



## TECHNOLOGIES FOR INCLUSIVE DEVELOPMENT: CO-PRODUCTION OF TECHNOLOGIES FOR BLINDNESS BASED ON SOCIAL INTERACTION

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### Abstract

The project "Technologies for Inclusive Development: Co-production of Technologies for the Blind Based on Social Interaction" aims to develop a proposal for intervention with the students and professors of the engineering and undergraduate courses of the campus Universidade Federal de Santa Catarina (UFSC), to develop technologies for the blind based on socio-technical interaction. Students, teachers, associates and professionals of the "Associação de Cegos do Vale do Itajaí", develop activities and strategies that result in technologies developed in coproduction. As the first results to be shared, we are coproducing a dress for the choir and golboal team, computer classes and the joint repagination of the institution's thrift store.

**Keywords:** Coproduction. Technologies. Inclusion. Blind.

## TECNOLOGIAS PARA O DESENVOLVIMENTO INCLUSIVO: COPRODUÇÃO DE TECNOLOGIAS PARA CEGOS COM BASE NA INTERAÇÃO SOCIAL

### Resumo

O projeto "Tecnologias para o desenvolvimento inclusivo: coprodução de tecnologias para cegos com base na interação social" objetiva desenvolver com os alunos e professores das engenharias e licenciaturas do campus UFSC/Blumenau, uma proposta de intervenção para o desenvolvimento de tecnologias para cegos pautada na interação sociotécnica. Alunos, professores, associados e profissionais da Associação de Cegos do Vale do Itajaí, desenvolvem atividades e estratégias que resultem em tecnologias desenvolvidas em coprodução. Como primeiros resultados a serem compartilhados, temos a coprodução de uma vestimenta para o coral e para o time de golbol, aulas de informática e a repaginação conjunta do brechó da instituição.

**Palavras-chave:** Coprodução. Tecnologias. Inclusão. Cegos.

## TECNOLOGÍAS PARA EL DESARROLLO INCLUSIVO: COPRODUCCIÓN DE TECNOLOGÍAS PARA CEGOS CON BASE EN LA INTERACCIÓN SOCIAL

### Resumen

El proyecto "Tecnologías para el desarrollo inclusivo: coproducción de tecnologías para ciegos con base en la interacción social" objetiva desarrollar con los alumnos y profesores de las ingenierías y licenciaturas del campus UFSC/Blumenau, una propuesta de intervención para el desarrollo de tecnologías para ciegos pautada en la interacción sociotécnica. Alumnos, profesores, asociados y profesionales de la "Associação de Cegos do Vale do Itajaí", desarrollan actividades y estrategias que resulten en tecnologías desarrolladas en coproducción. Como primeros resultados a ser compartidos, tenemos la coproducción de una vestimenta para el coral y golbol, clases de informática y la repaginación conjunta del brechó de la institución.

**Palabras clave:** Coproducción. Tecnologías. Inclusión. Ciego.



## INTRODUCTION

The extension project "Technologies for Inclusive Development: Co-producing Assistive Technologies for the Blind Based on Social Interaction" aims to develop an intervention proposal for the development of technologies for the blind and people with low vision based on a socio-technical interaction approach. This endeavor is a collaboration among students and professors of the UFSC courses at their Blumenau campus along with the Association of Blind People of the Itajaí Valley (ACEVALI)

Founded on February 28, 1987, ACEVALI is located in the city of Blumenau, and the organization focuses on literacy for the visually impaired through the Braille system as well as the transfer of notions of orientation and mobility. It seeks to assure its members continuity and discoveries of their abilities and potentialities by offering activities such as specialized educational services, computer classes in the *Dos Vox* and *Jaws* system, sports activities, handicrafts, music, psychological accompaniment, tours, commemorative celebrations and social assistance. It is a nonprofit, needy entity that services associates within their needs, inserting them as citizens of rights in the community and motivating them to overcome their limitations of vision and to fight against the prejudice and ignorance of their condition.

