Participatory Design in Practice

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Participatory design in practice:
the case of an embroidered technology

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Abstract. This paper presents a project for the social development of ICTs, which used a participatory design approach and sought to have a high social impact on a community of craftswomen (embroiderers from Cartago, Colombia). Participating in this project implied active dialogue with the community to recognize the knowledge of each participant and achieve culturally relevant representations materialized in technological artifacts. We posit dialogue, representation and recognition as key elements for developing successful participatory design. In practice, this was achieved through an iterative, incremental and open-ended methodology, whose main feature was engagement by doing. This process of design allowed engineers to recognize the craftswomen's traditional knowledge and allowed craftswomen to be less afraid of technology. The main resultant artifact was a tangible user interface that facilitates dialogue between fashion designers and embroiderers in the process of designing new embroidery patterns. This and other artifacts that emerged from the activities and dialogues, the level of engagement of the participants, and the convergence points discovered between embroidery and technology, lead us to conclude that the process presented here can be replicated with other craft communities, to reinforce these communities and assist them in generating innovation in their processes and products.

Keywords: Participatory Design, Crafts, Embroidery, Representation, Dialogue, Recognition, Tangible User Interfaces and Social Technologies

1 Introduction

Pérez-Bustos and Franco-Avellaneda outlined the idea of designing an ICT inspired by embroidery as an approach to enhancing embroidery as it is practiced in Cartago, Colombia [1]. They presented their intention to reinforce the making of embroidery as "an expression of caring practices aimed to build self-knowledge." Although Cartago is nationally recognized for its embroidery, the embroiderers themselves experience precarious conditions and their craft is often an informal and secondary labor. Because of this, Pérez-Bustos and Franco-Avellaneda proposed that

ICT could be an appropriate tool to make the artisans' material conditions and core skills more visible to those unfamiliar with this kind of craft work.

The creation of such a social ICT implied a project developed using a participatory design (PD) approach, to make possible the "dialogue between technological knowledge and different kinds of traditional wisdom" [1]. PD not only means involving the prospective users of a new technology in specifying requirements, and testing and gathering reactions to it, but giving users the role of co-designers. Choosing a PD approach for the project implied taking into account the care practices and the moral and pragmatic issues outlined in [1]. According to Carroll [2], users not only have the right to be included in the design process (moral proposition), but their inclusion leads to a more successful outcome (pragmatic proposition).

This project, "Embroidering self-knowledge: Systematization of experiences and participatory design of weaving as a caring practice in Cartago, Valle, Colombia"[1], began in January 2014 and will take two years. It is focused on *calado*, a particular type of embroidery made in Cartago[2]. It involves the participation of a group of people with diverse forms and areas of knowledge: the authors -electronic engineers-, ethnographers, software and information professionals, a collective of *caladoras* (embroiderers), fashion designers and educators. As the various research team members came to the project with different notions about PD, it was necessary to establish basic concepts and understandings at the start in order for the activities to be meaningful and successful. This included coming to a common understanding of PD concepts and adapting our ways of communicating and engaging with the other members.

In this paper we present the development of the project, which had an emphasis on engagement through doing. We outline how we achieved participation by involving ourselves in the others' and our own practices, and how this participation led us to a knowledge dialogue between tradition -embroidery- and innovation -technology-. This technological design was strongly related to activity theory [3] and phenomenology [4] as the theoretical foundations. Firstly, this was because of the continuous subject-object interactions that we were involved in, mainly in hands-on workshops, and secondly, because of the central role of our bodies, through which we explored, learnt, dialogued, and recognized the practices of the communities involved in the design.

2 Guidelines

The moral and pragmatic issues of the PD process set a very strong guideline for the team: each member had to become involved in the knowledge domain of the others. This involvement entailed the design of activities to learn *calado* techniques, the design of patterns, as well as basic concepts of electronics. Sabiescu and

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[2] *Calado* is made by removing threads from a fabric with warp and woof and then embroidering the fabric again with new threads, typically of the same color as the original fabric.

Memarovic [5] outline the potential challenges facing PD processes, some of which our team encountered: a knowledge gap between participants, renegotiation of design methods and reformulation of design goals, as well as the challenge of defining common boundaries for all of the research team and enabling the *caladoras* community to become conscious of their role as peer participants in the research. Coping with these challenges implied reconfiguring our ideas about the design of technology, because of the many heterogeneous actors identified in the process who played a dual role, both as potential users and as designers of the technology. Configuring the project to give responsibility to users was important in order to make sure that the designed technology would have a real impact and would lead to new ways of conceiving the practices both of making embroideries and of designing technology [6]. As a result of this configuration, three strongly articulated processes were established in order to achieve a successful PD: self- and mutual recognition, dialogue and representation.

