International Journal of Design for Social Change, Sustainable Innovation and Entrepreneurship

discern

https://www.designforsocialchange.org/journal/index.php/DISCERN-J

ISSN 2184-6995

Enabling co-creation for social innovation: The Parada do Sol Project

Juliana Bittencourt[a], Luzia Menegotto Frick de Moura[b], Ana Berger[c], Pedro Boeckel Mendes[d]

Published online: October 2021

To cite this article:
Bittencourt, J., Moura, L. M. F. de, Berger, A., & Mendes, P.B. (2021). Enabling co-creation for social innovation: the Parada do Sol Project. Discern: International Journal of Design for Social Change, Sustainable Innovation and Entrepreneurship, 2(2), 64-78.

Enabling co-creation for social innovation: the Parada do Sol Project

Juliana Bittencourt[a], Luzia Menegotto Frick de Moura[b], Ana Berger[c,] Pedro Boeckel Mendes[d]

[a]Pontifícia Universidade Católica do Rio Grande do Sul, Brazil. juliana.bittencourt@pucrs.br
[b]Pontifícia Universidade Católica do Rio Grande do Sul, Brazil. luzia.moura@edu.pucrs.br
[c]Pontifícia Universidade Católica do Rio Grande do Sul, Brazil. ana.berger@pucrs.br
[d]Pontifícia Universidade Católica do Rio Grande do Sul, Brazil. pedro.boeckel@pucrs.br

Abstract

This article describes a social innovation project coordinated by the Tecnopuc Creativity Laboratory (Crialab) from the Pontifical Catholic University of Rio Grande do Sul (PUCRS) that impacted Morro da Cruz, a neighbourhood in the peripheral region of the city of Porto Alegre, capital of the state of Rio Grande do Sul in southern Brazil. The main objective of the project was to positively impact the environment and the residents of the neighbourhood in question, which led to the development of a technological installation using renewable energy. The method combined the stages of the process for social innovation (Murray et al., 2010) with Tecnopuc Crialab's authorial user-centred exploratory research approach. Using the quadruple helix model for innovation as a framework, a group of diverse stakeholders was involved. The execution of the project followed a participatory process based on co-creation, which is one of the important characteristics of designing for social innovation. The participatory aspect was fundamental to creating an outcome capable of impacting and bringing real benefits to the territory and its community. In addition to the development of a technological installation, the project had a significant impact on the lives of young people, as an opportunity to train and educate the young participants was identified, providing practical learning opportunities that amplified the results and assured the project's continuity. This article reports the Parada do Sol as a case study, the results of which show the relevance of involving stakeholders in a participatory design process to create an innovative solution.

Keywords: Social Innovation, Co-creation, Participatory process

Introduction

Based on the concept of social innovation (SI) as a means of transforming reality, responding to the unmet needs of a group, usually in a socially vulnerable situation, and giving new meaning to processes and flows of authority to generate value for people impacted by innovations (Sinclair & Baglioni, 2014), the goal of the Parada do Sol Project was to positively impact the environment and the residents of the neighbourhood in question. By relying on partnerships and inputs from multiple stakeholders while adhering to co-creative design methods, it led to the development of a technological installation using renewable energy.

Historically, peripheral urban regions are spaces seldom covered by formal innovation initiatives, which are usually launched in central regions, thus contributing to strengthening a sense of segregation between social strata. The project's hypothesis was that a technological installation could transform the neighbourhood environment. For that, the residents' participation in the definitions regarding the solution was fundamental. Innovative and technological initiatives are usually conceived and implemented in top-down procedures, in which external and outsider stakeholders assume what should be done in a specific territory. Therefore, the project method and its participatory co-creative approach, which put residents in the spotlight, became very important.

The project's methodology was drawn from references that, amongst other characteristics, put forth three premises: user-centricity, experimentation and co-creation. Co-creation is also an important feature of design for SI (Cipolla, 2017), as involving users in the process of creating a product results in a much more relevant and innovative solution, built through the diversity of views and the real needs of users. Furthermore, for young people, participating in a project such as the Parada do Sol Project can influence their choices for the future. Most young people born to poor families grow up in an environment that reinforces this situation and tend to follow the same path as their parents (Lareau, 2014). When coming into contact with new incentive structures they envision new possibilities and can be inspired to choose a path not previously imagined.

The Parada do Sol project was characterized by environmental sustainability, since its outcome was related to renewable energy by 1) educational activities which arose from its implementation through training opportunities for young people in the community, 2) the understanding that all people have a right to obtain relevant knowledge for their personal growth and, finally, 3) the notion that SI should contribute to social-environmental issues. Thus, the Parada do Sol project is aligned with two UN Sustainable Development Goals (SDGs): the promotion of clean and accessible energy (SDG 7) and quality education (SDG 4).

In addition to the direct involvement of community representatives from Morro da Cruz, several stakeholders interacted over a period of two years, inspired by the quadruple helix model (Carayannis and Campbell, 2009), an internationally recognized model for innovation, in which the relationship between the university, business, government and organized civil society is considered. One of the goals of this model is social development. It acknowledges that it is of great importance to bring society and its cultural aspects into the process of innovation and construction (Galvão et al., 2017).