*Assistive technology* is a still new term used to identify the full array of resources and services that contribute to providing or enhancing the functional abilities of people with disabilities which thereby promotes independent living and inclusion (BERSCH, 2013). It is also defined as "an area of knowledge, an interdisciplinary feature that encompasses products, resources, methodologies, strategies, practices and services that aim to promote functionality, related to the activity and participation of people with disabilities, disabilities or reduced mobility, aiming at their autonomy, independence, quality of life and social inclusion" (Catálogo Nacional de Produtos de Tecnologia Assistiva, 2018). The subject of assistive technologies was chosen as the object of intervention while taking these definition contexts into account. Furthermore, considerations are also given to the breadth of the their production processes and the involvement of future professionals in areas such as control engineers and automation, textile and materials and mathematics, and chemistry) may have with the community in which the university is embedded.

There are countless assistive technologies that we can find that are aimed at providing or expanding the functional abilities of people with disabilities. However, there is also a great lack of participation of people who will make effective use of these resources or services in the definition of problems and the construction of solutions. This can be views as their *co-production*. Rafael

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Giglio Bueno, in his master's dissertation "Assistive Technology as a public policy: inclusion in the research agenda and coproduction with the user" (1990) defended the greater participation of the user in the development of technologies aimed at people with disabilities. Bueno believed that the initiatives would be much more valid and efficient when the person, who will make use of the product, works together with researchers and developers.

A striking case of the problems generated by the lack of participation of the potential users in the co-production of these artifacts happened in 2014 when some designers of the *Casa de Criadores*, a parade event in São Paulo, decided to develop what they called "fashion for the visually impaired". They started from the assumption that the blind would need to use distinct textures, pockets with embossed details, elastic rather than buttons and different fabrics to distinguish the sides of clothing. According to the "*Movimento Cidade para Todos*", this is a mistaken view, since it belittles the intelligence and the ability of the blind to dress certainly because, once again, they were not consulted when creating this project.

Unfortunately, this is no exception. Many of the engineering projects developed by our students, even though they have a strong vocation for social innovation for inclusion and citizenship, lack interaction with the user powers. When asked about the degree of development interaction with target subjects, the answer is almost always none. The projects are developed, and they emphasize that with the best of intentions there was little or no interaction. Reserved researchers are in their laboratories immersed in the search for solutions to the problems and the development of technologies with little interactive practice. These practices need to be encouraged, and this is the intention of this project.

We aim to make the future professionals trained by the university develop the practice of co-producing their technological artifacts, guided by a sociotechnical interaction approach that involves as many possible agents taking into account: a) the articulation between the different actors in this process as business, the community of the blind and everyone around them, the university, public management and the city at large, b) the effective participation of these subjects for the technologies that will be produced so that they are not left only as final receivers, c) elaboration of technologies that meet the specificities of these subjects in relationship to the city in which they live and with the different activities that students perform, (d) compliance with relevant technical standards and legislation, and e) environmental, accessibility and sustainability issues.

It is possible to improve the lives of these people. However, we must learn to listen and dialogue with them to build solutions collectively. It is this exercise that the academics accomplished in this project while contributing to the formation of the future professional as a

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subject capable of offering solutions and assessing the impact of sociotechnical interventions. In this sense, this article aims to present some results of this socio-technical intervention and discusses some of the actions already begun such as reactivation of computer classes, re-working of coral dress and golbol team as well as repackaging the thrift store.

### **MATERIAL AND METHODS**

The insertion in the field of intervention occurred through two methodologies which are the action research and the methodology of development of projects centered on the user. With regard to action research, it is a method that aggregates several social research techniques with which a collective, participatory and active structure is established at the level of information capture (MOURA and BARBOSA, 2006; THIOLENT, 2011). It is important to highlight the importance of the people's participation in addressing the problem. From the methodology of project development centered on the user, which presupposes that there is the greatest number of possible interactions between designers and users, we highlight its importance when it comes to the case of assistive products. This is because the user presents particular and specific requirements that are often difficult to understand and capture by designers who do not share the same needs (CHELA, 2014).

Through the interviews carried out by the scholarship holders and students in Introduction to Fashion Design, together with the members we identify their main needs and then proceed with the actions indicated. This Association has forty frequent associates, ranging in ages from 40 to 80 who are dedicated to physical activities such as their small gym in the institution in addition to a golbol team. There are handicraft classes in which twenty associates participate. There is a choir with fifteen associated members and a music band called "Coça Coça."

