solely on the mobile phone was sufficient. This lead to the design of the CAM Booklet (see Figure 3) – a laminated guide that serves as a reusable and tangible user interface to the inspection process.

Overcoming Evaluation Challenges

It is difficult to evaluate computing systems in the developing world with the same rigor and controlled circumstances as in an academic or industrial research lab. Obtaining useful and statistically relevant empirical data requires patience and planning.

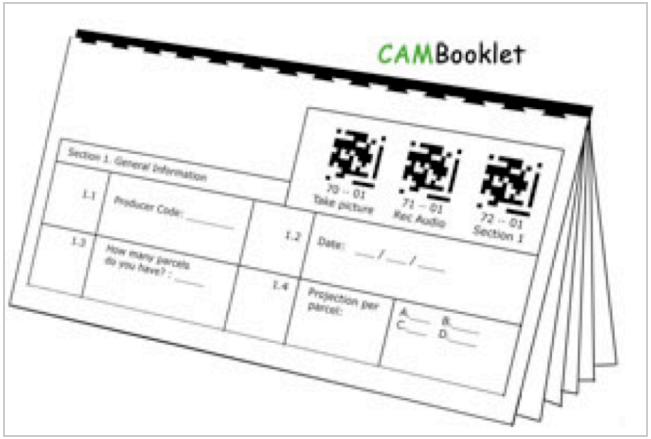

Figure 3. CAMBooklet- A laminated and reusable paper user interface (PUI) to the inspection process.

*"**At first, be patient and flexible."*** Due to the rigorous travel required to reach many producer communities, and the Asobagri staff's busy schedule, we decided to fit our iterative design and evaluation sessions with already scheduled activities wherever possible. To do this, we had to voice our needs early and often, and then be patient and flexible to achieve our goals. Most of our in-situ tests were organized in coordination with Asobagri's regular training and inspection field visits, which left us a limited amount of the producer's time and attention for our work.

"Conduct experiments that are clearly relevant for the participants." The best way to get participants to sincerely participate in design exercises is to reassure them that these efforts have long-term direct benefits. This limits the abstract or theoretical experiments you can do (at least without a direct financial incentive for the participants)[1]. On the other hand, this can focus the research team on those questions that have the most immediate and direct impact on real applications.

"Strive for a balance between control and enthusiasm". It was difficult to maintain a sterile testing environment, given that the inspectors, and especially the producers and their families, were very excited to witness the use of technology. During the inspections we visited, there were always dozens of people around, and the inspectors got distracted, both with people and nature. They were roaming around taking pictures of spiders, beehives and fruits on trees (for example, see Figure 4). While this was a distraction for the design process, letting natural interest and excitement carry forward also helps build rapport and user involvement.

"Use accumulated social capital to achieve better testing conditions." In India, once the design team had established a long-term working relationship, they were able to conduct statistically relevant experiments under controlled conditions[2]. We are hoping for the same result with Asobagri during the next round of internal inspections in May 2007, where we are planning an in-situ evaluation of RANDI covering 20 inspectors and over 600 parcels.

[1] In both projects, we have not financially remunerated local participants.

Figure 4. A producer showing his organic orange-tree during one of RANDI's in-situ evaluations.

"Take compliments with a grain of salt.". People in the rural developing world are often very polite and will not plainly give a negative answer. Some are also keenly interested in acquiring new technology (for example, fancy mobile phones). Therefore, all compliments should be taken with this context.

Discussion

After four years of iterative design and evaluation, the CAM SHG MIS application is now being used with live data at CCD. During the same time, the academic outputs have also been fruitful. Neither would have been possible without mutual commitment and respect.

In this paper, we have listed a set of practices that were used to establish what we hope will be a similar relationship with Asobagri in Guatemala. We have been very lucky in the partners we have chosen. Both Asobagri and CCD have been incredibly open and cooperative throughout the course of this work.

However, with success comes responsibility. We have been afforded this opportunity in the expectation of mutual benefit. Carrying out these projects to a sustainable hand-off point is the next challenge on our horizon. Without local adoption and ownership of systems, the end goal is still some distance away.

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