Since the 1990s, the application of the body of knowledge of design and its method has been extended to projects focused on social and environmental problems (Oliveira & Curtis, 2018). SI is inherently multidisciplinary, and the design contribution is of high relevance due to its people-centred and co-creative methods and mindset. This paper aims to discuss the contributions of a design-based method in SI projects. The Parada do Sol case study is presented below as a way to demonstrate aspects of co-creation, SI, multidisciplinarity and user-centricity. Initially, the theoretical framework that guided the work is presented. Afterwards, the method and the achieved results are reported, followed by a brief discussion.

Design for social innovation

A fundamental starting point to situate this case study is to understand the concept of SI. SI has three features: 1) the content/product, which is generally oriented towards unmet needs; 2) the process, which transforms social relationships so that the logic of the process is changed, bringing greater social participation and hierarchical change and 3) the empowerment of the people involved, strengthening social assets and relationships (Sinclair & Baglioni, 2014). Therefore, SI projects need to have a practical impact and generate value for the people affected by the promoted change. SI is a collective and creative process that happens in partnership with users, non-users, social movements and organizations (João-Roland & Granados, 2020). One aspect to be observed in projects that use a design approach for SI is that design must be adapted to reflect participation and co-creation, avoiding superficial approaches or just being a discourse that does not reflect practice (Hillgren et al., 2011).

According to Manzini (2014), design and SI have an affinity. While SI creatively recombines existing processes and things leading to change, design has the characteristics of creating processes and developing

solutions to existing problems. There has been an increasing recognition of users as potential sources of value and as innovators in innovation processes (von Hippel, 2005). Thus, SI seeks to solve social problems by working together with society, and it is complemented by design as a discipline to create projects and solutions focused on people. In this process, there are top-down projects, in which the solution has a large impact on social transformation but lacks in co-participation; bottom-up projects, which are usually initiated by local groups and that result in a more specific or territorialized solution; and hybrid projects, in which there is a mixture of these two modalities (Manzini, 2014). What differentiates hybrid projects is that they can start with a territorial focus (bottom-up) and be replicated based on top-down decisions.

Within the different applications of design within SI projects, its particularities stand out when working in a specific geographic territory, such as a neighbourhood or a small town. Some important aspects are: 1) valuing products and processes from the territory; 2) promoting the political and aesthetic potential of the territory; 3) dealing with convergences and divergences in the environment; and 4) creating spaces for experimentation (Krucken, 2017).

In this scope, the designer needs to connect with the people from the territory and its context to be able to propose a solution that will have greater chances of sustainability and continuity. Moreover, their work should respect local traditions or the "cultural heritage, that is the practices, representations, knowledge and techniques, associated with the instruments, objects, artifacts and places recognized by local inhabitants as part of their culture" (Krucken, 2017, p. 328). Thus, SI is achieved by respecting the territory's particularities.

Another important concept is user-centred design, as SI projects focus on people and the resolution of social problems, believing that the problems are solvable. According to IDEO (2015), "[…] human-centred design offers problem solvers of any stripe the chance to design with communities, to deeply understand the people they're looking to serve, to dream up scores of ideas, and to create innovative new solutions rooted in people's current needs" (p. 9). In user-centred design, one method used is co-creation, which despite being a concept still under debate, is understood in this article as a process of creation in collaboration with the end-user (Schuch & Hoffmann, 2021).

Articulating stakeholders for innovation

In design for SI, it is important to understand and strengthen the interaction between different actors who are somehow involved in the processes (Cipolla, 2017). The quadruple helix is the model that best represents the interaction between actors that occurred in the presented case study, as it indicates an evolution in innovation ecosystems, a respect for social and environmental issues, mainly by acknowledging society's role and interests (Galvão et al., 2017). Figure 1 shows the correlation of the actors involved in the quadruple helix.

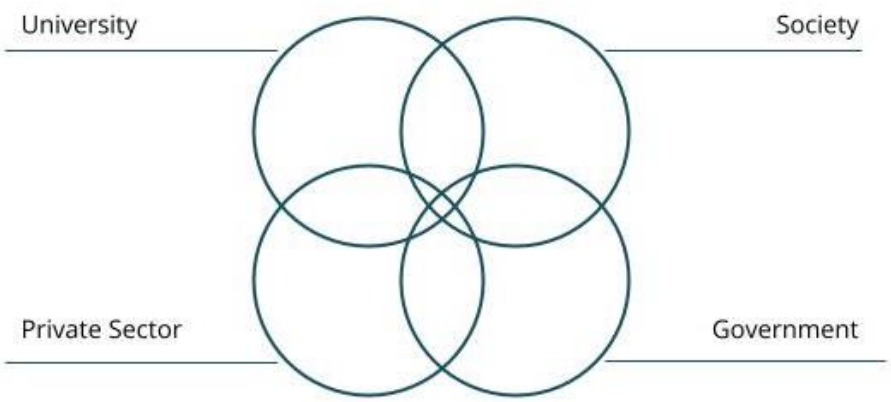


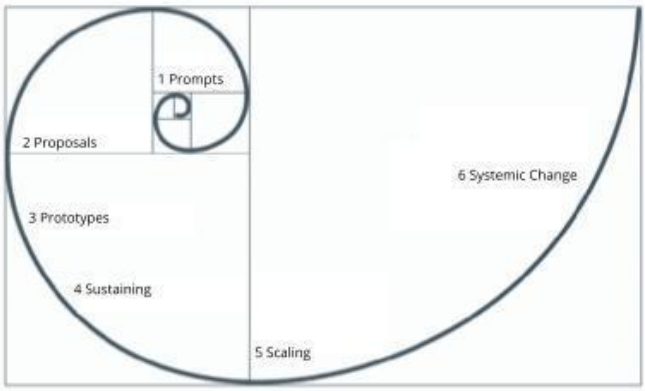
Figure 1: Quadruple helix model (adapted by the authors).

