Critical Participatory Design: Reflections on Engagement and Empowerment in a case of a Community Based Organization

Mamello Thinyane  
United Nations University institute on Computing and Society  
Macau – S.A.R.  
China  
mamello@unu.edu

Karthik Bhat  
United Nations University institute on Computing and Society  
Macau – S.A.R.  
China  
krtk.bhat@gmail.com

Lauri Goldkind  
Fordham University  
New York  
USA  
goldkind@fordham.edu

Vikram Kamath Cannanure  
Carnegie Mellon University  
Pittsburgh  
USA  
kmarkiv@gmail.com

ABSTRACT

Participatory Design (PD) methods serve a dual purpose of facilitating the achievement of superior design artifacts by connecting the designers and developers with their end-users, as well as catalyzing democratic engagement and empowerment of the end-users. These complementary goals of engaging and empowering individuals, who not only use the designed products but are also affected by these artifacts, have proven elusive to achieve in most cases. In this paper, we discuss a PD engagement with the staff of a community-based organization (CBO) towards developing a technology tool supporting their homeless outreach services. We undertake a critical qualitative inquiry, using a Situational Analysis analytic strategy to analyze the data reflecting on the complex dynamics of democratic engagement and participation, as well as empowerment in PD. The paper further unpacks the varied dependencies and relations between the elements and the discursive constructions prevalent in the situation of a PD session. It also presents a mapping of the various PD activities against levels of critical reflection.

KEYWORDS

Participatory design, democratic engagement, empowerment, ICT for development

ACM Reference format:


1 INTRODUCTION

The engagement of users in the design of solutions and artifacts can be motivated from the technology and political perspectives. From the former, including users in the design process leads to better and more effective products due to the incorporation of user-specific requirements and insights in the design process, and from the latter, involving users in the design process empowers users and allows them to gain better ownership of the developed artifacts [1]. Considered in the context of information and communication technologies and development (ICTD) engagements, the role of the users in the conceptualization and implementation of solutions can be framed along the continuum from passive recipients of technology solutions, to co-creators via participatory methods, through to the empowered stage where users actively drive the development of the solutions and technology artifacts [2]. Despite the recognition of the importance of end-user participation in solutions development, and the recognized goal of empowerment of the end-users, the lack of success in achieving these two goals of effective participation and empowerment is bemoaned by some researchers [3].

Participatory Design (PD), as a field, grew out of the realization of the need to include and involve the public in decision-making and planning. Over the years it has taken various forms and conceptualizations including
public/community consultation, cooperative design, collective resource approach, and more recently co-design and co-creation [4]. As a design approach, it has been used extensively in various fields including product and services design, architecture, urban planning, program design, and software development. It has also seen great developments in new techniques and methods for user engagement: techniques that target specific types of users, such as novice users, elderly, and special needs children; to the increasing use of technology tools to support the various stages of the design process. Despite the variety in tools and techniques, the purpose of PD remains primarily for [5]: probing the participants and encouraging engagement, priming the participants for immersion in the design process, gaining an understanding of the users’ current experiences and context, and generating ideas and concepts. Besides the concern with the methods and tools of user engagement, the PD discourse has also been dominated by the consideration of the politics, as well as the nature of participation and user engagement. In this regard, the interaction and power dynamics between not only the end-users and the designers, but also between the individuals and the technology become of great importance in understanding the effectiveness of PD techniques towards facilitating the achievement of the participation and the empowerment/emancipation goals.

In this paper, we reflect on participatory design sessions undertaken with a community-based organization (CBO) towards the implementation of an information-management and operations-support system for their organization. Over a series of six sessions of engagement between the CBO and the researchers/developers, we highlight the considerations that have shaped the engagement with this CBO towards achieving increased participation/engagement, and greater empowerment of the end-users, who in this particular instance are the CBO staff. The next two sections expound on Participatory Design and Critical Participatory Design, discussing mechanisms for increased user engagement as well as the (theoretical) formulations of user empowerment through critical reflection. This section is followed by a reflection on the specific case study of the CBO in this research, which is expounded on through the use of Situational Analysis instruments. The paper concludes with a discussion of critical reflexivity within the processes of PD as well as the consideration of the barriers and facilitating strategies for increased democratic participation and empowerment.