On the coral we were punctuated by the members with the desire to develop a clothing appropriate for the activity because they only had a very simple shirt. In addition, there is a thrift store in the institution considered quite important because it is from him that leaves the greater income for the association. There was still a computer class that was very important for the citizen insertion of these people. However, for more than a year they had no volunteers to teach these classes. Another quite punctuated activity was referring to the uniforms of the teams of golbol, masculine and feminine, very competitive and participant of diverse competitions annually. With these first results of interactive intervention, we started the following actions:

**Reactivation of computer classes:** The academic of the Textile Engineering course and scholarship holder of the PROBOLSAS - UFSC extension program, Larissa Satomi Costa started the computer classes in the association, both teaching, learning to master the system Dos Vox and Jaws. The classes took place throughout the year 2017, on Mondays, from 9am to 10am and from 10:45 to 11:45am, in the computer room of ACEVALI, with at least five students per class.

**Reformulation of the coral uniform:** The objective of this action was to work in an integrated way with the members of ACEVALI while trying to contemplate all the observed demands for the creation of the uniform. In this way, the partnership with the professionals and associates of the institution involved in the project was fundamental to creating a system of relational work, co-production and co-creation. Based on this principle, a set of actions were developed that were developed in the discipline *Introduction to Fashion Design* of the Textile Engineering course, during the year 2017 with scholarship holders Larissa Satomi Costa and Laura Palermo Gomes who were both students of Engineering Textiles. This allowed a successful relationship link between the activities and the knowledge built during the semester.

Throughout the development of the present action, we sought to create products with differentiated added value by using the principles of Universal Design and co-creation which was capable of attending functionality, combining comfort with aesthetics, provoking a more sensitive look and trying to understand the public- target, you're day to day, your body, your needs and your desires. The students designed the collection. After their studies, theoretical foundation and analysis of the life and work of a Brazilian artist, they chose the models to be made. From this perspective, the project was inspired by the work "Bailarina" by visual artist Antônio da Silva (2016).

The cloth was chosen considering the desires of the members and participants of the choir. They wanted their uniforms to be primarily blue in color (the logo color of the institution), made of fabrics that did not knead or easily stain and were easy to wear. The design and the pieces were presented to the research subjects. They selected, among all, two models of uniforms: one in the format of scholarship and the other in the format of poncho. The first had sleeves and reminisced about the model of scholarships used in presentations of corals and graduations. The second featured a more extensive and unique sleeveless model remembering the shape of a poncho. Some changes were made until the presentation of the final project. The models were adapted following the guidelines given by the members: blue uniform (color of the logo of the institution), simple modeling, wide, easy to wear and fit well in different bodies, unisex, length of the scholarship should be up to the knee and opening only on the sides. The logos of the institutions were embroidered and transcribed in braille with raised reliefs.

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**Golbol uniform reworking:** The objective of this action is to serve a group of visually impaired participants of the Golbol team (male and female) regarding their uniform so that it will more effectively meet the performance of the athletes in this sport. Thus, working directly with the athletes, a group of students created a set of actions that were developed in the discipline Introduction to Fashion Design, of the Textile Engineering course, during the year 2017. This allowed them to understand the relationship between the activities and the knowledge acquired during the semester. By interacting with these athletes, the students collected data in the field from participant observation and interviews and identified the main demands of the group that were listed, in synthesis, as the following: (1) absence of thermal and ergonomic comfort, and (2) the poor quality of the uniform as a whole. From these data, they aimed to propose uniform models that led to improvements in athletes' performance from modifications and adaptations. Finally, they developed a collection that answered the questions indicated by the athletes. In addition, they took as inspiration the carioca visual artist Marcelo Cunha, who paints pictures with his mouth and feet. They chose the work "The Fisherman," and from it they expressed the color chart. The development of the collection took into account all the technical norms of the sport. The project was only focused on the design of the parts, technical drawing and technical data sheets, for the time being.