In projects focused on specific territories, it is important to take into consideration the interactions between the different stakeholders involved, since these interactions might alter during the project, creating new dynamics in their relationships. Thus, it is possible to sum up the aspects that Manzini (2014) highlighted about hybrid projects in design for SI, as they can start with a territorial focus and be replicated with their widespread performance from top-level decisions. In the context of the case study, it is possible to situate Tecnopuc CriaLab as responsible for managing the co-creation approach and the diverse stakeholders involved in a user-centred hybrid project modality, due to its ability to connect university, business, society and government. The top-down perspective relates mostly to the definition and application of the method used and to the management of the stakeholders involved. The bottom-up perspective relates mostly to the community leader, who envisioned the opportunity to contribute to the development of the territory and reached out to Tecnopuc Crialab for help.

The social innovation process

In general, SI methods foresee community engagement, stakeholder articulation and co-creation. Based on the understanding that innovation is not a matter of luck nor is it restricted to brilliant individuals but that it can and should be shared and managed, the 'Open Book of Social Innovation' (Murray et al., 2010) provides a description of the process for social innovation (PSI) which was elaborated on based on various methods and tools for SI used around the world and in different sectors. Aligned with Manzini's (2014) concept of the hybrid project modality, the Parada do Sol Project highlighted that most social changes do not happen as a result of just one direction, that is, they do not result only from bottom-up or top-down interactions, but they involve the relationship in both directions, bringing together individuals who bring ideas and energy and large organizations with the power to develop and scale ideas. In this sense, Tecnopuc Crialab's work as a manager in a hybrid SI project indicates that design can fulfil this role by bringing multidisciplinarity, inclusion and social impact towards a cohesive, measurable and applicable result.

The PSI (Murray et al., 2010) comprises six stages to promote social impact, from the conception of the idea to systemic change. The stages are visually represented in a spiral that indicates magnification, shown in the graph below (Fig. 2). Importantly, this process does not necessarily need to follow the spiral sequence, and the stages can even overlap. The six stages are described in the illustration below.



1 Prompts - Commands, inspirations and diagnostics: The first stage concerns problem identification. It is understood that the best solution is found when the real problem is identified.

2 Proposals - Proposals and ideas: Once the right problem is found, a focused effort must be made to stimulate the generation of ideas. So the second stage aims at generating ideas.

3 Prototypes - Prototyping and pilots: An idea is rarely born fully ready, it molds itself as it is tested. Therefore, at this stage, prototypes and pilots are used, which are ways to quickly test an idea.

4 Sustaining - Support: The fourth stage aimed at improving the ideas that have gone through the pilot, considering their economic feasibility. Mappings and definitions are made regarding costs, revenues and actions necessary to take the innovation forward.

5 Scaling - Scale and diffusion: One interest of the social economy is to share innovations to promote change around social missions. In the fifth stage the goal is to scale the idea to spread the innovation.

6 Systemic change: The sixth and last stage represents the main goal of a social innovation: promoting change. It involves long and complex processes for change in different spheres (public, private, economic) and requires the adoption of new ways of thinking.

Figure 2: The PSI (Murray et al., 2010 - CC BY-NC-SA 3.0).

Combining methods in the Parada do Sol Project

Combined with the PSI by Murray et al. (2010), the user-centred exploratory research method (UCER), developed and tested by Tecnopuc Crialab, was partially applied in the Parada do Sol Project. This method is "directed – but not restricted – to the initial steps of a process of development of a technological product and/or service, from the perspective of user-centred design" (Szabluk et al., 2019, p. 4). A unique aspect of this method is the use of low-resolution prototyping (which uses simple materials such as cardboard, pens and adhesive tape) to build the first prototype of a product with low cost and reduced time. This type of prototyping contributes to creating and analyzing a first experience with the product or service, allowing the evaluation of the product ideation, in addition to facilitating changes and alterations to the project, without causing great financial expense (Szabluk et al., 2019). Figure 3 is the visual representation of the method and its four phases: Context, Plan, Action and Analysis.

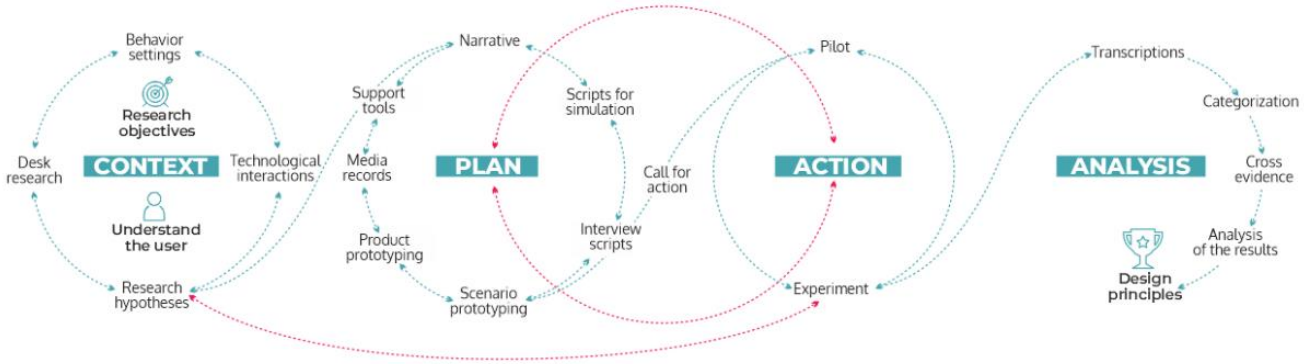


Figure 3: User-centred exploratory research method.
Reprinted with permission from Szabluk et al. (2019).