1.1 Participatory Design

Participatory design and its close relative Participatory Action Research are methodological traditions originating in Northern Europe in the 1970s and 80s. This early work originating in Scandinavia was motivated by a Marxist/Socialist commitment to democratically empowering workers and fostering democracy and ownership in the workplace [6]. This generated further research which emphasized the role of actively engaging the users in design [7], paper prototyping [8], cooperative prototyping and learning more about the context through fieldwork and ethnographic research [9]. Prior work has also measured a direct relationship between participatory design and project success highlighting the critical role of people’s participation [10]. Some of the benefits achieved through PD [11] are: that local people tend to make better decisions in context, increased citizen participation provides additional resources, citizens contribute and feel a sense of belonging around the problems they find relevant, and citizen-driven technology allows for local control over better maintenance after deployment.

1.2 Critical Participatory Design

Critical Participatory Design can be considered as the infusion of critical theory perspectives into PD - which would entail exploring issues of hegemony and emancipation in the design and development of artifacts [12]. However, a large body of literature on critical design focuses more on the role of (critical) artifacts, that emanate from the design process, to challenge the assumptions, preconceptions and the ‘givens’ about the role of products in everyday life [1, 13, 14]. In this research, we adopt the critical theory lens to explore and unravel the complexity of interactions between the various stakeholders/participants within the situation of PD sessions. The research is therefore concerned with the power interactions between the participants with the aim of unpacking the multiplicity of perspectives, and amplifying the ‘minority’ views and ‘marginal’ positions in the process of designing the technology artifacts [15].

Critical Theory (CT) has always had as one of its core motivations the reduction of domination and oppression and expansion of freedom in all its varied forms [1]. In this regard, CT provides and holds a strong alignment with the key perspectives in PD - having user’s democratic participation and empowerment as the core of PD practice. Notwithstanding this clear moral and political claim, empowerment and democratic participation in PD processes are wrought with varied complexities. In their review of literature on PD, Ertner et al. identified different ways in which empowerment has been enunciated and articulated in practice, corresponding to the following categories [16]: specific user groups, direct democracy, user’s positions, researcher’s practice, and reflexive practice. The specific users groups and direct democracy categories are largely concerned with empowerment as an outcome of the PD processes and practice. In our research, the interest is particularly on empowerment of the participants during the PD processes, which corresponds to user’s positions, researcher’s practice and reflexive practice in Ertner et al.’s categorization.

2. COMMUNITY-BASED ORGANIZATION CASE

This research is undertaken in collaboration with a large community-based organization that provides a myriad of social welfare services including a homeless shelter, outreach programmes, elderly care homes, rehabilitation centers, and youth development services. In engagements with this CBO and in the context of an ICTD project, a need for a technology...
solution for information management, and for providing operational support was identified, with a specific focus on supporting the outreach programmes of their homeless center. The proposed solution consists of three components: a public-facing mobile application for crowdsourcing homelessness hotspots data around the city, an operational support mobile application for use by the outreach team, and a back office desktop web application for managing homelessness hotspots data, coordinating outreach, and generating reports.

We undertook meetings with this CBO framed around: initial stakeholder engagement, requirements elicitation, participatory design, and field observations. The engagement with the CBO was across six weekly sessions, which were attended by the research and development team, the team from the homelessness center, as well as a participant from the CBO headquarters. These sessions, five of which were held at the premises of the homeless center, had a regular attendance of at least eight people: four from the research and development team, three from the homeless center, and the one research executive from the CBO headquarters. On a few occasions, two other staff members from the homeless center joined the meetings and participated in the PD session. The four-person research and development team was made up of a project/research lead, a visiting researcher, an assistant researcher, and a research intern who was also the lead developer in this project. On the other hand, the three regular participants from the homeless center were the center director, and two social workers - one of whom was primarily responsible for coordinating the homeless outreach operations of the center.

A typical PD session lasted approximately an hour and a half and consisted of identifying a component of the system to be the focus of activities during that session (e.g., the public facing mobile app, the outreach mobile user interface component). These sessions aimed to undertake both individual and collaborative design of the UI components employing: low-fidelity prototyping with paper sketches; group engagement for ideation / brainstorming and consensus building; and demonstration of the system prototypes for initial feedback and discussion. Although the meetings were structured to be informal and interactive, they were planned, coordinated and facilitated mostly by the research/project lead and the intern/developer. In these engagements, data were collected for the duration of the design process across the six weekly sessions, in compliance with the protocol approved by the institutional Human Subjects Research Board (No. 201704-02). The sessions were audio recorded, as well as having handwritten notes taken by the research assistant (the notation used in this paper to refer to the data from the notes is PDCX, where X is the PD session number). Subsequently, each session was debriefed between the researchers and these debriefings were documented. Lastly, to encourage continued reflection among the participants, and to facilitate interaction outside the context of the physical PD meetings, the researchers introduced the use of WhatsApp to the group so that participants could engage with each other in a relatively neutral virtual space.

