

**Participatory Design of a Mobile Platform for Social Justice:
Reflections on Power and Participation in the Mobile Voices Project^{1,2}**

By

Melissa Brough, PhD
California State University, Northridge

Charlotte Lapsansky, PhD
Asian Development Bank³

Carmen Gonzalez, PhD
University of Washington

Benjamin Stokes, PhD
American University

François Bar, PhD
University of Southern California

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Abstract

Given the emphasis in Participatory Design (PD) on the democratization of technology design and empowerment of users, PD has potential to contribute to the development of communication systems for social justice. Despite the growing significance of mobile technologies, especially within marginalized communities, there are few explorations of the application of PD to mobile communication technologies. This case study analyzes efforts at participatory design in creating the Mobile Voices (VozMob) mobile platform, which was designed with and for immigrant workers and organizers. Through the VozMob platform, participants use basic mobile phones to publish online multimedia stories about their lives and their social justice efforts. Through collective visualization methods, observation, and interviews, this study investigates user participation in the design of VozMob and the factors that enabled or hindered meaningful participatory design. Significant differences emerged between participants' experiences of the design process, including: whether they experienced the development of the platform as technology 'appropriation' or technology 'design'; and differences in the types and degrees of power-sharing in collaborative processes. These findings have particular import for future efforts to develop communication technology projects that seek to advance social justice through participatory design, particularly for projects that incorporate emerging mobile technologies.

Key words: participatory design, appropriation, mobile media, social justice, digital storytelling, collective analysis, communication technology, popular education, digital media and learning

Introduction

Contemporary communication research is rightly placing more emphasis on the inequities and barriers to participation in an increasingly participatory media culture. However, as López (2008), Longford (2005), and others contend, equity in media-based participation is not just a matter of media literacy, but is also influenced by the values that are embedded in the very media platforms themselves. Researchers, civic educators and activist designers alike share an interest in understanding the design of community media systems as a participatory process (e.g., Benston and Balka 1993; Asthana 2010). However, the history of participatory design, with origins in studies of workplace technology, shows how difficult it has been to meaningfully involve users and workers (Kensing and Greenbaum 2013).

The focus of this paper is on mobile platforms, which raise unique challenges for participatory design (Bar, Pisani, and Weber 2007; Panchard et al. 2007; Tacchi and Watkins 2007). Mobile media is particularly relevant for low-wage immigrants and migrants, whose work often necessitates mobility, who desire communication with friends and family across national borders, and who may use mobile phones as their primary computing devices (Vertovec 2004; Panagakos and Horst 2006; Wilding 2006; Diminescu 2008; Wallis 2012). Mobile platforms are increasingly significant in addressing the communication needs of poor, underserved or marginalized populations, particularly those with limited access to the Internet (e.g. Horst and Miller 2006; Jensen 2007; Kumar et al. 2008; Kim 2009; Patel et al. 2010; Donner et al. 2011). It is no surprise, then, that immigrant workers and their advocates are increasingly turning to mobile tools in their campaigns for social justice and for amplifying marginalized voices.

Mobile technology is simultaneously a growing interest for educators because of the opportunities it provides for media-based education and connected learning that emphasizes

participation and voice (Jenkins et al. 2006; Ito et al. 2009; Ito et al. 2013). While longstanding critiques from cultural studies scholars on the social shaping of technology (e.g., Williams 1974) have illustrated how values and relations of power are embedded in technology design, it remains infrequent, and yet crucial, for educators and community organizers who seek empowerment to question the values and practices that determine the technologies they inherit.

Several decades of participatory design (PD) research suggests that mutual learning and collaboration among users and designers can bridge cultural and social gaps to influence how values are encoded in software (Schön 1983; Béguin 2003; Sengers et al. 2005; Farooq et al. 2007; DiSalvo, Clement, and Pipek 2013). One of the ways to interrogate the formation of such values is to address the power imbalances that may be tied to technology (Benston and Balka 1993; Hess, Offenberg, and Pipek 2008). There is, however, little work on how ordinary mobile technology shifts the premise of participatory design, despite the fact that the complex interaction of mobile phone hardware, competing carrier plans, and messaging protocols create a web of technology in which multiple layers of power can be encoded. Mobile technology may therefore be an ideal lens to investigate the interaction between processes such as hardware appropriation (e.g., Bar, Pisani, and Weber 2007), and the constraints of user-centered software design.

In contrast to more common PD studies on large and formal organizations (including universities, e.g., Könings et al. 2007), this paper seeks to contribute to the growing literature on community-based PD in marginalized communities (e.g., see Dearden and Rizvi 2008; Light and Luckin 2008; DiSalvo, Clement, and Pipek 2013)—where mobile has become particularly relevant. While there is evidence that PD can empower users to become producers rather than passive consumers of technology and content (Spinuzzi 2005; Dearden and Rizvi 2008),

participatory practices remain rare in the development of communication technologies. There is very limited research on how marginalized groups participate in the design of software for mobile platforms, especially in light of the availability of open source software with claims of broadening technical participation.

This paper analyzes the mobile design effort of Mobile Voices or “VozMob.” The project, and its resulting media platform, arose from a partnership between the Annenberg School for Communication and Journalism at the University of Southern California (USC) and the Institute of Popular Education of Southern California (IDEPSCA).¹ IDEPSCA is an organization that pursues a social justice agenda through various programs that serve immigrant day laborers and household workers across Los Angeles.

The VozMob concept was presented to IDEPSCA leadership in late 2007 by an IDEPSCA coordinator and USC researchers, based on previous experiences with communication projects in immigrant worker communities and a recent needs assessment showing that mobile technology held untapped potential for the organization. Many of IDEPSCA’s staff and membership agreed that their organizing efforts could benefit from the incorporation of mobile technology. They were also, however, very aware of the potential privacy and security issues that might arise when immigrant workers become active in the digital public sphere. The design and implementation of a mobile-based project made specifically for immigrants would thus need to be developed in a way that would be sensitive to the needs and concerns of those who would be sharing their information with a broader audience. A basic concept for a mobile-based media platform was pitched to a group of eight day laborers and household workers (members of IDEPSCA) who had been publishing a community newspaper, *La Jornada XXII*, for several years. This core group, called the Popular Communication Team (PCT), embraced the project

and became the primary participants in VozMob's collaborative design process. In 2008, efforts commenced towards the design of a new community media and digital storytelling platform that would use ordinary cell phones to support the group's social justice and community organizing efforts (Mobile Voices 2011).

Under the VozMob project, the PCT began sending multimedia stories directly from their mobile phones to the Internet and reporting on events and issues relevant to their communities. The co-designed platform allows users to publish online stories, which can include multimedia components such as audio interviews, photo slideshows and video clips, inexpensively via the Multimedia Messaging Services (MMS) available on even basic mobile phones (i.e., not requiring smartphones or data plans). Users of the VozMob system also cross-publish some VozMob stories in their pre-existing print newspaper *La Jornada XXII*. At the time of this research, the core group of users was beginning to train additional workers and fellow community members to expand the platform's user base; by the time of this writing, the VozMob platform counted several regular users (see <http://vozmob.net/>).

To analyze the VozMob design process, an innovative method of collaborative visualization and analysis was developed by three of this manuscript's authors in consultation with an IDEPSCA coordinator. This collective analysis was based on data gathered through in-depth, individual interviews, and complemented by participant observations. The results are analyzed across three thematic areas: participation, control and ownership over the platform; factors enabling and limiting participation; and the interplay of appropriation and design. The analysis process also prompted collective reflection on the relations of power and political economy that are embedded in participatory mobile design processes. These findings have

particular import for the growing field of community-based participatory design, especially regarding mobile platforms built with open-source software.