The Context phase seeks to define the main objectives of the research, in addition to understanding the end-user through different tools. In this method, the user's understanding is fundamental for defining the hypotheses that will guide the next steps. The Plan phase consists of prototyping the scenario and the product or service that will be tested in the next phase. To guide this construction, a narrative of the user's

interaction with the product/service is made and a script for the research is formulated, considering the hypotheses raised in the previous phase. In the Action phase, users are prompted to test the product or service that was prototyped. The test is characterized by analyzing the user's complete experience from their arrival on the scene to their interaction with the product or service under research. Finally, the Analysis phase is dedicated to analyzing the data collected in the testing experience and compiling the results in the form of design principles that will define the development of the desired solution.

Although the method presents the phases sequentially and foresees actions that fit from the beginning to the end of the process, the authors highlight that "the method has an iterative character and each step can be revisited, whenever necessary" (Szabluk et al., 2019, p. 5). A relevant feature of the method is the intentional and well-planned interaction with the user. It highlights the importance of removing the designer from the role of sole responsibility in the creation process and shows the relevance of co-creating with users.

In the following section, we explain how the Parada do Sol project was developed by combining the SI process and the UCER. The case study is described, pointing out its main results along with the method and theoretical framework used and the researchers' perceptions.

Case Study: The Parada do Sol Project

Initially without a specific name, the Parada do Sol Project was born from the will of a community leader from Morro da Cruz to impact the community. This community stands in the São José neighbourhood located in the peripheral region of Porto Alegre. The neighbourhood has more than 30,000 inhabitants (Observatório POA, 2010), with heterogeneous characteristics in its socioeconomic constitution, but hosts mostly a low-income population and people in a socially vulnerable situation. Worried about the environmental issues caused by the lack of education in this community, the community leader thought the neighbourhood could benefit from getting closer to knowledge and innovation generation. He approached the closest university (PUCRS) and its Science and Technology Park (Tecnopuc) to get help to conceive an installation related to renewable energy that could make a positive impact on the community and its territory. Tecnopuc mobilized its creativity and design laboratory (the aforementioned Tecnopuc Crialab) to participate in this initiative.

Benefiting from an ecosystem that comprises over 180 companies of several sizes and 7 schools with an academic body of over 3000 professors and researchers, Tecnopuc Crialab started its involvement by mapping the actors whose activities were related to the topic of renewable energy. Thus, the first companies and startups were mobilized to participate in the project. Also, based on its regular practice of the user-centred design process, Tecnopuc Crialab proposed that young people from the community be invited to participate in the project. It was up to the community leader to invite young people between 16 and 25 years old who live in the community to be part of the workgroup.

The process was oriented to the co-creation approach and bottom-up modality to capture the community's needs and wishes. Seeking to make the presence of these young people viable during the project, a grant was provided for the duration of the project, sponsored by one of the companies involved. In addition, lessons about basic electricity, photovoltaic installation and curriculum development sought to expand the participants' skills. This later proved to result in a feeling of belonging to the project amongst the young participants, according to feedback sessions with the participants.

Therefore, an ecosystem for creating the means for SI was articulated. Using the quadruple helix model, Tecnopuc Crialab mapped the stakeholders that were involved in the project (Fig. 4). The 'University' dimension was represented by PUCRS Science and Technology Park (Tecnopuc) as host of the project, by the University career office (PUCRS) as the support for curriculum development and by the Tecnopuc Crialab, the laboratory whose team was responsible for coordinating the execution of the project, mobilizing the necessary actors and conducting the co-creation process with everyone involved.

The representatives from the 'Society' dimension of the model were the community leader, the project participants and the Morro da Cruz community. The community leader recruited and organized the participants, and the community got involved in the in situ co-creation activities. Regarding the 'Private Sector' dimension, the representatives were Clube Watt (a startup that develops photovoltaic panels), Sevenia (a company that sells renewable energy solutions), NaE (an architecture firm) and Metalco (an urban furniture manufacturer). The startup, Clube Watt, was responsible for filming and photographing the activities, and the Sevenia company financed the grants and provided lessons on basic electricity and photovoltaic installation. NaE and Metalco were responsible for generating technical drawings and for building the structure that was the project outcome. As representatives of the 'Government' dimension, the Public Transport and Circulation Company (EPTC) and City Hall were contacted to ensure public authorization and licences for the implementation of the project.

