Designing Technology Probes for Resource-Constrained Areas

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Introduction

Over the years, HCI has adopted different approaches that are used in design research (e.g., technology probes, ethnography, and participatory design) to investigate people living in diverse settings. Researchers in ICTD/HCI4D emphasize on building on these methods and contextualizing them to fit in with the developing world context [1,8,10,13]. However, there are little efforts to contextualize and apply a technology probes approach in these fields [2,5]. In this work in progress, I draw from my research and examples from other fields to propose new directions for using this approach in developing countries (e.g., Kenya). Technology probes are neither prototypes nor end products, they are research products that motivate research participants to think of novel ways of using technology in their context. Their outcomes result in workbooks, prototypes and project proposals. Technology probes are open-ended in nature to "inspire new activities by its users" [9]. Designing technology probes with target participants comprises their open-ended nature. Instead of working with target participants, I propose working with local collaborators in these settings to design and develop technology probes. This work contributes to this year's theme because the proposed approach can be used in sustainable development projects' formative stages to understand potential ways of using technology in developing countries.

Probing with Technology Probes in Marginalized Communities

Hutchinson *et al*. defined a technology probe as type of probe that has the "social science goal of understanding the needs and desires of users in a real-world setting, the engineering goal of field-testing the technology, and the design goal of inspiring users and researchers to think about new technologies" [9]. One goal of a technology probes approach is to inspire users to think of new ways of using technology in their context. "This does not turn users to be designers", but rather include their voice in the design process [9]. This makes the term technology probe meaningful: users only participate in the design process during the deployment of the probes—that is after the probe is already designed. Further, after data collection, only designers are involved in the process of analyzing data to generate design ideas.

Exploring ways of involving users in all phases of the design process including data analysis is important. HCI, as a multidisciplinary field has relied on adopting methods from other fields (e.g., anthropology, sociology, and computer science) and modify them to fit in with the discipline [6,12]. Methodologies in HCI keep changing to address existing challenges [12]. In the field of education, participatory evaluation techniques have been used ensure authentic and meaningful community-based interpretation of the data by involving participants during data analysis [7]. This helps participants to feel that they are taking a leading role in a research project. More importantly, it helps in providing more authentic data interpretation [7]. In sociology, researchers have explored methods of engagement and important issues such as the balance of power between adults and children, training, support, ethical considerations, time and resources [4]. The goals of technology probes consist of an understanding of people's reflections about the role of technology in their contexts. People living in resource-constrained contexts have less power to influence data analysis process—their voice is only given through data that is interpreted by someone who might not have more experience with the context. Broadly speaking, HCI researchers—especially those conducting research in developing countries—should consider involving participants during data analysis.

Is it feasible to involve participants throughout the design process including data analysis? There are challenges that make it difficult to practically accomplish this especially for participants from marginalized communities. It would be costly to involve participants throughout the design process. Meeting logistics (e.g., participant allowances and transportation) would be costly depending on the number of meetings required. In addition, participants may not have the expertise to understand some of the concepts important for data analysis. This would be the case especially when the participants are illiterate.

Integrating Technology Probes with Participatory Design Approach

Given these challenges, this option appears to be difficult. We should seek other ways of capturing participants' reflections during deployment. Perhaps, participatory design can be used to involve participants and influence the initial designs of technology probes. However, if participants are directly involved in the process of designing the probes, should we really expect to collect novel

data when the probes are deployed? A challenge with this is that participants will simply use the probes for the specific purposes they suggested during the process of designing the probes. The open-ended nature of technology probes might be compromised.

Collaborating with Local Technicians

What should be done? Instead of directly involving participants, what if we involve local technicians in the process of designing the artifacts? Local technicians have a better understanding of the study contexts and they can provide details more about how they design their own products [11]. In addition, they have a strong understanding of the local technical infrastructure. In my recent work, I collaborated with local technicians in Kenya to design a research product [3]. Local technicians participated in designing the artifact's wooden form factor. When the probe was deployed in participants' home for a month, it prompted them to not only think about its functionality but also the materials that were used to design it. This helped the design team to include other factors that prompted participants to think more about the probe's aesthetics, sustainability and role in their context. I would encourage working with local technicians to designing technology probes especially when the researchers are not from within the study context.

Conclusion

This work in progress has proposed involving local technicians in the process of designing technology probes for developing countries. This indirectly incorporates participants' voices and also accounts for contextual challenges in the design of technology probes without compromising their open-ended nature. As other researchers have proposed, HCI4D researchers should continue extending existing approaches in HCI to fit in with contextual challenges of the developing world.

About the Author

George Hope Chidziwisano is a PhD student at Michigan State University, Department of Media and Information. His research focuses on HCI and ICTD. Specifically, he is interested in investigating the role of sensor-based technologies in resource constrained households.

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