Mobile and the Spectrum of Technology Design Involvement

The design of mobile communication hardware and software has historically been dominated by corporate investment and commercial interest.ⁱⁱ Unfortunately, communication technology typically reflects and often bolsters the interests of those who are most able to influence its design (e.g. Lessig 1999; Longford 2005; Bijker 2006; Chun 2006; Light and Luckin 2008). For mobile technology, the problem threatens to grow worse as mobile design shifts from electrical engineering to personalized and user-driven applications. It is unclear how traditionally marginalized users will fare if they are absent from these processes, particularly when they experience barriers to participation such as access to materials and security and privacy concerns.

Participatory Design & Appropriation

Participatory Design (PD) is a technology design philosophy, one that places value on a process of co-creation with the end user. It advocates for direct involvement of users to democratize the design process and empower users while increasing the technology's effectiveness (Asaro 2000; Simonsen and Robertson 2013). Achieving user empowerment in the design process is challenging, and too often PD is reduced to generalized, "politically correct" measures rather than meaningful participation (Ertner, Kragelund, and Malmberg 2010).

While it encompasses an array of methodologies (Spinuzzi 2005), there are some common features and ideals that characterize PD. These include encouraging users to be active, empowered producers instead of passive consumers of technology; a more democratized design

process rather than top-down decision making; and iterative approaches to design and prototyping developed through processes of co-learning and co-determination between developers and users (Asaro 2000; Spinuzzi 2005; Byrne and Alexander 2006; Simonsen and Robertson 2013). Inherent in even the early writings about PD in 1970s Scandinavia is a vision of empowerment, and recognition of the power hierarchies at play in the relationship between technologies, their users, and the social and political interests of those who control their design.

Much of the early research on PD emphasized its application to empower workers in industrial workplaces (Asaro 2000; Simonsen and Robertson 2013). But PD in a community-based setting is distinct (see DiSalvo, Clement and Pipek, 2013) and, in many ways, more difficult because social relations in the community-context are typically more fluid and ambiguous. In community-based PD work there is often a plurality of interests beyond the binary workers-manager power relationships with which early PD literature was chiefly concerned. However, applying PD in the context of community-based social justice work can present fruitful opportunities. Communities previously involved in social justice efforts may, for example, already be more familiar with the participatory ideals of PD. As a result, we argue that community PD is especially important to analyze as a spectrum of participation, rather than merely as a power binary.

While there have been a few PD initiatives for mobile design (e.g., Svanaes and Seland 2004) and some with mobile learning (Sharples, Corlett, and Westmancott 2002), relatively few studies of mobile-centric PD consider low-income or marginalized groups (exceptions include Panchard et al. 2007; Tacchi and Watkins 2007). This is understandable, since mobile technology represents a relatively new frontier, and community-based groups who attempt PD are often resource-strapped (Carroll 2008; DiSalvo, Clement, and Pipek 2013). The VozMob

case illustrates this resource limitation, while also revealing one set of coping strategies and exploring implications for PD and empowerment.

Power, Participation, and Appropriation

PD theorists such as Dr. Kristin Nygaard (a prominent computer scientist and a vocal trade unionist, as well as one of the key early figures in PD) and her colleagues produced a number of methods and techniques for bridging the gap between designers and end-users, allowing workers to directly participate in setting goals and designing systems so that technology might better promote their interests. PD is thus historically rooted in a political contestation of the relations of power embedded in the technology design process (Asaro 2000; Spinuzzi 2005; Simonsen and Robertson 2013). The field of PD today, however, is marked by debates about whether PD maintains such a social justice valence, or whether some instances of PD have been driven primarily by instrumental, profit-driven goals such as increasing the likelihood of purchase or take-up by the end users (Asaro 2000; Blom et al. 2005). PD projects that hold this goal may improve product design, but do so without seriously critiquing or challenging the ethics and structures of power that underlie the use and design of technology (Byrne and Alexander 2006; Robertson and Wagner 2013). We argue that PD approaches can be compatible with social justice goals depending on how they are implemented and put into practice and how well they engage the question of power in the design process. While the VozMob design process was not participatory at *every* decision point, participation—where it occurred and was experienced as such—has led to a greater sense of control and ownership over the resulting platform, and a critique of the power relationships embedded within its technology.

Olsson (2004) argues that user participation can be understood along a spectrum. On the low end of the spectrum, he argues, users are represented in the design process when designers think about products from the user's perspective. In this case, users are involved only as informants or subjects of research for design projects undertaken on their behalf. In the middle of the spectrum lie design processes influenced by continuous access to users, user feedback sessions, and user collaboration. Finally, on the other end of the spectrum we find projects that conceive of users as co-designers.ⁱⁱⁱ This end of the spectrum most directly challenges existing relations of power in the design process, and is perhaps the most promising for supporting and advancing social justice projects because it places agency in the hands of the user. Sometimes projects embrace this in the extreme, like the radical Community Design described by Karasti and Baker (2008), which seeks to entirely avoid the intervention of professionals. By contrast, the VozMob team saw value in facilitating dialogue between users with almost no computer literacy and open-source programmers with more formal technological training.

Similarly, the concept of appropriation resonates with a social justice perspective on technology design. Bar et al. (2007) define appropriation as, “the process through which mobile phone users go beyond mere adoption to make the technology their own and embed it within their social, economic and political practices” (p. 1). As users change or “tweak” mobile devices in a “creative renegotiation process” to better meet their needs, they are “re-inventing” the technology in order to engage in a broader range of social, economic and political practices (Bar et al. 2007, p.2). In turn, the process of appropriation is influenced by political, economic and cultural factors that either limit or expand the possibilities for adoption, reconfiguration and use. The process of technological appropriation, like the process of technology design itself, is thus a politically charged one—“a user-driven attempt to re-negotiate the power relationship embodied

in a technological system” (Bar et al. 2007, p.36). Acts of appropriation were certainly part of the VozMob process, and the collective analysis carried out for this case study (described below) addressed the relationship between appropriation and participatory design that emerged through the evolution of the project.

Overview of the VozMob Technology Design Process

VozMob’s development process was emergent rather than pre-determined to follow any of the diverse methodologies elaborated in the PD literature. Yet the project shared many of the ideals of PD, which informed much of its design process.

When VozMob was first conceived by IDEPSCA community organizers and USC researchers, the aim was to democratize power relations by involving all stakeholders in the design of the platform rather than imposing an external solution to the communication needs of immigrant workers. This approach was greatly influenced by the existing culture within IDEPSCA, which is rooted in a philosophy of popular education that emphasizes horizontal dialogue and the co-production of knowledge (as opposed to top-down decision making).^{iv} Collaborative, critical learning is at the center of this process.

A key challenge of the project was to structure the design process itself and communication between stakeholders. For most of the design period, between 2008 and 2010, about 20 people were on the design team, including immigrant workers (8), community organizers (3), university researchers from the Annenberg School (7, including these authors), and professional open-source software programmers hired under the project (2). In particular, stakeholders needed a workflow whereby the software programmers could respond to the needs expressed by the workers (rather than simply to the researchers’ or staff’s preconceptions about

what might work best) so as to collaboratively design a system that reflected the goals, values and communication needs of the workers.

The primary collaborative practice took the form of a weekly workshop. These workshops became the key mechanism for VozMob participants to work together on designing, researching, and implementing the project. The workshops followed a popular education methodology and included discussions about technology, privacy issues, media literacy, media justice and storytelling goals as well as training on the use of mobile phones for digital storytelling, testing of features and identifying bugs, and hands-on graphic design.