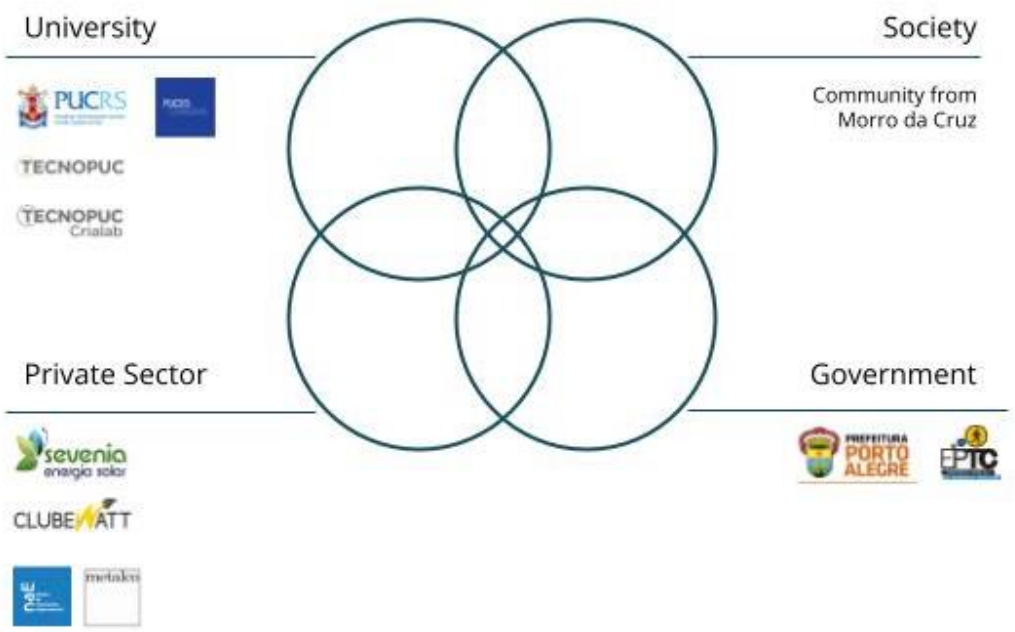


Figure 4: Stakeholders of the Parada do Sol Project.

From the initial objective of impacting Morro da Cruz's community with a technological installation, specific goals were drawn and the method was established. With the guidance of Tecnopuc Crialab's team, the group found an opportunity to work on a co-creation process to identify relevant possibilities to benefit the community through the use of this renewable energy. As a project preamble, a series of meetings took place at the Tecnopuc and the community centre at Morro da Cruz. All stakeholders were involved in some or all the meetings, according to the method used and its activities.

Since the project arose from the preconceived idea ‘to impact Morro da Cruz with a technological installation’, the stages of identifying problems came together with the effort to think how this idea would be. Therefore, regarding the method used in the Parada do Sol Project, stages 1 (Commands, inspirations and diagnostics) and 2 (Proposals and ideas) of the PSI were developed concurrently.

The stage 1 activities were aimed at group formation, visiting and exploring the territory in field visits to know the habits of the Morro da Cruz community and identifying problems that could be minimized or needs that could be addressed with a technological installation using renewable energy - a suggestion from the community leader motivated by observing the lack of public lighting in the area. During field visits to Morro da Cruz, user-centred research techniques were used, such as interviews, observations and field notes. As a result of this stage, it was highlighted that the young identified the area near the community centre as the place the installation would be made, since it is a central area of the neighbourhood where the community and external people meet and also the definition of using solar panels as a visual way of instigating people about the theme of sustainability and renewable energy. It was important to have representatives of the community (the young) in the field exploration to gain the community’s trust. Also, the representatives of the university and the companies could not think about the problems of the community with the same gaze as those who live there.

Young participants visited the sites of the startup and the companies who partnered in the project to learn about their work and meet the professionals. Due to the basic level of education of the young participants, the companies got together to offer ways to help them gain knowledge about renewable energy and the realities of the labour market in the technology sector. Those initiatives are described below.

Figure 5: Exploratory field visits at Morro da Cruz and the place defined for the installation.

At stage 2, activities aimed at identifying the best place to make the installation and generating ideas in co-creation sessions were undertaken. Brainstorming techniques were used in a co-creation session between the community participants and the representatives of the companies and the university involved. From the narrative and previous experiences of the community, it was defined that the best place for the installation of the technological installation would be the bus stop near the community centre (Fig. 5). Besides generating ideas and designing the installation format in more detail, during co-creation sessions the community named the project. Parada do Sol is a play on words in Portuguese that means ‘sun stop’.

The group then brainstormed about its inherent problems and how electricity generated by the solar panels could help. The problems identified were the lack of public lighting (which resulted in insecurity for the population), the small shelter available for the number of people who wait for buses daily and the lack of entertainment possibilities since people spend a lot of time at the bus stop. Ideas like having cell phone chargers, plants and seating could improve the space. Each participant drew how they envisioned the

installation and presented their idea. Then, combining ideas and converging them into a single concept, the ideal model of the bus stop was defined (Fig. 6).

Figure 6: Co-creation sessions and conceptual drawings of the installation.

The stage 3 activities concentrated on conceiving and making the group ideas tangible. Tecnopuc Crialab's team (the university representatives) saw the opportunity of using the UCER method, concentrating on the 'Plan' and 'Action' phases, as highlighted in Figure 7.