The context of this research and the engagement between the various participants involved in the design of the ICT artifact is layered with complex, power-laden interactions. At one level one can observe the major power differential between the researcher team and the CBO team. But beyond this initial and obvious power gap, there are also power differentials within both the research team and the CBO team, and these are associated with various factors: the positions and roles of the individuals within the teams and within their respective organizations, gender dynamics, cultural dynamics, as well as the relational dynamics between the individuals. These complex power-laden dynamics are not only apparent from the interactions within the PD sessions; they are also generally recognized and described in the literature [17], [18]. We have adopted Situational Analysis for unpacking the complexity of the power interactions and exploring the dynamics of democratic engagement and empowerment within the PD sessions undertaken in this research. Thus Situational Analysis is used as a methodological framework for analysis and reflection, including for self-reflection, which is motivated by and congruent with the critical constructivist notions of ‘researchers-as-instruments’ and researchers as co-creators of meaning [19], [20].

3. SITUATIONAL ANALYSIS

Exploring democratic participation and empowerment in participatory design calls for a methodological framework that recognizes and embraces the complexity of the PD situation and the political factors associated with empowerment and democratic participation, such as equality, justice, diversity, representation, agonism, and pluralism. This particular framing of the research is as such best served through the adoption of a critical, reflexive, and qualitative research approach. It needs to be critical in order to unpack the structural dynamics and constructs within PD that would tend to empower or disempower the different participants. It needs to be reflexive to give explicit recognition and to account for the influence that the researchers/developers exert on the situation of the PD session. Lastly, it needs to be qualitative to support the exploratory motive in this research i.e. to explore and expound on the dynamics of democratic participation and empowerment in the PD sessions. Situational Analysis, which was developed by Clarke, is one such critical analysis method that considers the situation as a unit of analysis and is centered on elucidating complexity, identifying the key components and conditions that characterize a particular situation, and facilitating reflexivity [21].

Situational Analysis is a variant of the qualitative research method, Grounded Theory. It incorporates a visually oriented data analytic strategy that complements the traditional open coding of Grounded Theory [21]. Investigators create products such as situational maps, which conceptualize a scenario as inclusive of what usually has been considered context, and explicitly and systematically includes missing or otherwise silenced data. This method of analysis is useful for those
interested in considering issues of context such as culture, power, socioeconomics and so forth, that might not be as amplified when utilizing the traditional Grounded Theory approach.

Three tools from the Situational Analysis suite have been utilized for the critical analysis of the elements, conditions and discourses that have shaped the dynamics of empowerment and democratic engagement in the situation of the PD sessions with the CBO: these are messy situational maps, ordered situational maps, and relational maps. Situational maps are primarily a "strategy for articulating the elements in the situation and examining the relations among them" [21]. Clarke suggests some questions to be asked of the data, to bring out the elements of the messy situational map. These questions include: who and what are in the situation? who and what matters in this situation? and what elements make a difference in this situation? Adopting a technique that would allow for triangulation of different perspectives, two of the researchers independently undertook an open thematic coding of the data, largely relying on the textual records of the session notes looking to answer these questions, while also relying on their observations during the PD process to inform this process. These independent sets of elements were then compiled into a unified set of elements that formed the messy situational map. In this unification step, closely-related elements were integrated into groups, for example, Group dynamics (i.e., forming, norming, storming, performing) (See Figure 1). Further, conflicts were resolved through discussion and consultation with the other researchers.

The messy situational maps capture the complexity of the discourses, issues, and considerations present in the situation of a PD session. The key actants within these sessions include the researchers, the specific homeless center staff, as well as the parent CBO staff. Technology also plays a critical role as an actant within these sessions: as a tool for mediating the interaction and engagement between the participants (e.g., presentation tools), and as an element that provides certain technology affordances (e.g., mobile devices features and limitations) and characteristics towards the realization of the design artifact.

Beyond detailing the human and non-human elements within the PD session, the messy situational map in Figure 1 also captures the dominant discursive constructions within these PD sessions. Empowerment (and disempowerment) as well as democratic participation (or lack thereof), which are key considerations in this research, are associated with aspects of group dynamics and the evolving maturity of the group through the forming, norming, storming and performing phases [22].