The software developers, who were largely located offsite, were unable to attend all but two of these workshops. This decentralized approach to software development in which programmers worked from remote locations necessitated a secondary layer of deliberation that took place almost entirely online. Lack of regular face-to-face interaction between the developers and the other project participants posed a significant challenge to the participatory nature of the project. Therefore, every effort was made to ensure that these more technical deliberations reflected the decisions made in the workshops as faithfully as possible. Design decisions were then broken into coding tasks and assigned to specific developers. The practical need to prioritize coding tasks inevitably gave the software developers a certain degree of power and influence over which features were implemented and when, although the team made all good faith efforts to ensure that prioritization of coding tasks was in line with the decisions of the larger group of stakeholders.

From the outset, some of the parameters set by consensus of the stakeholders for the platform's design were that the system be low-cost to use, and that the privacy and security concerns of the users could be adequately addressed. After exploring some of the commercially

available options, it was decided to build a custom website based on the open-source Drupal platform that made it possible to make the system available for appropriation and adaptation by other groups and organizations. The first prototype Drupal site (vozmob.net) launched in June 2008. This initial website used a minimalist design until a participatory graphic design process led to a new presentation of the stories (see Figures 1 and 2).

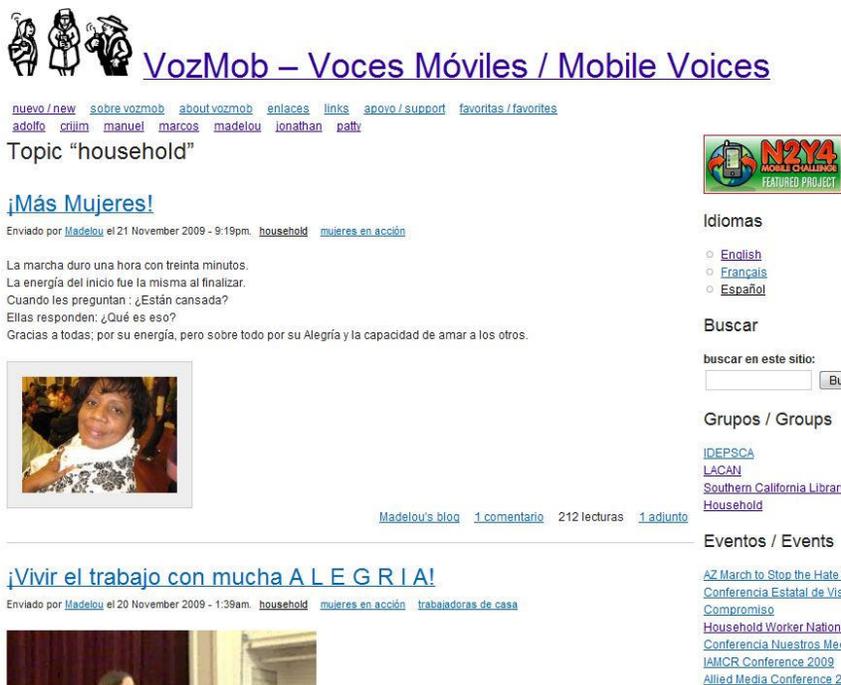


Figure 1. Screenshot of the VozMob website with a minimalist design as of November 2009 (prior to the graphic design process).



Figure 2. Screenshot of the VozMob website in May 2012 (after its redesign in 2010).

At this time, the coders increasingly relied on online project management tools to coordinate and document technical work. Priorities were organized and communicated using Redmine, an open-source project management tool that offered the possibility for stakeholders to propose new functionality, ask for technical support, and report bugs to the appropriate programmer. It also stored a record of conversations about best approaches to resolving issues. Technical work—carried out primarily by two USC researchers and the off-site programmers, with some involvement of IDEPSCA coordinators—was also structured by less formal communication tools, including weekly scheduled meetings using Internet Relay Chat (IRC),

teleconferences, and occasional in-person code-sprints. Two such code-sprints were held in Los Angeles and included extended meetings with the workers.^v

The need for such tools underscored the distributed nature of the team—with software developers in distant cities around the world, the immigrant workers spending long days working at their jobs across Los Angeles, and community organizers and USC researchers in offices miles apart. These channels of communication were, in theory, open to participation by all team members, although in practice direct collaboration with the programmers was typically carried out by only one to two university researchers. Access to communication with the programmers remained challenging for workers without computers at home, in addition to language and technical literacy barriers. Since workers' direct participation in programming meetings was limited, researchers and IDEPSCA staff made it a priority to bridge communication between the workshops and the online technical deliberations; that is, despite language, technical and geographical obstacles, VozMob attempted to position its users as *co-designers* (Olsson 2004) through hands-on testing, brainstorming, and participation in decision making.

Research Questions

Based on VozMob's social justice orientation and a review of the literatures on participatory design and appropriation, the researchers and IDEPSCA project coordinators expected that a design process using participatory methods would be an empowering and more democratic experience for participants. The hope was that a participatory multimedia project would cultivate a sense of control and ownership over all or parts of the platform and, hopefully, result in a more relevant and effective system. It is often presumed that participation inherently leads to such outcomes (Asaro 2000; Spinuzzi 2005; Byrne and Alexander 2006), but less frequently are the actual experiences of participation interrogated. While participatory

approaches to the design of communication systems are clearly promising for social justice aims, it remains necessary to evaluate such practices critically and to identify challenges and areas for improvement.

Toward that end, in this paper we explore how VozMob participants experienced the design process, with emphasis on the participation of the immigrant workers (as the stakeholder group with the least 'technological capital' in terms of both resources and technological literacy at the start of the project). We also investigate how participation (or lack thereof) influenced the workers' sense of control over the design process and ownership of the resulting system. Finally, we consider the relationship between appropriation and design and its implications for the project and theory-building in general. In summary, we explore the following themes and questions:

Participation, Control & Ownership

We document and analyze the extent to which project stakeholders felt they were able to participate in the technology design process. Did experiences of participation lead to a greater sense of control over the outcomes of the technological system? How did the workers' experiences of participation (or lack thereof) in the design process affect their sense of ownership over the platform? We consider these questions in relation to the spectrum of user participation (Olsson 2004), including aspects of the VozMob process in which workers were successfully involved as active design agents and those in which they may have been confined to an informant role.

Factors Enabling and Limiting Participation

In exploring ways to improve VozMob's development and sustainability, as well as offer findings relevant for other groups with similar aims, we analyze some of the factors that most enabled or hindered worker participation in the project's design process. In particular, we consider modes of participation in what was a distributed design process, with software developers in other cities, and with certain participants acting as intermediaries between the workers and the developers, to overcome language and technical barriers.

Design and Appropriation

Whether technology is designed or appropriated by users is not always an either-or proposition. In exploring the relationship between relations of power and technology design, it is equally important to understand users' experiences of appropriation. To what extent do participants feel they have helped *design* the platform? To what extent do they feel they have participated in *appropriation* of the technology rather than direct design? How do participants understand the relationship (or difference) between appropriation and participatory design of technology, and is this significant? These concepts were introduced to the project by the USC researchers and became central terms of debate among participants in the collective analysis, as a way to discuss relations of power, modes of empowerment and implications for social justice.

Case Study Methods & Collective Analysis

An increasing range of research methods have emerged that seek to rectify the inherent power imbalance of top-down, expert-driven, and often extractive research, and view community participation as enhancing the data's relevance and accuracy (Fals-Borda and Rahman 1991; Chambers 1997; Jackson and Kassam 1998; Parks et al. 2005). The findings in this article are based largely on one such participatory, collective analysis process developed by these authors in

collaboration with IDESPCA, and conducted in a daylong workshop with project stakeholders in mid-2010. In addition, the researchers participated in the majority of the weekly workshops with the workers, and in meetings with both the programmers and the community organizers at IDEPSCA.

Semi-structured interviews were first carried out with all stakeholders, providing data for the collective analysis.^{vi} The intent of these interviews was to gain a sense of how each participant in the project perceived and experienced the process of developing the VozMob platform; to identify some of the differences in these experiences (particularly with regard to participation and individual feelings of empowerment, influence in the process, and sense of control over the technology); and to create a space for participants to reflect in-depth on the process and offer suggestions for improving it.