With the reconfiguration of the thrift store, the objective of this action was to improve the facilities of the thrift store with the perspective of increasing the profits of the association. Also, another objective was to improve the accessibility conditions for people with disabilities since the great majority of the members buy their clothing in the thrift store, given the difficulties they face to buy clothes and footwear in the conventional trade. Based on this principle, a set of actions were developed in the course Introducing the Fashion Design (from the Textile Engineering course during the year 2017), which allowed the relationship between the activities and the knowledge constructed during the course. Two groups of students were evaluated, together with the members, in terms of the thrift store's structural conditions in addition to assessing the existing clothing and accessibility of the disabled persons. These evaluations took place in order to begin a social network campaign and the UFSC donation of new parts. For the customization of parts, there was a complete organization of the thrift store by categories with consideration of accessibility issues for disabled people. Reconfiguration of the loophole environment. Dissemination in social networks of the best pieces available to increase demand and sales. We emphasize that the work done by the students, scholars, professors and associates was not just to reorganize spaces and pieces of clothing. The efforts but also did entail creating a collection for the thrift store together with the associates. In this way, two groups developed

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customized pieces inspired by works by Brazilian artists, and the notion of assistivity, thus creating a differential in these pieces.

### **ANALYSIS AND RESULTS**

We still have several actions to complete in this project which will be extended throughout 2018. Fortunately, we were covered by the PROBOLSAS 2017/2018 announcement with two exchanges which strengthened the continuity of the actions with ACEVALI.

The results, for the most part, are more positive than negative. First, it was possible to reactivate the Association's computer classes. This includes more than ten associates, who are part of the digital world and are learning how to master that use the Dos Vox and Jaws system. Additionally, new uniforms for the Coral were developed thanks to the partnership with the company "Imperial Assessoria Empresarial Ltda" which accepted sponsoring and making the ACEVALI choir uniforms according to the model chosen by the members. Thirty pieces were produced in different sizes to better meet the different heights of the associates, and this exceeded our expectations. On September 16, the ACEVALI choir performed for the first time with the new uniforms at the event "September White of Inclusion 2017: affirmative actions for the inclusion of people with disabilities", an activity promoted by Blumenau city, SEMUDES, SENAC, SESI and UFSC. After this debut, the choir has performed several times, with a presentable dress, as they report, has been prominent in the region, including increasing the cash in the association, by charging a fee.

With the reformulation of the Golbol uniform, we now have a men's and women's collection to be made. The current phase now is searching for partnerships with textile companies in the region. The idea is to improve and make this collection by the year's end by making necessary adjustments to the athletes.

We were successful with the first stage of thrift store reconfiguration. All custom parts have been sold and the highest consumer frequency in space due to the management of an account on Instagram. The idea for this year is to continue the reconfiguration of the thrift store by collecting and customizing more pieces. Additionally, we will continue improvements of the environment in terms of accessibility and visibility among social networks with greater inclusion of associates in the task.

One point that should be further developed is better articulation of assistive technology principles, since the those for co-production are already much better consolidated.

## FINAL CONSIDERATIONS

We initially stated that one of the objectives of this project was to develop an intervention proposal for the development of technologies for the blind with the students, teachers of the UFSC-BLUMENAU courses and the *Association of Blind People of the Itajaí Valley* (ACEVALI), which encompasses people with low vision guided by a socio-technical interaction approach. The purpose for all of this was to broaden the vision of future academics formed on this campus concerning the impacts that the development of technologies can generate with and for the community in which the university is inserted.

By featuring some of the actions developed throughout this article, the resumption of computer classes, the development at the golbol and choral uniforms, and the reconfiguration of the thrift store, we have consolidated the collaborative work in the construction of technologies for the blind and people with low vision the volunteering of our students, beyond the reach of other issues such as: (a) articulation between the different actors in this process, such as companies, the community of the blind and everyone around them, university, public management, the city in general, b) the effective participation of these subjects as to the technologies to be produced, leaving them not only final receivers, c) elaboration of technologies that meet the specificities of these subjects in the relationship with the city in which they live and with the different activities that students perform, (d) compliance with relevant technical standards and legislation and (e) respect for environmental, sustainability and accessibility issues.

In order for all these actions to reach their final objectives, we need to increase the network of partnerships, which we will call the *socio-technical network*, in addition to the idea of co-production and assistivity. It is different to produce technologies for someone in comparison to them being developed with the person. This is the greatest challenge of the project for teachers, associates and students which is to understand the deficiencies, not as limiting, but having the potential to create broader, social, inclusive and universal technologies. As the project proceeds during 2018, this is our main task so that all the goals we set for ourselves are achieved.

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