From one evaluation and reflection session, it was noted "when we started people were ok, slow meh ... getting to know each other" (PDN_3:8) reflecting the initial group forming dynamics of member acquaintance and bonding. Due to the high demographic diversity of the group, engagements and interaction within the group were always accented with issues of consensus building and negotiation between the participants, hinged on the differences in the socio-cultural values, as well as aesthetics and cultural markers.

In this research, the personal perspectives of the researchers and the particular focus on the power aspects within sessions - informed by Critical Theory, have shaped the resultant ordering of the elements (as captured through the ordered situational map) and the subsequent relational mapping analyses that were undertaken. The key elements present within the PD sessions have been clustered using the categories suggest by Clarke [21] as follows:

- **Individual Human Element/Actors**
  - Researchers; CBO staff; Homeless center staff; Homeless center clients
- **Non-human Elements/Actants**
  - Design prototype tools; Meeting presentation aids/tools; WhatsApp (i.e., Virtualizing participants engagement)
  - Discursive constructions of human actors
    - Proxy opinions and perspectives; Consensus building; (Dis)Empowerment; Trust among homeless center workers; Loci of power and control; Group activities; Hindrances and barriers; Group and subgroup interactions; Presence and absence; Interaction modalities; Reflexivity; Mutual learning and engagement; Group dynamics (forming | norming | storming | performing); (Lack of) Democratic participation
  - Discursive construction of non-human actants
    - Technology affordances; The power of defaults
    - Political/Economic Elements (PEE)
    - Economic/financial considerations; Resource constraints
    - Sociocultural/Symbolic Elements
      - Language (i.e. participants and UI); Translations (i.e. participants); Aesthetic and cultural markers; Socio-cultural values
      - Temporal Elements

**Figure 1 Messy situational map of the Participatory Design session situation**
Time and scheduling; Structure and process

- Spatial Elements
  Meeting sitting positions; location of the meetings

Situational Analysis, as a critical qualitative inquiry methodology, facilitates not only the discovery of the various elements and discourses present within a situation, but also helps to unpack the complex interactions and relations between the elements. The process of relational mapping within Situational Analysis entails exploring the multidimensional connections between the various elements identified in the messy and the ordered situational maps. It is invariably a non-exhaustive process that, based on the analytical commitment of the researchers, focuses on untangling the key central relations and connections between the concepts. Informed by the objectives of this research and to constrain the relational analysis, two key concepts, (Dis)Empowerment and Participants, were identified for further analysis and for each of these concepts, ten significant relations were mapped and explored. Two of the researchers independently worked to identify these central relations and subsequently merged their list of key relations to develop the relational maps in Figure 2 and Figure 3, for (Dis) Empowerment and Participants respectively.

**Figure 2 Relational mapping centering on “Empowerment”**

Empowerment of the participants is one of the key goals of PD, along with democratic participation and mutual learning and engagement. Empowerment can be historically articulated through Marxist notions of emancipation from structural oppression [16] or in terms amplifying individuals’ substantive freedoms towards achieving certain functionings, from the Capabilities Approach perspective [23]. In the context of the PD sessions, empowerment has largely been associated with two key aspects: amplifying the varied and diverse voices of the participants towards contributing to the resultant design of the ICT artifact, and balancing the power differentials between the participants and democratizing participation.

As far as the first aspect is concerned language, and the need for and the role of translation, was a critical factor in the interactions (thus the relational links in Figure 2). While the meetings were largely conducted in English, language proficiency of the participants varied greatly, from three of the participants who were second language speakers with low English proficiency, to one native English speaker. Conversely, six of the participants were native Cantonese speakers, and four participants did not have functional proficiency in Cantonese. This language aspect led to the associated dynamics of having sub-group interactions as well as proxy opinions being expressed in the discussions. The impact of language on the effectiveness of the engagements was noted in a reflection by one of the participants: “... But I feel I could have done more if I could talk Cantonese, language was a barrier, maybe not as effective as I wanted” (PDN_3).