Interview data was organized into broad, thematic categories (e.g. enablers or barriers to participation), using emergent categories agreed upon by the researchers and IDEPSCA coordinators. For each category, recurring and emergent themes were identified from the interview transcripts by one researcher and then verified by at least one additional researcher. Any discrepancies in theme identification between the researchers were discussed until mutual agreement emerged. The key themes that emerged were reviewed with the IDEPSCA coordinator and served as the starting points for the collective analysis workshop.

VozMob stakeholders agreed that a participatory data analysis process would best further the popular education goals of the project. Further, it was felt that a co-constructed interpretation of the data would yield the most representative and productive analysis. We thus carried out a process of collective analysis over a daylong workshop involving the majority of VozMob

participants at the time, including five of the university researchers, two IDEPSCA coordinators, and five workers.

The collective analysis methods used drew upon a unique combination of visualization and popular education techniques; we see these as an innovative outcome of the VozMob collaboration and therefore provide a detailed explanation of the analytical process in Appendix A for future adaptation and use. To summarize, each stakeholder group (the workers, IDEPSCA coordinators, and the university researchers) created a visual diagram of VozMob's development process and identified 1) key influencers over the various stages of development; 2) the stages of the process during which each individual felt they had exerted personal influence over the design; and 3) moments of design and/or appropriation. Finally, participants worked in their groups to match representative quotes from the interviews with important aspects of the design cycle as represented on their diagram, allowing the group to analyze participants' experiences of participation in relation to the design process overall. This also gave each group an opportunity to review and reflect on some of the themes, quotes and ideas that were raised in individual interviews and to co-construct an analysis of larger themes based on these.

Figure 3 depicts the example diagram presented by two of the present authors (who co-facilitated the collective analysis) at the start of the workshop to prompt the analysis activities.

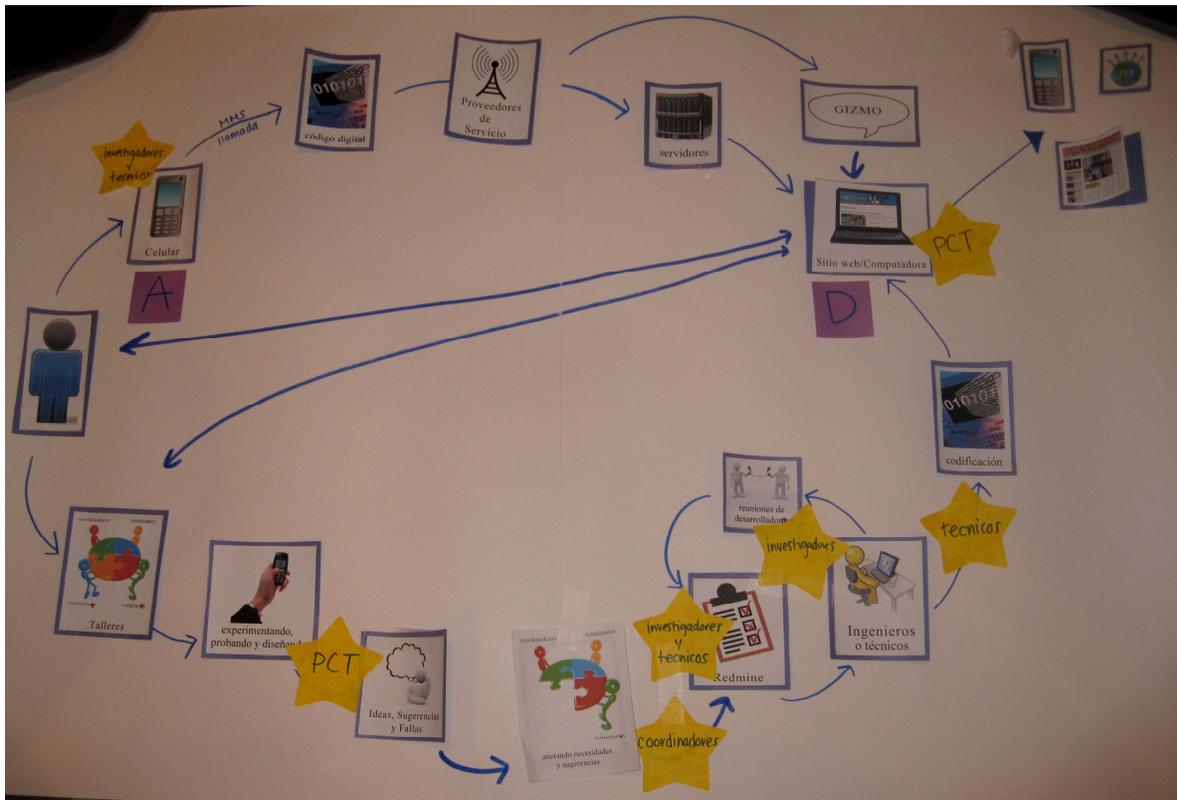


Figure 3. Example visual diagram of VozMob’s development process, developed by two of the present authors based on an approximate aggregate of interview findings.

The diagram in Figure 3, which was based on findings from the interviews, depicts a cyclical, dual process; the top half of the cycle represented how the system functioned at the time of the collective analysis workshop and how the digital stories traveled from the individual user/producer to the website and to the public. The bottom half of the cycle represented the VozMob design process (at the time of the collective analysis workshop) in terms of the stages of feature development. Broadly speaking, the top half of the cycle represented the technological components, while the bottom half of the cycle represented the social process that informs the technology development. The diagram presented was used as a provocative example; it was not

presented as an authoritative representation but rather as a simplified example of how one might visually represent VozMob’s process, based on several of the statements in the interviews.

Figures 4-6 depict the diagrams of VozMob’s development process produced by each stakeholder group in the process of collective analysis. In each diagram, arrows represent the direction of the process and the relationships involved. The square sticky notes signify components that were either *designed* (“D”) or *appropriated* (“A”) and the other, shaped sticky notes represent key influencers. Small round stickers represent moments or areas of perceived individual influence.



Figure 4. Diagram created by the workers to represent VozMob’s development process.



Figure 5. Diagram created by IDEPSCA coordinators to represent VozMob’s development.



Figure 6. Diagram created by the university researchers, excluding two of the present authors who facilitated the workshop, to represent VozMob’s development.

Each stakeholder group presented their diagrams and analysis back to the full group resulting in further discussion and analysis, concluding with action points for the project as well as a summary of lessons learned that may be applicable to similar projects (see Conclusion).

Findings

Because of the project's commitment to co-construction of knowledge with all participants, in this article we privilege the findings and discussions that arose out of the collective data analysis process rather than the raw data from the interviews. However, it must also be acknowledged that the workshop resulted in conversations of much more depth than can be reported here, thus the authors had to make some decisions about which themes to foreground. Workshop discussions took place primarily in Spanish, but as with all of the project's discussions or materials, special care was taken to ensure the appropriate translation and interpretation of the interview data, including verification with project stakeholders. In the following section, we present findings from the workshop according to the three framing themes we identified earlier in this paper: Participation, Control & Ownership; Factors Enabling and Limiting Participation; and Design and Appropriation.

Participation, Control & Ownership

One observation that emerged in the collective analysis workshop is that participation was experienced differently at different stages of the project. Here it is helpful to think of the design process as a range of distinct yet interrelated activities that entailed varying degrees of participation. For example, it became clear that the experience of participation in the design of technological features was very different from the experience of participation in the graphic design of the website's look and feel.