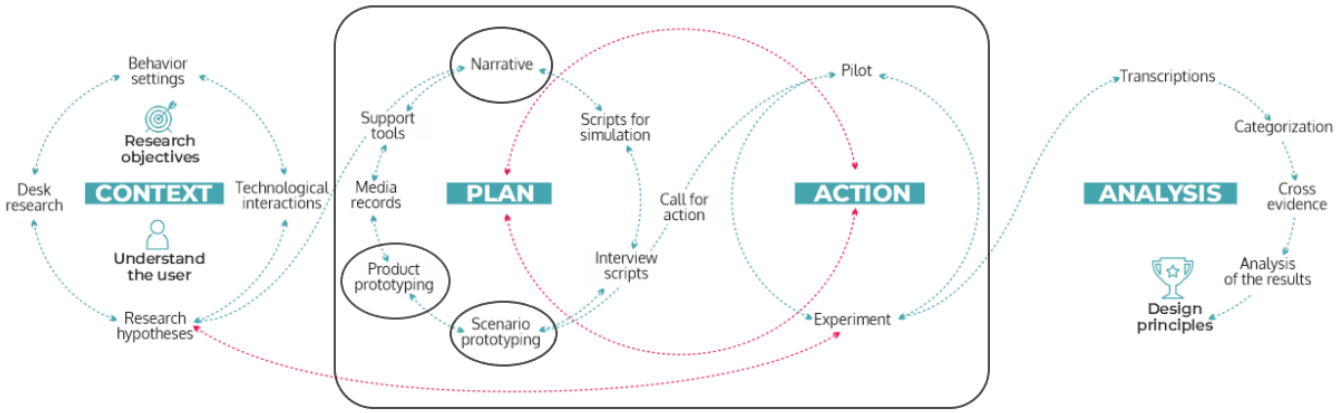


Figure 7: Diagram of the UCER method adapted to the PSI.
Adapted with permission from Szabluk et al. (2019).

In a field visit, the location where the installation developed by the participants of the project would be implemented was studied in detail. Therefore, new co-creation sessions at the University premises were facilitated to prototype the ideal installation. Once again, the young representatives of the community and the representatives of the companies and the university worked together prototyping in a reflection-in-action process (Goldsmith, 1991). From that, a true scale prototype was built. This approach to prototyping allowed the group to keep reflecting on the users' needs (in the Parada do Sol Project, the users were the community itself) which meets one of the characteristics of the method, that is "constant interactions throughout its application" (Szabluk et al., 2019, p. 7).

Following the proposed UCER method combined with the PSI, the technique used was low-resolution prototyping: the installation model was built using cardboard, brown paper, adhesive tape, crepe paper, pens and other simple materials available on site.

Figure 8: Co-creative prototyping process.

At Stage 4, the stage the project is currently on, the results of the co-creation sessions and prototype were turned into a technical project, led by one of the companies participating in the project. During this stage, the young participants from Morro da Cruz were not as involved as in previous stages, due to the technical aspect of the activity. Until this stage, the participants attended six different training courses given by one of the companies involved in the project, in which the following topics were taught: Basic Electricity, Basic Photovoltaic Project and Installation and Maintenance of Photovoltaic Systems. The training took place in different locations at the university campus, providing opportunities for young people to have contact with the university's undergraduate environment. At the end of the training, a workshop conducted by PUCRS Careers (an area of the university that provides career development orientation) provided guidelines for the development of a curriculum and information about the current labour market.

Figure 9: Training courses in basic electricity, photovoltaic projects and installation and maintenance of photovoltaic systems at the University's premises.

Still at stage 4 and in preparation for stage 5, a retrospective dynamic session was held with all participants to consolidate group learning. This discussed issues about the project, seeking to understand how participants felt during the process, positive and negative points they identified and what could be improved in the next effort. Regarding the positive points, the young participants from Morro da Cruz mentioned that they were grateful for the opportunity of knowing the innovation ecosystem of the nearest university to their home and that they felt like they had learned a lot about topics their regular school does not cover. They were also enthusiastic about the prototype they built. Regarding negative points, they mentioned feeling frustrated with the time it will take to build and install the bus stop they designed and that they wished the project was better communicated to society to inspire other initiatives. The will to keep in touch with the stakeholders involved was also highlighted to find new project opportunities.

The results of the Parada do Sol Project until stage 4 and the preparation for stage 5 of the process were presented to the Morro da Cruz community in a traditional Christmas event in December 2020. The young

participants received certificates for the training they had attended, and a video about the project was shown to the community. The Tecnopuc Crialab team is currently in touch and working with the companies who are manufacturing the co-created solution. This aroused in the community high expectations of what could result in their neighbourhood from this project. In the next section of this paper, considerations regarding the method used and the main results achieved so far in the Parada do Sol Project are discussed.

Discussion

This article presented a case study that used the process of social innovation (Murray, 2010) as a methodological framework. From the standpoint of co-creation, the quadruple helix (Carayannis and Campbell, 2009; Galvão et al., 2017) helped to understand stakeholder involvement. The steps of the UCER method (Szabluk et al., 2019) were indicated as a guide in specific stages of the process, specifically the prompts, proposals and prototype stages. In this process, co-creation was facilitated and its method was proposed by a design team. It was important to have people trained in design to manage the process, the information and the people involved. The facilitation was important not only in the prototyping sessions but also in the field visits and ideations. The user-centredness mindset of the designer was important to ensure that the community perspective was always in focus during the process, despite other stakeholders' interests.

Co-creation had an important impact on the stakeholders involved. In relation to the community members involved in the project, treating them as co-designers is a way to promote the culture of innovation (Eckhardt et al., 2021), and it also generates a sense of belonging when they are involved in the process of developing solutions in tandem with organizations (academic, private sector and governmental). The community valued having other actors involved in creating something to impact their territory, and the con-creation sessions led to greater integration between the participants. Therefore, it is possible to highlight the design and its inherent multidisciplinary, horizontal and co-creative approach as a locus for merging and managing different methods and tools to drive purpose and push through difficulties, encircling expectations and desires to generate measurable, positive outcomes.