**Figure 3 Relational Mapping centering on “Participants”**

We further noted the role of the tools (both the design prototyping tools and the meeting and presentation aids/tools) towards amplifying the voices of the participants. The ability to work on the individual low-fidelity design with accessible tools, such as wireframes and paper sketches, allowed the participants to engage and express their design preferences and opinions, as noted by one of the participants “... after prototype, hands on, I get to see what my design feels like. How it feels for complete newbie. Thinking about user friendliness” (PDN_3). However, the tools utilized in the session were not always empowering or contributing positively to the interactions. This was noted in the case of the use of high-fidelity prototyping tools, which rendered the UI designs and components on various screens and allowed...
basic interaction from the user. This became a source of initial confusion and frustration for some of the participants as noted in the meeting notes that “... they are confused about the high-fidelity prototype, not clickable... not zoomable” (PDN_2).

For the second aspect of empowerment (i.e., balancing the power differentials within the group), this was largely associated with dynamics of democratic participation (or lack thereof) of the participants and the use of the supporting techniques, such as consensus building through peer number-based judging of individual’s UI designs. The observed power differentials between the participants were noted to be associated with the participant roles and responsibilities outside the context of the PD sessions - some of these power dynamics were translated into the PD sessions.

The second element that we focused on in the relational analysis of the situation is the PD session participants (Figure 3). The participants are noted to be one of the central human collective actants within the situation of the PD sessions, not only because they give purpose and eventuate the PD sessions, but also because they are the focus of this research on empowerment and democratic engagement in the PD sessions. The significant associations noted include the role and contribution of the participants towards the group, in particular towards the evolution of the group through the forming, norming, storming and performing phases [22]. Associated with the progression through these group phases is the increase in group cohesion, rapport, performance, and efficiency, as noted from the following participant reflections: "when we started people ok, slow meh ... getting to know each other" (PDN_3); “but now good team... communication is free” (PDN_3); “was good to maintain contact. Was helpful” (PDN_3); and “if you are working in a team, you gotta enjoy working with them” (PDN_4).

Other key factors strongly associated with the participants element are the socio-cultural values, aesthetic and cultural markers and consensus building. The cornucopia of complex dependencies between these factors is encapsulated in the following reflection by one of the participants - “brainstorming, different people, different ideas and chose best and see different and helps learn” (PDN_3). Notwithstanding the inevitable commonalities (e.g., similar cultural backgrounds), the different individuals in the PD session each held a different set of values, had a different sense of aesthetics and beauty, and had different perspectives; as such the PD sessions interactions were largely a space for brainstorming, negotiation, and consensus building. The spaces (i.e., context, location, and site) where these interactions occur is not insignificant as has been noted in literature. Salacuse et al. discuss the non-neutrality of the location where negotiations occur [24], and Brown and Baer note the advantage that accrues towards a site’s residents (i.e., versus visitors) during negotiations [25]. Notwithstanding the fact that these influences of the choice of location have been discussed in the context of distributive negotiations, which are orthogonal to the integrative negotiations that would typically occur in a PD session, the power dynamics associated with the different meeting locations are apparent. In the case of this research, the bulk of the face to face meetings occurred at the CBO center, with one of the sessions being an outreach session involving driving around the city and walking with the team at various sites. Besides interaction in these physical spaces, part of the participation was virtualized and conducted via a WhatsApp group. This technology-supported space for interaction afforded the participants a different set of tools for engagement and a different power dynamic landscape. For example, while some of the participants might have been restricted by the language in face to face interactions, with WhatsApp and on their mobile devices, they could translate their comments before sending to the group; they did not have the pressure of immediate, real-time and synchronous response, and this in turn allowed time for more reflection in the communication. This communication tool also supported the use of various communication features (e.g. pictures of their designs, emoticons, voice notes, GIFs).

Empowerment and democratic participation are noble yet illusive aspirations and goals in PD. The factors that shape the realization and that contribute to the achievement of these goals are not only complex and varied, they are also wrought with complex interdependencies and interactions. Through the use of Situation Analysis instruments, we have unpacked some of this complexity to highlight the key elements, the discursive constructions, as well as the relations prevalent in PD sessions. The analysis has been informed by Critical Theory perspectives, of seeing to understand the structural conditions and processes that perpetuate dominance and oppression; conversely seeking to understand dynamics of empowerment and democratic participation respectively within the PD sessions.