All of the stakeholder group diagrams depicted the VozMob design process as cyclical (see Figures 4-6); this confirms that participants experienced it as iterative and informed by ongoing participation and input of all stakeholder groups, albeit to varying degrees. In both the interviews and the collective analysis, this iterative process was often described as a cycle beginning in the weekly workshops, continuing with the communication of design priorities to the programmers (usually via IDEPSCA coordinators or USC researchers) and then circling back to the workshops when developments were tested. The workers described it as a circular process of learning. In the center of their diagram they placed a component to represent that, “in the middle of all of this learning that we have done... is our signal to the world, where we are already transmitting what we have learned.”^{vii}

However, when asked in the collective analysis to identify the top three actors influencing the technology design process, the workers did not represent themselves specifically among the top three, but rather included themselves as part of the larger group of “everyone” (all project participants) who had influenced the platform. The only channel for technical participation identified by the workers was to report problems, ideas or requests for the system to the project coordinators or researchers, but many of them were not clear about what happened after they did so. This was an interesting finding considering that the interviews with the other project stakeholders, particularly those working on the software development and other technical components of the project, widely reflected a perception that the workers had greatly influenced the technical design outcomes. In the collective analysis, both the university researcher and IDEPSCA coordinator groups identified the workers as one of the primary influences on the development of VozMob technological platform, with their influence occurring through the

workshops, testing and suggesting of features, developing practices of production (further elaborated below), and reporting bugs.

Although the workers perception of their influence was less than the researchers perceptions, nonetheless, the workers still expressed feeling a degree of control and even a sense of ownership over outcomes of the design process:

This has been a long process, where we've tried to inform that the blog doesn't function at times, the photos don't arrive there, the cell phones are broken, they don't send the photos. So, we've been part of identifying problems and telling the person closest by [e.g. IDEPSCA coordinators] what is occurring... we continued in the process and we arrived at what is now our technology.^{viii}

When asked to locate on their visual diagram the stages over which they personally had influence (as individuals), various workers identified the workshops; testing and experimenting with the technical tools; sharing the tools with new users outside of the VozMob team; offering feature suggestions and identifying bugs; the community newspaper *La Jornada XXII*; and the graphic design of the website, among others, but notably did not include the actual technological development of features. Thus, the synopsis presented by the workers in the collective analysis reflected a degree of participation that resulted in a sense of ownership over the platform, while also reflecting a sense of limited participation in the most technical stages of the process. However, their description of the development process also reflected a degree of learning about the technological elements of the project, “in which we've become informed about what digital code is, the service providers, the servers, and the technical engineers.”^{ix}

The IDEPSCA coordinators depicted that they each had influence in the workshop stage through the stage of reporting feature requests and bugs (see Figure 5), but did not identify

themselves as having personal influence over the coding process. Interestingly, they identified personal influence over the cellular service providers, most likely reflecting the fact that they have struggled – in many cases successfully – to work around limited features in the phones and high service costs, frequently changing service configurations. This suggests a sense of control – perhaps better characterized as ‘push-back’ – over an external actor (the service providers) that they also see as a market force having great influence over the project. It illustrates some of the ways in which the development of the project entailed a struggle for control over the existing technology and services, a struggle through which some degree of agency was experienced in the process of appropriation (a point to which we return below).

While the workers expressed a degree of lack of control over the design of the technological features, this was not the case for the *graphic* design stages. In discussions of design in both the collective analysis and the individual interviews, the workers most often pointed to their direct roles in the graphic design of VozMob’s website and the re-design of the community newspaper *La Jornada XXII* to include content produced through VozMob's mobile platform. The graphic design activities were ultimately some of the most participatory in the development of the platform and spanned over multiple workshops in the course of several months. In the collective analysis a representative of the workers' stakeholder group explained, “the design of the new web page... this is also where we have been an important part. We [the VozMob team] have all been committed but ...[the workers have] been fundamental to the development of our webpage.”^x Perhaps not surprisingly, direct participation in the development of the site’s graphic identity helped promote a sense of ownership over it.

Across the three stakeholder groups, the relative lack of perceived influence over the programmers and of control over the coding stood out most clearly.^{xi} For the workers, IDEPSCA

coordinators, and researcher stakeholder groups (with the exception of the two researchers who acted as the primary liaisons with the programmers), influence over the design of technological features was primarily experienced as occurring in the workshops, through testing and experimenting with the phones and the website, or when reporting bugs identified in and outside of the workshops.

Overall, however, the diagrams created in the analysis workshop suggest that the VozMob process has been relatively democratic, as all participants perceived they had personal influence over multiple stages and outcomes of the project, especially in relation to the graphic design process. A broader finding of the project has been that enabling participation in the design of the ‘front end’ of a site is far easier than enabling participation in the design of the ‘back end,’ which requires a different set of tools and capacities. Inherently, co-designing site layout is simpler and poses fewer barriers to participation than relatively abstract and highly technical decision-making about feature development and code design.

Factors Enabling and Limiting Participation

The findings in this category are generally in keeping with those of other studies (e.g. Guijt et al. 1998; Byrne and Alexander 2006; Light and Luckin 2008; DiSalvo, Clement, and Pipek 2013), so here we draw the reader’s attention to points of specific interest in this case.

Perceived lack of technological literacy & varying skill levels. Perceived lack of technological understanding was a key barrier to participation identified by the workers. “I feel that my influence is limited,” stated one participant, “because I don’t have much technological understanding; often the fact of not being a technology expert may mean that some people avoid making comments related to the technology.”^{xii} (We note here that this was a *perceived* rather than a measured degree of technical understanding.) Similarly, the workers stakeholder group

reported that Redmine, the online project management tool that VozMob used, is something that they did not yet understand well. This is not surprising given that the tool is online and in English, both of which present obstacles to the workers' participation. Further, while this tool was demonstrated and discussed in some of the weekly workshops, the workers' direct use of it was not at first considered a priority for the project, as they generally preferred to use their limited time to focus on aspects of the technology that more directly enabled their content creation. The feasibility and advantages of the workers learning to use Redmine was still being debated in the collective analysis workshop. Learning to adequately report bugs and feature requests is its own skill set (made more difficult by language barriers), so the group discussed ways of simplifying and improving the reporting process including setting up an email address on the VozMob website with instructions for detailed reporting and requests.

Another significant finding (identified in particular by the worker and IDEPSCA coordinator groups) was that users developed their digital storytelling skills at different paces due to time and ability to attend weekly workshops, computer literacy, and comfort with mobile phones. The workers perceived that the varying skill levels within their group slowed the pace of progress because it was often necessary to repeat training in the workshops. Further, varying skill levels posed a challenge to the group's effectiveness as trainers of new users, slowing plans to expand the project and recruit new users. Significant one-on-one time had been dedicated to bringing the core group up to the same skill level in preparation for the project's expansion.

Building bridges with off-site programmers. The project's reliance on Redmine was partially a function of the need for coordination, especially in light of the challenge of using off-site software programmers. While all programmers were present for one 4-hour workshop with the workers and the lead programmer participated in another meeting, sustained interaction was

not possible and was identified in the collective analysis as one of the greatest challenges for the project. On-site, bilingual programmers would have been ideal but had not been successfully recruited for the project.

The university researchers' diagram (Figure 6) used the metaphor of a river that flowed between different stakeholder groups. Bridges spanning these rivers represented the strength of the ties and communication between the stakeholders. Specifically, they drew a small, weak bridge between the workers and the programmers. This river metaphor was emphasized again in the group discussion, leading to a consensus that there was a need for a more solid "bridge" of communication and collaboration between VozMob workshop participants (especially the workers) and the technical decision makers (primarily the software programmers).