- *Self- and mutual recognition*. This indicates the process whereby each member of the team reflects on and comprehends who s/he is and what s/he does, and who each other member of the community is and does; this leads to the realization of what can be done as a single community.
- *Dialogue*. Within the team, participants in each knowledge area have their own codes with which to represent what they do and know, and to communicate effectively with their peers; for example, software modeling languages in the developers' community. Dialogue in a PD process, however, should allow each member to communicate ideas in a common language for all the team, and then find convergence points where all of the participants have the same core understanding.
- *Representation*. This process is possible when the participants are able to suggest and discuss design ideas because they have a sufficient interpretation of the others' and their own knowledge. It implies wishing and giving form to ideas as tangible objects that reflect diverse opinions, and are relevant and useful for the communities involved. It also means finding suitable ways to present them to others.

3 Participatory design in practice

In our context, PD was achieved through a methodology that included a series of activities aimed at facilitating self- and mutual recognition, dialogue and representation. These activities allowed the encounter between diverse actors at different moments of the project. In addition, these encounters allowed the co-creation of innovative and culturally representative artifacts.

3.1 Methodology

Methodologically, this project was organized using four iterative, incremental and open-ended milestones to achieve a successful technological design: recognition and

reflection, ideation, prototype and experimentation (Fig. 1). Iterative means that the design process requires more than one cycle of going back and forth, and that there is a connection between milestones. This connection implies that there has to be reflection on all ideas prototyped and experimented, which includes recognizing how the different stakeholders react to prototypes and how this reaction reshapes the research. Incremental in this case does not refer to an incremental artifact, but to an incremental way of better representing the communities involved in the design. It means that the greater the immersion in the project, the easier it is for ideas to become culturally relevant artifacts. The step between one cycle and the next occurs when the design sees a significant change: an addition or removal of previous ideas; or the outcome that some ideas are justifiably swept out of the boundaries of the project, or new ideas are swept in [7]. Ideas swept out of the project boundaries may become counter-examples, helping to recognize issues within the communities or the technology itself. Finally, aiming for open-ended milestones considers that results are not just finished artifacts but an empowerment of the community, which eases the appropriation of the designed technologies and the local development of new sustainable social technology. Empowerment and appropriation lead to a process of continuous design while the artifacts are being used [8].

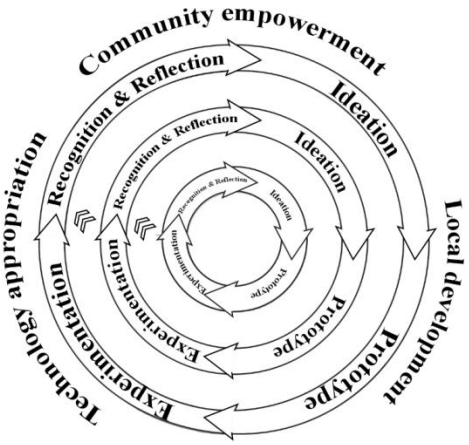

Fig. 1. Methodology followed in participatory design

3.2 Milestones

- *Recognition and reflection* implied continuous active observation and receptive listening, involvement in one another's practices, as well as analysis of related work. This was accomplished through ethnography, hands-on workshops, surveys, meetings and informal chats. Through ethnography, the academic community recognized that in Cartago, *calado* embroidery and design are understood as completely separate forms of knowledge. *Calado* is usually

associated with tradition and commonly used and done by elders, while design is related to young people and innovation. This recognition was the motivation for creating a technology that could bridge the gap between the design and making of *calado*.

- *Ideation* was based on desiring, proposing, discussing and negotiating ways in which technology could be woven into the context. In this case, we travelled through many ideas, from the desire for an artifact in order to smell, taste and listen to embroidery patterns, to more realistic ideas such as representing stitches in a way that would allow users to explore new possibilities with them.
- *Prototype* refers to the act of giving form to ideas. This form is a representation of an idea that allows people in the team to express, communicate, share, manipulate, modify, transform and discuss thoughts [9]. In our project, one of the engineers had the idea that a *calado* stitch could be expressed as a drawing. The resulting prototype was a set of sketches made with different color pencils representing physical constraints of the materials, as well as the form that this stitch would have in an embroidery.
- *Experimentation* indicates the scenario in which prototypes were manipulated by all members of the team. This milestone is mainly focused on sensitizing participants to use their hands to explore, learn and test prototypes, and is thus strongly connected to reflection [3, 4]. In relation to the prototype mentioned above, when embroiderers experimented with the sketches they did not feel motivated to translate them into *calado*. They argued that though they could be embroidered as *calado*, they would not look like it. Reflecting on this, we realized that the novelty in *calado* is not in the design of new stitches, but in the way in which existing ones are combined.

3.3 Activities

The aforementioned milestones are ways of viewing the methodology, not of partitioning it. To illustrate this proposition, below we present some of the main types of activities developed in the project, which served the purposes of more than one milestone in a non-linear way.

- *Hands-on workshops* were spaces where participating communities could interact through the making of some of their practices. They were focused on: *i)* allowing the academic community to recognize some of the processes involved in the design and craft of *calado* in Cartago, *ii)* allowing embroiderers to get in touch with some technological issues that are close to embroidery and distant to automation[3], and *iii)* allowing the complete team to use the prototypes generated during the project. Hands-on workshops involved active dialogue, embodied learning [10] and the manipulation of materials used by the different collectives in their areas of practice (Fig. 2).

[3] Embroiderers were very afraid of technology because it was understood as a way of eliminating the craft through automation.