4. REFLEXIVITY AND PARTICIPATORY DESIGN

Beyond the post hoc critical reflection on the six PD sessions undertaken with the CBO, we further explore the extent to which reflexivity was realized during the participants’ engagements. Reflexivity, which in group contexts refers to the ability of the team to “overtly reflect upon and communicate about group objectives, strategies, and processes and adapt them to current or anticipated circumstances” [26], has been argued to be one of the critical virtues in PD [27]. Widmer notes that reflexivity in teams does not occur spontaneously and that there are necessary antecedents for reflexivity [26]: team characteristics, trust and psychological safety, shared vision, diversity, and leadership style. These factors, some of which have been observed and discussed in the situational analysis in Section 3, are the precursors to the iterative process of reflection, planning, and action/adaptation that constitutes reflexive practice in teams [28]. Reflection not only facilitates the improvement of design practice and the effectiveness of the team, it also allows the team to be critically aware of how the various group dynamics (e.g., negotiation, cooperation, creativity, empowerment, engagement, participation) play out in the specific situation. From a design and PD perspective, there is recognition that reflective design facilitates improved critical review, empowerment of the users, and self-development [29].
In this research, we have explored the extent to which reflection was espoused, embedded and achieved in the PD processes undertaken with the CBO. Using the five levels of reflection identified by Fleck and Fitzpatrick, we discuss the observations from the PD sessions and note the specific instances and levels of reflection by the participants during these sessions [29].

**Level R0, Description: Revisiting**

This is a foundational or descriptive level at which focus is concretely on stating what is known, exploring the information or the data, and revisiting an event or an experience, without much justification or analysis. While this level is generally not considered reflective, it nonetheless supports and provides the foundation for high-level reflection.

A number of activities were undertaken at this level during the PD sessions - the discussions between the participants were audio-recorded, and a researcher performed the role of taking abridged notes during the sessions. We also captured the screen-designs and sketches created by the participants during the sessions. These were then stored for use in the next level.

**Level R1, Reflective description: Revisiting with explanation**

Beyond just basic description, this level focuses on providing justification and reasons for interpretation. At this level, there is no anticipated change in the user's perspective, and the level of analysis is very limited. The context of a PD session, wherein interactions between the participants involve negotiation and discussion, typically provides an opportunity for reflection at this level, as people justify their positions and perspectives to each other and the group.

The participants presented their designs from past sessions as well as those designed between sessions (which were circulated digitally on WhatsApp) and described their reasoning behind their choices, and the motivations for the specific design commitments. For example, one of the participants who was an administrative staff at the CBO included a "close file" feature, noting that "the reason why the file was closed" (PDN_1) was important to their administrative process.

**Level R2, Dialogic reflection: Exploring relationships**

Following on from providing descriptions and justifications, this level is about exploring relationships, different interpretations, different hypotheses, and other points of view. At this level, individuals actively question and seek alternative explanations and points of view for events and experiences.

In the PD sessions, the activities that were undertaken at this level of reflection were different consensus-building exercises. With each user presenting their designs, the other participants were encouraged to suggest improvements to the design in order to establish the different perspectives held by them. We also conducted rating sessions for all screens designs, to both quantify the participants' satisfaction with the designs at various stages, and encourage (democratic) participation in the sessions by allowing for a critique of each other's designs. For example, while one of the participants' designs provided equal preference to multiple keyboards commonly used in the region, another contributed with the lived experience of her elderly mother who would prefer "handwriting keyboards, because they would (otherwise) have to learn other keyboards" (PDN_1).

**Level R3, Transformative reflection: Fundamental change**

This level is associated with an intent towards fundamental change, for example, changing personal assumptions or changes in understanding. This level of reflection is associated with the critical awareness of the originally held beliefs and the values, accompanied by the willingness to have those challenged, restructured and reframed. While the fundamental outcome of reflection at this level is an internal personal process that would be hard to observe, the resultant change of practice or perspectives can, however, be observed and noted.

During the scoring exercise in the PD sessions, participants were again asked to express reasons for their scores to communicate what they felt was lacking in the design. Further, they were encouraged to suggest improvements they felt would increase their score. The improvements were summarized by a researcher who was responsible for implementing the designs. Approval was sought from the other participants to ensure that they all agreed with the summarization and its goal of improving the existing design. The summary was generally met with more agreement and higher satisfaction with the design.

The collaborative design process, which is central in PD, pegged the participants' differing socio-cultural values, different opinions and different perspectives against each other in a systematic process of negotiation and consensus building. It is in these contexts that individuals are challenged, and that subtle, incremental transformations occur.