Further, at the time of the analysis, one researcher in particular was serving as the primary bridge connecting the workers and the programmers, acting not only as a messenger and interpreter of the information coming out of the workshops but also helping the programmers to anticipate future needs of the project and making direct decisions about system design based on current and future project priorities. This posed not only a potential bottleneck and limitation to participation, but also a threat to the sustainability of the project due to the decreased availability of this researcher in the future. In the collective analysis workshop it was decided that additional time should be allocated for participatory decision-making about development priorities, outside of the weekly workshops. However, this is a challenge given the demands on participants' time—particularly that of the workers whose voluntary time was focused on many other aspects of the project, such as publishing content. Time was thus another constraint on participation identified in this research, a common phenomenon in such participatory processes (Guijt et al. 1998; Byrne and Alexander 2006; Light and Luckin 2008).

In the context of the proliferation of open source software it is tempting to assume that developing software in a participatory manner is inherently more resonant with social justice goals. On a general level this is true, but the above limiting factors highlight the challenges for community-based groups, which like VozMob, must often confront limited free time and differing levels of technological skill (DiSalvo, Clement, and Pipek 2013; Carroll 2008). The technical complexity and the time required to participate directly pose real obstacles and raise the question of what *kinds* of participation in *which design activities* yield the greatest benefit to participants. Despite its best intentions, VozMob was not fully able to bridge a direct and ongoing relationship between the workers and the off-site software developers. The project did not endeavor to train all stakeholders in software coding in part because there were other priorities for participants' time; but the project did try to demystify the general process of software development during the weekly workshop discussions, and ultimately developed a platform that in many ways reflected the input, preferences, and needs of the workers. It remained up for debate, however, whether the benefits of more direct participation in technical design (e.g. coding) would have outweighed the significant cost in terms of the time it would have required from participants to learn these highly technical skills.

We note that one element identified as important for enabling participation was one-on-one support, i.e. one IDEPSCA coordinator or researcher working directly with one worker to troubleshoot, experiment, and become comfortable using the mobile phones and website in new ways. Another key enabler of participation was the ability to create mock-ups and look at the layout and design of other website to generate ideas for the graphic design; visual representations were more readily available and easily incorporated into the graphic design process than into the technical design.

Design and Appropriation

As described above, both the individual interviews and the collective analysis revealed significant differences in the way participants conceived of VozMob's development process. These varied conceptions seem to reflect different individual relationships to the technology. For example, those with more technological literacy tended to identify VozMob's process as one of *design*, in which stakeholders had significant control over how the system operates, while those with less technological literacy who felt less control over the form and function of the technology tended to identify their own experience as one of *appropriation* of the tools. However, appropriation was not seen as isolated from the experiences of participation, but rather as an important form of participation. The IDEPSCA coordinators, for example, saw the continued "appropriation" or ownership of the project by the workers as fundamental to the participatory nature of the project and its sustainability in the future. Furthermore, this sense of appropriation was often accompanied by a sense of triumph over the limitations of existing configurations and costs of technology; for example, the group felt proud that they had devised a way for workers to use inexpensive, relatively basic mobile phones to send multimedia digital stories that otherwise would require access to then-costly smartphones and data subscriptions. In some cases this sense of triumph through appropriation was in reference to not only preexisting tools like the cell phones but also the website created by and for the VozMob project – that is, appropriation of both external technologies and those created by the project.

For example, in both the interviews and the collective analysis the workers tended to characterize only the graphic design processes as design, while they felt they had appropriated the mobile phones and computers. In contrast, the university researchers identified the use of the computers, the cell phones and some tactics adopted from other movements (e.g. the open source

movement) as acts of appropriation, but the code, the website, and workshop curricula as being designed by the VozMob team. The workers discussed having appropriated or *adopted* (i.e. taken up, but neither designed or appropriated) certain tools but not having had a direct hand in designing the technology itself. For some of the workers, this distinction was important in that it reflected both the political and material constraints of the technology. On the material level, the pre-existing functions on the cell phones have certain limitations such as short audio recording time, advertising embedded in MMS messages^{xiii}, and costs of sending messages. All of these factors influenced the development of the VozMob system. These have constrained the appropriation of the mobile phones for VozMob's purposes and at times limited participants' sense of control over the technology. Yet transcending these limitations and finding ways to tell mobile stories using without data connections or smartphones was seen as successful appropriation and an important accomplishment of the project. Some members of the team saw this as being in direct conflict with the original commercial intent of the mobile phone manufacturers and service providers, and therefore a political as well as material act.^{xiv} Insisting on both the limitations of the existing technology design as well as on the act of appropriation is thus a way to foreground the political and economic dynamics in which the project is embedded.

The process of appropriation can, in fact, constitute a form of design practice, albeit an informal one that takes place through the creation of technical and social practices surrounding the technology, rather than the more formalized 'pre-distribution' design processes.

Contributions from the cultural studies literature, many influenced by Raymond Williams' (1974) now classic discussion of the social shaping of technology^{xv}, suggest that design is pervasive in acts of everyday appropriation and is thus linked to daily negotiations of power and agency (Wajcman 1991; Mackay and Gillespie 1992; Stolterman 2001; Slack and Wise 2005;

Light and Luckin 2008; Wallis 2012). These studies illustrate how power is negotiated through creative practice and appropriation, in subtle or more aggressive ways that may constitute their own form of design. Hacking in do-it-yourself communities is perhaps one of the clearest examples of re-negotiating relationships of power through appropriation and (re)design.

Two stakeholder groups, the university researchers and the IDEPSCA coordinators, found these terms insufficient for representing VozMob's process. The researchers articulated appropriation and design as part of a continuous scale or spectrum between simply adopting or using technology as it was intended, and designing it from scratch. However, they added the term *creativity* because they felt that creativity played a significant role in both the practices of content production that were developed in and outside of the workshops, as well as in the development of the code and the unique solutions that the programmers brought to the problems they are presented. They also added *practices of production*, because "not only are we developing new technologies such as new code, but also developing new practices. The practices of production... come from the workshops, the experiments and uses... and the ideas and suggestions that people bring to the workshops. So we exchange ideas and this modifies the practices of producing the stories. There is a cycle here."^{xvi} The researchers felt it important to highlight creativity and production practices (in contrast to more techno-centric notions of design) as inherent and crucial components of any design process, and of the social shaping of technology more broadly.

The IDEPSCA coordinators felt the project had appropriated some of the tools (e.g. cell phones and the Internet).^{xvii} However, they were not in agreement with using the term *participatory design* for all stages of the process because they felt that the tools being used in the project, including Drupal, already existed and imposed a set of design parameters, "so we are

appropriating the design of Drupal, creating other code to appropriate it to what we need”.^{xviii}

Instead, they proposed the term *appropriation of design* – here again, insisting that existing structures embedded within the technology are important on both material and political levels.

Thus, while varied perspectives on the concepts of appropriation and design remained and new terminology was suggested, consensus emerged that emphasizing the political economic implications of the terminology itself was a valuable part of the process of *conscientization*.^{xix}

Further, it was clear that for the VozMob participants, appropriation of technology may be just as politically potent an act as technology design, and the lines between the two are often blurred.

Interestingly, through the process of conducting this workshop, we learned how appropriation was understood as an empowering process by team members, and perhaps more descriptive than the term “participatory design” of the role the workers played. It is thus important to consider appropriation *as a design practice*, arguably an inherent part of *any* design process. Yet maintaining the tensions between these concepts in order to explore their analytical utility, and the ways in which they can be experienced differently from particular political or social justice standpoints, has proven to be a productive catalyst for broader discussions of technology and power within the project. We therefore recommend exploring the interrelations and boundaries between these concepts in future technology design projects; lessons learned from this project, summarized in the following conclusion, may serve useful in this regard for further explorations of PD in social justice projects.

Conclusion

In this paper we have situated the results of a collective analysis of the development of the VozMob mobile media platform in relation to the literature on participatory design and appropriation, and considered their relevance to a social justice perspective at the community level. As an action research project, this study has been equally concerned with both theoretical inquiry as well as practical analysis which, while intended to inform subsequent VozMob project decisions, can hopefully also be of use to future efforts to use participatory design to build communication systems for social justice causes. We therefore, by way of conclusion, provide a brief overview of the theoretical implications before turning to a practical set of lessons learned that we hope can serve as inspiration for future projects.

