Fab Lab Livre SP: laboratories of digital fabrication as public policy from São Paulo City

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Abstract

This paper is about the government initiative from São Paulo City Hall to create a public network of twelve laboratories of digital fabrication, Fab Lab Livre SP. This proposal will present the phases of the project, from the initial concept to implementation, going through the challenges, goals and strategies for the sustainability of the project. The main concept of the project is to have an open and free network of laboratories of digital fabrication, to democratize the access of a creative environment and digital technologies to the population of São Paulo. This paper aims to demonstrate the relevance of the network Fab Lab Livre SP as public policy to benefit the local community and the individuals.

Keywords

FabLab, public policy, digital fabrication, democratize technology.

1   Introduction

The city of São Paulo is a dynamic metropolis, highly populated and important economic, technological and cultural centre for the country. Despite being a city with a large influx of capital, the distribution of wealth is concentrated, resulting in a strong social inequality. As a strategy to combat this historic problem, the current public administration of São Paulo (2013-2016) works with a governance model to think the city as an inclusive space to reduce the gap between the most privileged and the poor ones.

With a participatory planning, the City Hall created the "Targets Program" and drew up axes of transformations to overcome the social and economic inequalities. In addition to topics such as education, health, transport, and housing, one of the goals of the program is to promote the city of São Paulo as a center of technology and innovation, to widen as much as possible the access to the open and collaborative technologies for the population of São Paulo.

Since digital technology is inherent to contemporary life in many aspects and fields of activities, digital inclusion is very important to guarantee to the people the access of opportunities of the urban life in a more relevant and participatory way, aiming the reduction of social inequality. The Secretariat of Public Services of São Paulo City Hall with its Coordination of Connectivity and Digital Convergence is the department responsible to manage the municipal policy of digital inclusion, and to encourage the creation and application of innovative technological accessible to the population.

With this vocation to think digital technologies as public policy, the Coordination created and implemented the Public Network of Laboratories of Digital Fabrication – Fab Lab Livre SP. The project started in 2014, in the end of 2015 the first lab was installed and on April 2016 the network of twelve laboratories was completed.

The main idea that underlies the creation of the open and free network of laboratories of digital fabrication is to democratize the access of a creative environment and tools to the population of São Paulo, in accordance with the Target Program to promote social and technological innovation applied in the territory of the city. With a vision for the future, the proposal of Fab Lab Livre SP deals with the concept of innovative city and offers to the citizens new opportunities in the field of digital fabrication.

2   Management model of the project

The management model of the Public Network of Laboratories of Digital Fabrication is a partnership between the City Hall and a non-profit organization selected in an open call, according with the Term of Agreement. In this document it is defined the places of the labs, the machinery, the activities, the personnel, the schedule, the minimum goals, the budget, payment, evaluation methods, reports, commitment among other legal topics.

To elaborate the Term of Agreement it was necessary to have an understanding of how a FabLab works and what are its purposes. In this context, the existing FabLabs in town were very important and inspiring to elaborate the public model, like the Fab Lab SP from the Faculty of Architecture and Urbanism of the University of São Paulo, the Garagem Fab Lab, a private one, as well as the Centre of Information Technology Renato Archer. The City Hall staff visited these labs and had the opportunity to get contact with the environment of a digital fabrication laboratory, the personnel and users, the usage dynamics, machinery, the digital tools and the potential of the laboratory for creativity, education and entrepreneurship.

In the initial phase of the project, the help of professors, researchers, architects, designers, engineers, makers, technical consultants were relevant in the development of the Term of Agreement. Since it was a first initiative in Brazil and also considering its scale of coverage, many aspects of the project was a new territory to discover and had to be done from scratch. It was employed a collaborative effort to lay the groundwork of the Public Network of Laboratories of Digital Fabrication.

On February 2015 it was published the open call to select a non-profit organization to create and run the Public Network of Laboratories of Digital Fabrication. The organization that won the selection was the Institute of Social Technology – ITS Brasil. On August 2015 the Secretariat of Public Services and ITS Brasil signed the Term of Agreement, starting the partnership to carry out the project Fab Lab Livre SP for a two years contract with the possibility to renew it for more two years.

The ITS Brasil is responsible for the physical implementation and maintenance of the laboratories, development and planning of activities and courses, hiring the staff, user attendance, purchase and management of supplies, insurance of the equipment, and communication actions. All of these duties are detailed in the Term of Agreement, and are monitored by the Coordination of the project.