**Level R4, Critical reflection: Wider implications**

This is the deepest level of reflection at which socio-political and ethical issues are taken into consideration. The discussions at this level touched on various aspects of the users’ interaction with the designed product. Among some of these discussions were the users' motivations for using the app, and the design that would best harness it. One such discussion centered on the need for a landing page for the app, with arguments being made against it suggesting that it introduces a latency between the moment a user attempts to report a homeless person, and finally being able to submit the report.

The discussions, on multiple instances, also touched upon the issues of privacy, security and confidentiality concerns of the users, and the CBO. Some of the specifics included collecting GPS information of the user and the legality of taking pictures of the homeless person who would be the subject of the report.
A notable dynamic that can be presented here was the trust developed within the group over the course of the PD sessions. The members of the CBO expressed concerns over the security of the application and the ability to protect against malicious users and bots. They acknowledged that the researchers would handle the security concerns about the application without requiring justification.

The PD interaction with the CBO facilitated the engagements between the participants at the varying levels of reflection. Invariably, the lower levels of reflection support and undergird reflection at higher and deeper levels. The nature of the deliberations at R4, which is at the level of critical reflection, gives an indication of the participants’ engagement not only with the artifactual and functional aspects, but also with the socio-cultural aspects of technology (e.g., the possible inappropriateness of taking pictures of a homeless person in public, issues of data confidentiality and privacy).

5. DISCUSSION

Democratic participation and empowerment are non-trivial to achieve in PD. Having discussed the complexity of this landscape, we recount and highlight some of the pertinent barriers that we have noted and experienced in the PD sessions with the CBO and discuss the mitigation strategies that we have explored.

Language

There is a language barrier between participants in the PD sessions, where the designers/developers do not speak the local language, and where the CBO team has varying level of fluency with the English language. This has the effect of limiting the extent of the engagement between the participants and reducing the level of understanding within the group.

The language barrier was addressed through: having bilingual participants assist with the translations during the meetings; ensuring seating proximity between people needing translations and the translators; having drawn low-fidelity artifacts; and virtualizing aspects of the participatory design through a social media group chat.

Despite this, we observe some limitations to people’s participation in the activities. The participants who were uncomfortable with speaking in English provided their opinions through the translator, and there is a possibility that some language-dependent, culturally relevant feedback was lost in translation. Additionally, one of the participants opined that virtualizing the design through the social media group chat resulted in the loss of the “human connection” (PDN_3), and suggested that we should “make sure the human feel is there” (PDN_3).

Cultural factors

There is a cultural difference between the researchers and the CBO staff. While the researchers were comfortable with the group dynamics that employed group discussions and open-ended questions, the CBO staff were more comfortable to interact with direct one-to-one questions. Attempts were made to include popular local apps as exemplars as well as using locally relevant mock data to enhance cultural relevance.

The differences were also observed with regards to the design of the application itself - when a researcher recommended a landing screen design with a video and animations in the background. This recommendation received both positive and negative feedback, with a notable response being that having the video would make it look “too affluent” (PDN_1).

In the PD sessions, we tried to mitigate the cultural barriers by being cognizant of and sensitive to the local contextual factors, having a translator who had experience living in multicultural contexts and minimizing misunderstandings by repeating ideas and discussion points to the group. Additionally, we used sharing of snacks and food during the sessions to add an informal, cross-culturally relevant aspect to the PD sessions.

Power dynamics

Various power differentials exist between the individuals during the PD sessions - some of these include between the designers/developers/researchers and the end-users, and the CBO director and CBO staff. These power dynamics affect the interaction and engagement between the individuals. Figure 4 provides a rough illustration the researchers’ perspective on the group dynamics from one of the PD sessions (i.e., Session 2). The figure highlights the key conversations between participants. In this session, Researcher 1 (intern) led the session which was moderated by the senior researcher (i.e., Researcher 2) who was more familiar to the CBO staff. The translator, who is also a research executive from the CBO headquarters, helped communicate the ideas better in Cantonese to the staff. Social worker 1 had less knowledge of English and needed frequent translation from the translator while the director and social worker 2 were more conversant with English and they were able to converse with the other researchers from time to time. The model helps in identifying and articulating the perceived power dynamics to facilitate mitigation strategies for future sessions - for example, modifying seating arrangement to allow for better communication between the CBO staff and researchers.

Ameliorating the power inequities and their related dynamics was dealt with by strategically positioning individuals around the table to encourage interaction across the groups; prompting and nudging individuals for participation; and creating a cordial, relaxed and “playful” environment during the PD sessions. Along with power, language facility was also considered among the dimensions of power for seating purposes and was taken into consideration when these arrangements were made.