- *Discussion sessions* were spaces in which to talk about diverse issues surrounding the project. These sessions were aimed at socializing the systematization of the fieldwork, collectively clustering information, brainstorming, organizing incoming work and even telling anecdotes in familiar encounters.
- *External dialogues* were activities where the team had encounters with other people and conducted research outside of the boundaries of the project. They allowed us to know about and connect to related work, to talk to experts in knowledge areas not present in our team, to share the advances of our research and to listen to external opinions.

Fig. 2. E-embroidery workshop: using embroidery and electronic materials like conductive thread, we embroidered a crafted Christmas manger with illumination and interactivity.

3.4 Results

We consider that the process of designing technology in a participatory way constituted a result in itself. Two main achievements support this statement: *i)* embroiderers managed to be less afraid of technology and to think of convergence points between embroidery and technology that are different to automation, and *ii)* technology professionals recognized the potential, complexity and transformative capability of knowledge associated with embroidery.

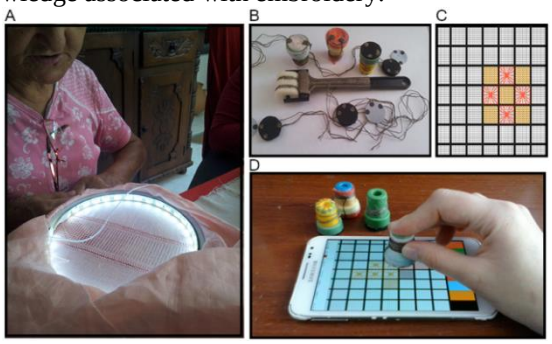

Fig. 3. A. An embroiderer using the lighted embroidery hoop upside down. **B.** Embroidered tangibles with conductive thread used to stamp digital representations of stitches onto a capacitive surface. **C.** A simple *calado* pattern designed with the TUI. **D.** A user stamping a stitch onto a smartphone screen.

Another result are the two technological artifacts that represent us as communities involved in the design. The first is a lighted embroidery hoop designed in recognition of the delicacy required to embroider *calado*, a craft that cannot be done with poor illumination. This artifact represents an innovation in the process of making embroideries in Cartago and has modified -and been modified by- the ongoing practices of embroiderers: to avoid shadows cast by the embroiderers' hands on the fabric, craftswomen started to use the hoop upside down, so having the light on top (Fig. 3A). The second artifact is a Tangible User Interface (TUI) that mediates dialogue between fashion designers and *caladoras* in the process of designing *calado* patterns. This TUI represents our recognition of the need to reduce the aforementioned gap between the design and making of *calado*, and a way of reinforcing and making visible the embroiderers community.

The TUI has two components: digital and physical. The digital one is a computational representation of stitches; its development required an embodied learning of *calado* [4, 10], continuously doing and undoing the labor with our hands, and developing a close relationship with materials from both *calado* and electronic development [3] (Fig. 3C). The physical dimension of the TUI represents our comprehension that a new *calado* pattern emerges from combinations of existing stitches, and not from new ones. In this sense, with the TUI components, a fashion designer can take a tangible stamp to print a representation of a stitch onto the digital representation of the fabric shown on a tablet (Figs. 3C & 3D). The most interesting part is that after many prototypes, the technical solution for tangibles was literally embroidered: we used conductive thread to embroider tags on the stamps, making them recognizable on the capacitive screen using pattern recognition algorithms (Fig. 3B).

4 Reflections and conclusions

Participation was accomplished to the extent that dialogue between the different communities in the research project was achieved. A horizontal dialogue allowed negotiations and tensions to be easily translated into design decisions. Our most significant dialogue was non-verbal and took place mainly in the hands-on workshops. These activities were focused on self- and mutual recognition, and on seeking the participatory creation of representative artifacts. We also realized that the design was incrementally achieved by thinking ideas collectively, giving them a form, experimenting with them and then reflecting on the process.

Actively involving communities facilitates their empowerment, their appropriation of designed artifacts and also makes possible the local development of new sustainable social technology. Giving embroiderers and fashion designers the role of co-designers offered a more realistic interpretation of the way in which technology involves users: through use, artifacts both modify and are modified by ongoing practices [8]. The plurality and heterogeneity within and between the participating communities in our project led us to conclude that PD does not necessarily imply the complete involvement of all actors in every task, all the time. Limited resources, geographical distance and specialized languages make such participation impossible.

Instead, we argue that recognition, dialogue and representation, as presented in our work, are key elements for collectively materializing relevant artifacts as synergies of multiple kinds and forms of knowledge.

We found out that crafts and technology design share a material dimension in which interacting through doing makes possible the creation of representative artifacts. This creation is achieved when each member is involved in the practices of other collectives within the research team, which generates connections between tradition and innovation, enriching craft without replacing the human role. In our project, getting involved in one another's practices enabled engineers to be more reflective about the complexity of the knowledge in the hands of embroiderers, but also revealed to *caladoras* connections between their knowhow and technology that differed from automation. These results may encourage the replication of the presented process with other craft communities, as a way of bringing innovation into their own processes and products.

5 References

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