A real-scale prototype of the bus stop was rapidly developed using the exploratory method of user-centred research. The approach used differs from existing ones due to the low-fidelity experience prototyping procedure and the hybrid modality adopted to convey and engage the multiple actors of the quadruple helix involved in the project. The build of a real scale low-fidelity prototype of the intervention helped participants to perceive the outcome of the co-creative process and also to visualize how their idea could impact their territory. The prototype also brought tangibility to the process the community had gone through along with the other stakeholders who were already more familiar with innovation and product development processes.

From an external person's standpoint, a simple bus stop might not be the choice to start a process of SI, but it emerged as a point of reference for the community, where every day many people meet and stop by to go to work, featuring a space of the territory's identity. This highlights the importance of respecting the cultural heritage of each location (Krucken, 2017). This was possible because by bringing the standpoint of the members of the community into the spotlight, it was possible to capture problems, wishes and needs specific to their neighbourhood and the idiosyncratic interactions that happen within it. These grievances might be addressed in future projects complementary to Parada do Sol, eventually resulting in a virtuous circle of spontaneous improvements in the environment.

The government acknowledged the need for improvements in the public security of the area and accompanied and authorized the work to be done. The university and its science and technology park acted with the articulation of the actors and conducted the co-creation sessions, mobilizing knowledge and human resources to spread innovation beyond its campus. The project's young participants and the community actively participated in efforts to understand their own needs as a community and generate alternatives to overcome difficulties. The Parada do Sol Project is in stage 4 of the PSI, and stakeholders are currently fundraising for the construction and installation of the bus stop.

An unexpected outcome of the project was the relevance given by the young participants to the training and certificates that they were awarded. In the reality in which they live, education usually presents itself as something distant and difficult (Lareau, 2014). Reaching a peripheral urban region with innovation initiatives and providing training broke the 'glass ceiling' of a socially and educationally segregated community. These are elements that might be explored in a knowledge-based society, creating a path forward to help discontinue the disbelief in the educational system towards the insertion of skilled people in the labour market. These aspects corroborate the concept of SI, as the young people have experienced another dynamic of education, accessing relevant knowledge and professionals, developing relevant skills and improving their placement in the current labour market. Furthermore, it contributed to objective 4.4 of the SDGs, which is to "substantially increase the number of young people and adults who have relevant skills, including technical and professional skills, for employment, decent work and entrepreneurship" (United Nations, 2021).

Brazil lacks human resources in the information technology labour market due to basic educational gaps. In this sense, the Parada do Sol Project shows a way to insert a socially vulnerable audience into the science, technology, engineering and mathematics (STEM) area, which is so important for a knowledge-based society. Assessing the collaboration between stakeholders based on the quadruple helix model, it was identified that the partnership between universities and companies is extremely relevant for promoting long-term change. The mixing of the academic environment with members of society who do not have access to formal education proved to be a very rich learning experience for the group. However, it is noted that diverse interests from each group of stakeholders could have been better taken into consideration. From the real scale prototype on, the progress of the project was somewhat impaired due to difficulties in the interaction between the companies, the university and government.

These difficulties can be exemplified by the protraction and bureaucracy regarding municipal authorizations for the installation and the deprioritization by the companies of the pro bono project due to labour market demands. Thus, it is possible to say that from the quadruple helix model perspective, mobilizing stakeholders and creating an innovation ecosystem for the project built from the interaction of these actors brings great results, but it faces some difficulties, especially regarding project management, considering the time it takes for each institution involved to conduct its external and internal processes.

It is important to mention the inherent complexity in developing and implementing a project with the characteristics of Parada do Sol. The expectations generated in the participants, especially in the community involved, needed to be carefully managed. People tend to become emotionally involved with the idea or concept they are creating and prototyping and naturally tend to find it hard to understand the slowness of implementation. Another limitation identified relates to the participation and support of the government in medium-term projects such as Parada do Sol. The periodic election and renewal of the government body needs to be considered in the project timeline due to the fragility of combined agreements.

In addition to the practical issues of the Parada do Sol Project, the overlaying of the UCER method to the PSI should also be highlighted. Its main tools are low-resolution prototyping and the use of narratives to elicit opportunities and to run tests with users, which fit the PSI. As indicated, the process's stages 1 and 2 (respectively, Prompts and Proposals), correspond to the 'Context' phase of the UCER method created by Tecnopuc CriaLab, as they are the stages of problem identification, research and raising hypotheses and of generating ideas to solve the identified issue. Stage 3 of the PSI (Prototyping) can be correlated with the 'Plan' and 'Action' phases of the UCER method. Tecnopuc Crialab's method offers the tools of structured low-resolution prototyping and the use of narratives to build an effective and low-cost prototype. The last overlap identified is between stage 4 of the PSI (Sustaining) and the 'Analysis' stage of the UCER method. In both situations, the aim is to identify the feasibility of the created product/process.