Consistent with the community-based approach to PD (DiSalvo, Clement, and Pipek 2013), a central goal for VozMob was to enable participants to be co-designers of the technology to the greatest degree possible. The collective analysis suggests that degrees of participation varied across different aspects of the project, with all stakeholders agreeing that the workers' hands-on involvement in the graphic design process enabled them to be true co-designers of the graphic interface. However, in terms of the technological feature design process, participation took the form of extensive user feedback sessions and collaboration, if not true co-construction, placing this in the middle of Olsson's spectrum of user participation. Nonetheless, the shared perception was that VozMob's platform reflects the participation of all stakeholders and that the design outcomes would have been significantly different had this participation not taken place.

One reason for the difference in degrees of participation experienced in the graphic and technical design may be that we found the front end of the system more conducive to direct user participation than the back end; coding—not as easily visualized as the graphic design of a website—requires a specialized technical skill set in order to directly participate. Mobile media,

which necessitates that designers consider multiple screen sizes and diverse operating systems, aggravates this problem.

Another key finding concerns the value of engaging multiple definitions of ideologically loaded design terms. While the literature offers multiple definitions of *participatory design* and *appropriation*, researchers typically adopt a single definition, despite the multiple forms of empowerment often explored in PD (e.g., see Ertner, Kragelund, and Malmborg 2010). By contrast, our case suggests that participants' varying usages of the terms reflect their lived experiences of the design process in politically meaningful ways. In the collective analysis workshop, as well as in the weekly workshops, debating the concepts of appropriation and design precipitated broader conversations about the relations of power embedded within technology and the social justice implications of this. This negotiation of terminology echoes IDEPSCA's Friirian orientation (Friere 1970), where critical dialogue is a central path to knowing the world. In terms of PD, an important finding is that many of the stakeholders in the VozMob project viewed appropriation to be distinct from design, yet just as significant an act.

'Influence' (i.e. perceived influence or control over design decisions) proved a useful analytical theme to identify and reflect on stages of the process where users may or may not have had an empowering experience. This necessitated consideration of how much influence or control a user may have over the forms of technology; how much control they have over prioritizing new feature development and bug fixes (including understanding the budget trade-offs entailed in this prioritization); and the extent to which they are equipped to weigh pros and cons of different technological solutions. While in theory anyone can write code, it requires a higher level of technological literacy than most users have and is often perceived as an intimidating terrain. It remains largely the playground of a highly educated techno-elite

(Longford 2005), though VozMob and many other projects are making important inroads.

Increasing the involvement of users without such technological skills requires intentional efforts to make design processes accessible. However, participation of all stakeholders at every step of the process may not be ideal, given that participants may have other priorities for scarce time and resources. As this case illustrates, a sense of ownership or control over the resulting designs may be attained through a variety of modes and degrees of participation, even if direct involvement in programming is deemed impossible or is not desired or prioritized by participants.

The dimensions analyzed in this paper (Participation, Control & Ownership; Factors Enabling and Limiting Participation; and Design & Appropriation) remain important areas for future PD research and practice, all the more so because of the growing significance of mobile media in everyday civic life. In 1995, well before the proliferation of open source software and mobile technology, William J. Mitchell asked us to consider, “Who shall write the software that increasingly structures our daily lives? What shall that software allow and proscribe? Who shall be privileged by it and who marginalized?” (Mitchell 1995, p.112). These prescient questions continue to be paramount to technology design for community-based PD projects and can help move us beyond theoretical inquiry to offer practical insights into how this process might be democratized. To this end, we close by offering the reader a more applied summary of our findings, in the form of practical lessons emerging from our reflection. Since overly rigid “best practices” may undermine the stakeholder negotiations and contextual adaptations at the heart of participatory design, we offer these as inspirations rather than as a formal guide, and hope that they will spark useful and critical debate among participants of future social-justice oriented PD projects:

- **Approach technology design as a way to reflect on broader power relations.**
Especially for projects that adopt a popular education approach, we find that the design process can be a powerful way to spark conversations about the broader political economy within which technology is embedded and the limitations this may impose on design. VozMob's process for developing its platform sparked and sustained critical debate about relations of power around technology, which played an important role in collective conscientization.
- **Consider and try existing tools.** Experimentation is one of the most powerful ways to develop insights and innovations. Furthermore, it may not always make sense to build new software, even if the resources exist to do so. Pre-existing tools can often be connected together—if somewhat awkwardly—thus saving project resources for other priorities such as training. We note that a project similar to VozMob *could* have been carried out using pre-existing tools. The debate over whether to adopt existing technologies or build new ones is a productive one; we see particular value in investigating the hidden constraints and implications of using commercial tools, especially around issues of privacy, security and longer-term staffing.
- **Anticipate different paces of learning.** It is easy to anticipate different skill levels, especially with technology. The harder challenge is anticipating different paces of learning, and differing learning goals. Participatory design may be more effective when peer learning and popular education are incorporated and supported.
- **Discuss parameters of participation early while maintaining fluidity.** VozMob took a fluid, evolving approach to the design process, rather than establishing a strict, linear design methodology at the outset. This enabled the project to be responsive to emerging

needs, lessons learned, resource constraints and opportunities – be it shifts in funding, the availability of new technologies, time constraints, etc. However, the project could have gone even further by creating a more participatory process for deciding on the design methodology itself at the start of the project.^{xx} This could have included, for example, visioning exercises on specific ways to participate and collective discussions about how decisions would be made, who would be involved in each stage and how best to facilitate and support this participation. Of course, this would have to be constantly re-evaluated since in reality praxis is often messy and fluid given that participants and facilitators begin from very different assumptions and continually to learn together.

- **Visualization is valuable.** Visual exercises, especially simple ones using basic tools like pen and paper, can be incredibly helpful for reaching greater understanding, thinking outside of the box of existing technology possibilities, and for provoking innovation (see also Dearden, Rizvi, and Gupta 2008). For example, the visualization techniques used in VozMob’s collective analysis process provoked new dialogue and helped the group reach a greater, shared understanding of the development process and of the project’s strengths and weaknesses. Similarly, the visualization techniques used for the graphic design enabled what participants agreed to be one of the most successful moments of true co-creation. Visualization techniques throughout the design process may deepen communication and learning as well as inspire innovation. In particular, developing more accessible visual or physical examples to illustrate coding decisions and their implications is an important task for future action research.^{xxi}
- **The devil is in the details: Providing programmers with the specifics.** In participatory design, it is important to nurture participants’ ability to provide detailed feedback and

suggestions to programmers. In VozMob’s case, users’ suggestions for improving the system or the website were often too general or vague for the programmers to be able to assess and implement the best response. When developing a technical vocabulary and knowledge base is impractical for a project’s timeframe, it is important to consider how to make the process of translating user goals into technical specifications as participatory as possible. Yet this does not necessarily require highly technical vocabulary. Helping users develop a practice of providing detailed descriptions of their experience with the technology, including their unrealized goals or technical challenges, may help bridge communication with programmers.

- **Cost analysis can be participatory.** Cultivating a greater understanding among participants of the cost for new features and bug repairs—including their benefits and limitations—may be crucial if the goal is to be participatory in setting priorities for software development.^{xxii} This is a good way to ensure a project is participatory at the level of decision-making.

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Appendix A: VozMob's Collective Analysis Methodology

The following provides a step-by-step description of the process of collective analysis conducted by VozMob in a daylong workshop designed by three of this article's authors in consultation with an IDEPSCA coordinator, and co-facilitated by two of the authors and one of the IDEPSCA coordinators. Representatives of all stakeholder groups except the software programmers participated. These activities drew in large part on the data previously obtained through in-depth, semi-structured interviews with all project participants (including the programmers and all authors of this paper).