We had an inherent power dynamic between researchers in terms of seniority, skills, and position. The power play from seniority was mitigated by accounting for the same in our workflow - for example, the intern was given the opportunity to lead the meetings and present ideas to the whole group. For skillset, we used paper prototyping and voting to balance the contributions of the group. Finally, the positions (i.e., temporary/staff/researchers) power play was balanced by conducting a pre
and a post-meeting where all were invited to create the agenda or reflect on the meeting retrospectively.

A further measure that was taken to ensure a balance across the power differentials was locating the PD sessions at the office of the CBO. The participants from the CBO could attend to their other pressing responsibilities at the office, if necessary. This also encouraged other members of the CBO to participate in the PD out of their own volition and interest. Locating the sessions in their office, in addition to the other measures, went a long way in reducing any perceived and existent notions of an imbalance of power.

Lastly, we worked to keep the interactions beyond the physical PD sessions through social media group on WhatsApp. All the members of the team were assigned a task to contribute - for example, posting a design screen or comment on an idea. This allowed for participants and researchers to give their opinion with less peer pressure and provide prompts for everyone to keep brainstorming about the PD session.

![Figure 4 Perceived power model among the participants](image)

### Personality traits

The size of the group can intimidate introverts from fully expressing their ideas while the extroverts can dominate the PD sessions. We noticed that participants were open to speaking their ideas but were more comfortable speaking to each other.

We capitalized on the existing group dynamics to combat barriers to participation from their personality traits. We allowed for smaller discussions among the participants, which organically let everyone open their ideas to the group. Additionally, we used space to our advantage by interspersing and mixing the designers/researchers and the end-users through the seating arrangement, which prevented these small discussions from prolonging and being dominant, while performing the role of mitigating and ameliorating some of the other barriers.

### Knowledge of Technology

The members of the CBO who participated in the PD sessions were not novices in the use of technology having both desktop computers in the office environment as well as smartphones for their personal use. Their lack of knowledge about the capabilities of different technology, however, sometimes resulted in seemingly unrealistic expectations and corresponding disappointment with technology.

At its foundation, PD addresses this barrier in that it demystifies technology design by allowing users to contribute to the construction of the technology artifact. For the case in this research, the emphasis has been placed on getting the hands-on participation of the users through low-fidelity prototyping tools.

However, this barrier was starkly noticeable at the first instance they were asked to evaluate high fidelity prototypes corresponding to their paper-based designs. They expressed confusion about why the elements of the design were unclickable and did not support zooming.

The factor that largely contributed to mitigating this barrier was the participants’ positive attitude towards technology, and the desire to design the application. Their enthusiasm to create the design enabled them to discount this lack of knowledge as a barrier, and actively participate in the PD. They also used the PD sessions as a means of improving their knowledge of technology, a testament to their positive, accepting attitude towards technology.

### 6. CONCLUSION

The effectiveness of technology interventions, and therefore of associated technology artifacts, towards the empowerment of the users, can be improved through human-centered technology development approaches that value human diversity, promote human agency and encourage democratic engagement and participation [30]. Participatory design approaches have as their foundation an attempt to engage and involve the end-users in the design of solutions. However, without facilitating a deep and critical reflection with the underlying socio-political structures and assumptions, technology designs can perpetuate the disempowerment of the end-users.

In our work, we embrace Critical Participatory Design (as a PD approach infused with Critical Theory perspectives – realized through approaches such as Reflective Design) and continue to explore the mechanisms for increased participation and more effective empowerment of end-users. In the case of the PD engagement with the CBO presented in this paper, while we note the varying levels of critical reflection that have been achieved in the sessions, including reflection at the R4 level, we recognize however the opportunities for more structured and planned reflection for future PD activities.

Similarly, we have noted the challenges and barriers to effective engagement and participation within the group, for each of these barriers (i.e., language, cultural factors, knowledge of technology, power dynamics, and personality traits). We have discussed the mitigation strategies currently being incorporated into our PD sessions, as well as potential future mitigation strategies.
This paper has presented ongoing research that explores the role of Critical Participatory Design approaches towards the empowerment of individuals and organizations (in this case community-based organizations). This work is undertaken within the larger context of research that seeks to support and mainstream the role of individuals and community-level actors towards the achievement of sustainable development goals and specific targets that they have reason to value.

References