The main difference between them is that the PSI foresees in its process the reproduction and expansion of the carried out initiative, while the UCER method does not foresee this step, although it is not an impediment. Thus, the UCER method can support projects focused on SI providing tools and process flows. It was noticed that in the Parada do Sol Project, the diagram of the UCER method was not applied to the research of a product to be marketed but to the elaboration of an artefact in a specific social context, which was conceived through and reflects the needs of a community and the territory in question. This demonstrated its viability in contexts other than a market-oriented one. Also, the young and the community from Morro da Cruz represented the end-users, whose collaboration in the creation of the product/installation was essential. This meets the characteristics of SI projects. Thereby, the viability of applying this method in the design-driven SI field was identified.

It is believed that the project had a positive impact on the participants. It has already transformed the community by the transfer of knowledge it made possible. Even if the solution is not implemented, a spark for a fruitful path has been started, in which the community felt included with the ability to insert themselves in contexts that would not otherwise feel adequate (e.g. the technology area). This way, this case can inspire other initiatives that seek respect for the environment and society, understanding that sustainable development is a reflection of the balance between technology, well-being and respect for differences. As a contribution to the body of knowledge in the area of design, this paper emphasizes the importance of the role of the designer as a facilitator and manager of an SI process, the possibilities and limitations of mobilizing different actors to achieve a design goal (society, government, organizations and the university) and the value of using design methods and techniques with non-designers in the pursuit of relevant innovative solutions.

References

Carayannis, E. G., & Campbell, D. F. J. (2009). Mode 3 and 'quadruple helix': Toward a 21st-century fractal innovation ecosystem. International Journal of Technology Management, 46(3), 201–234.

Cipolla, C. (2017). Design social ou design para a inovação social?: Divergências, convergências e processos de transformação. In A. J. de Oliveira, C. Franzato, C. D. Gaudio (Eds.), Ecovisões projetuais: Pesquisa em design e sustentabilidade no Brasil (pp. 147–154). Blucher.

Eckhardt, J., Kaletka, C., Krüger, D., Maldonado-Mariscal, K., & Schulz, A. C. (2021) Ecosystems of co-creation. Frontiers in Sociology, 6, 1–11. https://doi.org/10.3389/fsoc.2021.642289

Galvão, A., Mascarenhas, C., Rodrigues, R. G., Marques, C. S., & Leal, C. T. (2017) A quadruple helix model of entrepreneurship, innovation and stages of economic development. Review of International Business and Strategy, 27, (2) 261–282. https://doi.org/10.1108/RIBS-01-2017-0003

Goldsmith, G. (1991). The dialectics of sketching. Creativity Research Journal, 4(2), 123–143. https://doi.org/10.1080/10400419109534381

Hillgren, P., Seravalli, A., & Emilson, A. (2011) Prototyping and infrastructuring in design for social innovation. CoDesign, 7(3–4), 169–183. https://doi.org/10.1080/15710882.2011.630474

IDEO.org (2015). The field guide to human-centered design. https://bit.ly/3n0Bn6Q

Instituto Brasileiro de Geografia e Estatística (2018). Síntese de indicadores sociais: uma análise das condições de vida da população brasileira (pp. 49–55). https://biblioteca.ibge.gov.br/visualizacao/livros/liv101629.pdf

João-Roland, I. S. & Granados, M. L. (2020) Social innovation drivers in social enterprises: Systematic review. Journal of Small Business and Enterprise Development, 27(5), 775–795. https://doi.org/10.1108/JSBED-12-2019-0396

Krucken, L. (2017). Ecovisões sobre design e território. In A. J. de Oliveira, C. Franzato, & C. Del Gaudio (orgs.) Ecovisões projetuais - Pesquisa em design e sustentabilidade no Brasil (pp. 327–334). Blucher.

Lareau, A. (2014). Unequal childhoods: Class, race, and family life. In D. B. Grusky, (Ed.), Social stratification: Class, race, and gender in sociological perspective (4th ed., pp. 1689–1705). Routledge.

Manzini, E. (2014). Making things happen: Social innovation and design. Design Issues, 30(1), 57–66. https://doi.org/10.1162/DESI_a_00248

Murray, R., Caulier-Grice, J., & Mulgan, G. (2010). The open book of social innovation. NESTA; Young Foundation. https://youngfoundation.org/wp-content/uploads/2012/10/The-Open-Book-of-Social-Innovationg.pdf

Observatório POA (2010). Bairro São José. https://bit.ly/3jWAxaR

Oliveira, M. V. M., & Curtis, M. C. G. (2018). Por um design mais social: Conceitos introdutórios. Revista D: Design, Educação, Sociedade e Sustentabilidade, Porto Alegre, 10(1), pp. 20–36.

Schuch, E. M., & Hoffmann, M. G. (2021). Co-creation and design thinking: An experience of innovation in public service in a Brazilian municipality. Teoria e Prática em Administração, 12(1), 1–12. https://periodicos.ufpb.br/index.php/tpa/article/view/57191/33401

Sinclair, S., & Baglioni, S. (2014). Social innovation and social policy – Promises and risks. Social Policy & Society 13(3), 469–476. https://doi.org/10.1017/S1474746414000086

Szabluk, D., Berger, A., & Capra, A. (2019). Storytelling and low-resolution prototypes for innovative simulated experiences in user-centered research. Conference Proceedings of the Academy for Design Innovation Management, 2(1), 607–619. https://doi.org/10.33114/adim.2019.07.310

United Nations (2021). Sustainable development goals. https://www.undp.org/sustainable-development-goals

von Hippel, E. (2005). Democratizing innovation. The MIT Press.