I. Overview of findings by the researchers: To set the stage for the participatory analysis activities, the facilitators presented key findings and emergent themes from the interviews; these were not intended to be conclusions in their own right, but points of departure for discussion through which the entire group could co-construct an analysis. Linked to this was a discussion of the relationships between technology and power, and how VozMob is embedded within these. The facilitators presented how these relationships have been theorized by others (including the concepts of *participatory design* and *appropriation*), as well as some of the ways that members of VozMob had reflected on these topics in their individual interviews. While the concepts of participatory design and appropriation had been discussed informally in previous VozMob workshops, they were examined and debated explicitly in the collective analysis of relations of power and modes of empowerment in design (see point IV, below).

II. Depicting the VozMob design process: The interview responses suggested that participants had diverse perceptions of what the process of developing the VozMob platform entailed, and that members had participated in each stage of this process in different ways and to varying degrees. Because of these varying perspectives, collectively describing the VozMob

design process became the first activity of the workshop. The goal was to reach a shared understanding of the VozMob process in order to work together to improve it.

To prompt this, the researchers presented a diagram of the VozMob design process that was created as an approximate aggregate of how the process was described in the interviews (see Figure 3). Each stakeholder group (the immigrant workers; IDEPSCA coordinators; and university researchers) then created their own representation of the process, using components representing technologies (e.g. mobile phones, computers, the website, etc.) as well as social processes (e.g. workshops, experimenting with the tools, reporting bugs, etc.) that were offered by the workshop facilitators, and adding others as they saw fit. After debating each of the components of the process, each group configured these on their visual diagram and drew arrows representing the direction of the relationship and/or process between them. These became each stakeholder group's visual representation of the VozMob design process. (See Figures 4-6.)

III. Identifying key influencers and individual influence: Using sticky notes, the groups were asked to identify the top three most influential stakeholder groups or actors in the process and where they had the most influence. Then, using small, colored stickers, each individual participant added stickers to each part of the diagram where they personally felt they had influence over the process/outcomes. Thus, participants were asked to reflect on and analyze points of influence in the design process as both individuals and as a stakeholder group.

IV. Defining the experiences of design and appropriation: The next phase of the analysis asked each stakeholder group to further debate the extent to which they agreed with the conceptualizations of appropriation and participatory design presented at the start of the workshop, and the extent to which these were reflected in VozMob's process. If they did not feel that these concepts adequately reflected VozMob's process, they were asked to develop their

own definitions or new terms. Each group was asked to reach consensus on the terms and then to place a letter indicating the terms (i.e. “D” for “designed”, "A" for “appropriated”, “neither” or “N/A” for not applicable, or a new term) on sticky notes onto the visual diagrams at each stage of the process where they applied, in order to provoke analytical discussion about each stakeholder groups’ perceptions and experiences of the platform development process.

V. Identifying enablers and obstacles to participation: Each stakeholder group was provided a copy of a document containing data from the interviews in the form of anonymous quotations or short summaries of individual statements regarding factors that have enabled or been an obstacle to participation. Each group selected some of these statements and added them (by number) to the visual diagram where they felt the statements applied to different stages of the process. Based on the resulting discussions within their groups, each group was asked to craft one sentence on each of the following:

- What most enabled participation?
- What were the greatest obstacles/challenges to participation?

VI. Suggestions for future improvements: Based on the obstacles and enablers pinpointed as well as other themes that emerged, each group was asked to identify suggestions for the future keeping in mind the planned scaling up of the number of VozMob users.

VII. Report back and group discussion: Finally, each stakeholder group presented their visual diagrams and statements back to the full VozMob team for discussion. Based on the results of the small group analyses, the larger group together discussed the strengths and weaknesses of the VozMob process, particularly with regard to reducing barriers to participation and the sustainability of the project. The collective analysis process closed with a discussion of

lessons learned to share with other groups interested in social justice and participatory processes of design/appropriation (see Conclusion).

ⁱ Mobile Voices has received support from the Social Science Research Council (SSRC), the Annenberg Program on Online Communities (APOC), the Palo Alto Nokia Research Center, and the Humanities, Arts, Science, and Technology Advanced Collaboratory (HASTAC), among others.

ⁱⁱ For a helpful historical overview, see Agar, J. 2005, *Constant Touch: A Global History of the Mobile Phone*, Totem Books.

ⁱⁱⁱ Light and Luckin (2008) use a similar framework, distinguishing between “designing for” and “designing with” users.

^{iv} Popular education is a critical pedagogical philosophy and practice grounded in the goal of social transformation. Developed most explicitly by Brazilian educator Paulo Freire in the 1960-70s, it emphasizes participation, dialogue, horizontal learning and the valuing of local and popular knowledge, with the goal of *conscientização* or “conscientization”. Freire contrasted this with what he called the “banking method” of traditional education, in which learners are treated as passive recipients of information, thus perpetuating unequal relations of power (Freire 1970).

^v The source code for the VozMob project was initially kept on the github repository, more recently on gitorious. Other coordination and communication tools VozMob has used include a research blog (blog.vozmob.net), tagged bookmarks on delicious.com (#vozmob) and a twitter account.

^{vi} Between November 2009 and March 2010, semi-structured, in-depth interviews were carried out by three of the present authors with all project participants. The researchers developed the questions and piloted them with an IDEPSCA coordinator. Researchers interviewed each other

as well, so that responses from every participant in the project were captured. It was also hoped this would help to break down the researcher/subject divide since all authors were also members of the project and participants in the study.

^{vii} Transcripts from Mobile Voices Collective Analysis Workshop (June 2010). Authors' translation of Spanish transcript.

^{viii} Authors' translation of workshop transcript.

^{ix} Authors' translation of workshop transcript.

^x Authors' translation of workshop transcript.

^{xi} The software developers did not participate in the collective analysis, but in their individual interviews they expressed a perception that the workers were one of the primary influences.

^{xii} Authors' translation of workshop transcript.

^{xiii} The programmers had to create filters to scrape off the embedded advertising from the MMS content that appears on the project website. The researcher group considered this a process of design and appropriation; design was necessary in order to appropriate.

^{xiv} Of course, if the Mobile Voices platform is widely adopted it could also increase profit to service providers for the delivery of MMS messages. At this stage of the project, however, the accomplishment of finding a way to publish multi-media stories from low-end mobile phones to a website, without the use of costly smartphones with wireless data plans and without the embedded advertising, was seen as a noteworthy accomplishment. It was arguably a form of resistance to the predominant mobile/wireless market.

^{xv} Williams' (1974) analysis of television showed the importance of avoiding both technological determinism and the notion of socially determined technology. He argued against either of these

unidirectional understandings of the relationship between the social and the technological, in favor of the concept of the “social shaping” of technology.

^{xvi} Authors’ translation of workshop transcript.

^{xvii} In a one-on-one interview, a coordinator argued that the workers had also appropriated MMS messages because they had found their own styles of producing stories through the MMS system and had thus appropriated the tool rather than just accepted it as a given technology or format.

This is another example of the appropriation of tools created within the project.

^{xviii} Authors’ translation of workshop transcript.

^{xix} The term “conscientization”, according to Paolo Freire, “refers to learning to perceive social, political and economic contradictions, and to take action against the oppressive elements of reality” (Freire 1970, p.35).

^{xx} This suggestion comes from these authors, not the collective analysis process.

^{xxi} See also Lyndsay Grant's "The Case for Design and Social Justice as 21st Century Literacies" at <http://dmlcentral.net/blog/lyndsay-grant/case-design-and-social-justice-21st-century-literacies>.

^{xxii} This suggestion comes from the authors.