The total budget of the project is about 2.5 million of dollars (quotation from July 2016) including the purchase of machinery (about US$600,000.00) and a two years contract with ITS Brasil (about US$1,900,000.00). The payment to the nonprofit organization occurs at trimester base and it is subject to accountability. The quarterly transfer must necessarily be allocated to the following types of expenses:

- personnel, the salary of the staff;
- supplies, the materials and components that are used in the courses;
- communication, website, printing, and promotional material;
- insurance of the equipment.

Except for the personnel, to contract a service or buy supplies the organization of the agreement have to do a budget research with three different companies, and deal with the one that offers the cheapest price. The purpose of this procedure is to avoid illegality and be transparent with the use with public resources.

2.1 Evaluation methods

The Coordination of Fab Lab Livre SP has the task to monitor the activities to guarantee a good quality of the project and to verify that the Term of Agreement is being fulfilled. The visit to the labs is important because one can verify the physical condition of the space and technical issues, talk with the staff and know their demands. A regular meeting with managers and chiefs of the labs is another resource to discuss questions of the project and find solutions. It was also created an evaluation form that is sent to the participants of the courses and workshops, asking about the quality of the courses, the skills and interaction of the staff during the course, the punctuality and duration, the organization of the space, equipment and tools.

ITS Brasil presents a monthly activity report, specifying all the courses offered, the public attendance, participation list with signatures of the users. This document is import to measure the quantity of the public attendance, checking if the goals are accomplished. The quarterly account report presents the receipts of expenses and bank statement regarding all the payments, money transfer to personnel, supplies, communication and insurance. The Coordination of Fab Lab Livre SP must verify if the money payed to the project has been employed correctly, and identify problems in the accountability.

3 The laboratories and equipment

The network is formed by twelve laboratories, with two formats, the grand and standard size. There are four grand labs, and eight standard labs. The difference between them is basically the inventory of equipment (cf. Table 1). However, the idea in a next phase of the project is to have all the labs with the same machinery.

Description	Quantity in grand lab	Quantity in standard lab
3D printer	3	2
Vinyl cutter	1	none
Laser cutter	1	1 (in bidding process)
CNC Router large size	1	none
CNC Router small size	1	1
Scanner 3D	1 (in bidding process)	1 (in bidding process)

Table 1: Inventory of digital fabrication machines per grand and standard lab.

One of the biggest challenges of the project was to buy the equipment. The City Hall cannot deal directly with the seller, there are bureaucratic processes of bidding that takes time and the final item may be not the exactly one that was originally intended. For this reason, each item has to be specified very precisely but without mention the brand and model. Eventually the binding may fail, and it happened sometimes, so it had to start all over again the whole process of bidding. But in general, the bidding was well succeeded. There are still some items in bidding process that should be ready by October 2016.

All the software used in the training activities are open source, like Inkscape, Gimp, Scratch, Arduino IDE, Blender, FreeCAD, LinuxCNC, Repetier-Host, so the users can easily get it in their computer, without any restriction or payment, and keep practicing and developing new skills after the course at Fab Lab Livre SP.

3.1 The location of the laboratories

The places of the laboratories were strategically located in cultural and educational centers spread in the territory of the city, allowing more people of different regions to get in touch with the culture of digital manufacturing and design processes and use the laboratories. The location was chosen prior to the elaboration of the Term of Agreement. Most of them are located in poor regions, allowing the surrounding community to access the lab without traveling long distance (cf. Figure 1).
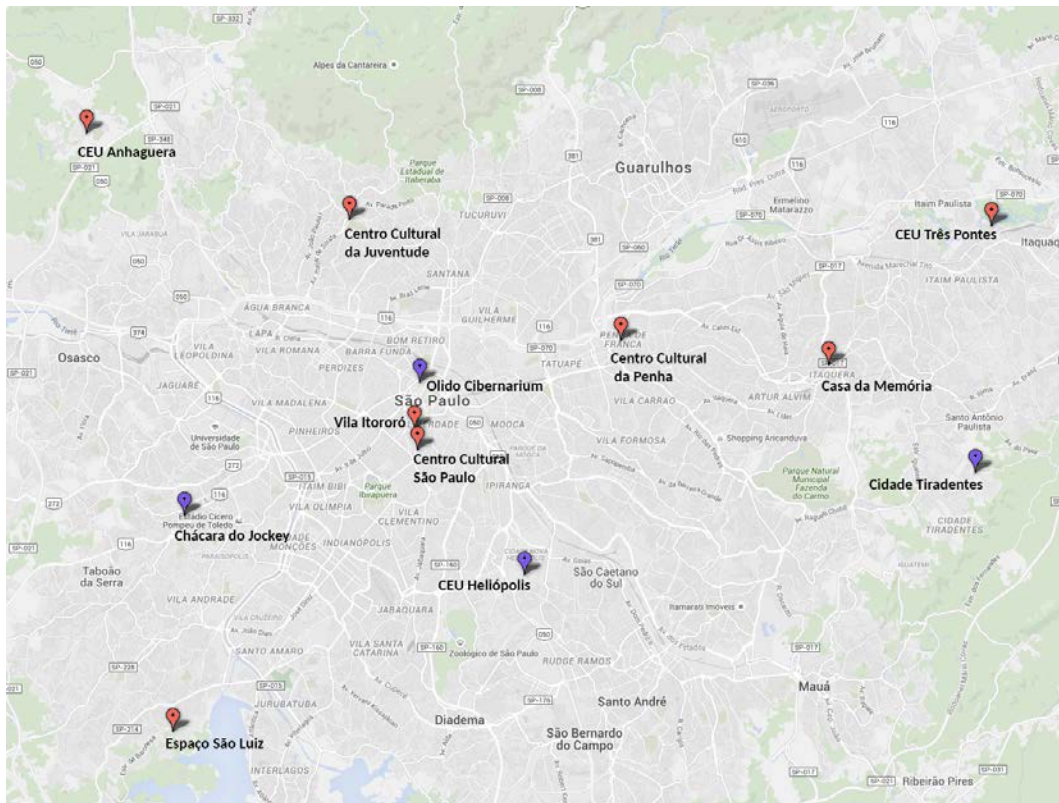
Figure 1: Location of the Public Network of Digital Fabrication Laboratories in São Paulo city. The red labels are the standard labs, and the blue labels are the grand labs.

Despite being part of the same network, each place and its community of users give shape to a unique identity of the lab. CEU is a short that stands for Unified Educational Center, and it is a public facility focused on education, that are usually located in the peripheral areas of the city. The presence of Fab Lab Livre SP is very welcome by the educators and teachers of the CEU, so they can think in activities beyond the classroom and work together with the community.

The laboratories Fab Lab Livre SP started their activities as soon as the places were available with the tools and the staff. However, all the labs had an official ceremony of inauguration to celebrate the opening of the lab (cf. Table 2). The laboratories are open from Monday to Friday (09:00-18:00 / 10:00-19:00) and Saturday (09:00-13:00).

Unit of Fab Lab Livre SP	Region	Date of inauguration	Size
Cidade Tiradentes	East	17/Dec/2015	Grand lab
Galeria Olido	Center	08/Mar/2016	Grand lab
Casa da Memória	East	10/Mar/2016	Standard lab
Centro Cultural da Penha	East	10/Mar/2016	Standard lab
CEU Parque Anhaguera	North	18/Mar/2016	Standard lab
CEU Três Pontes	East	21/Mar/2016	Standard lab
Vila Itororó	Center	22/Mar/2016	Standard lab
Centro Cultural São Paulo	Center	22/Mar/2016	Standard lab
Centro Cultural da Juventude	North	23/Mar/2016	Standard lab
CEU Heliópolis	South	29/Mar/2016	Grand lab
Espaço São Luiz	South	15/Apr/2016	Standard lab
Chácara do Jockey	West	30/Apr/2016	Grand lab

Table 2: Chronology of inauguration of Fab Lab Livre SP.

The preparation of the space was an important task of the project. It was necessary some improvement and renovation to run the laboratory properly. Accordingly with the layout of the machines, a new electric installation was made to provide a reliable power supply, and also a network to connect the computers.

3.2   The staff

The staff of the laboratories has different backgrounds, it has a multidisciplinary team with architects, designers, engineers, visual artists, journalists, educators, computer technician. There are three members of the staff in the grand lab, two in the standard lab, and one internship per lab. The personnel hierarchy is formed by two chiefs, each one is responsible for 6 labs; 4 leaders, one for each grand lab; and 24 technics, two per labs; in a sum of 30 persons in the staff.

Through a process of humanized teaching, the staff gives support to the production of knowledge in design, art, technology, science and innovation. They encourage learning and creativity through making, with regular courses and workshops and help the development of projects.
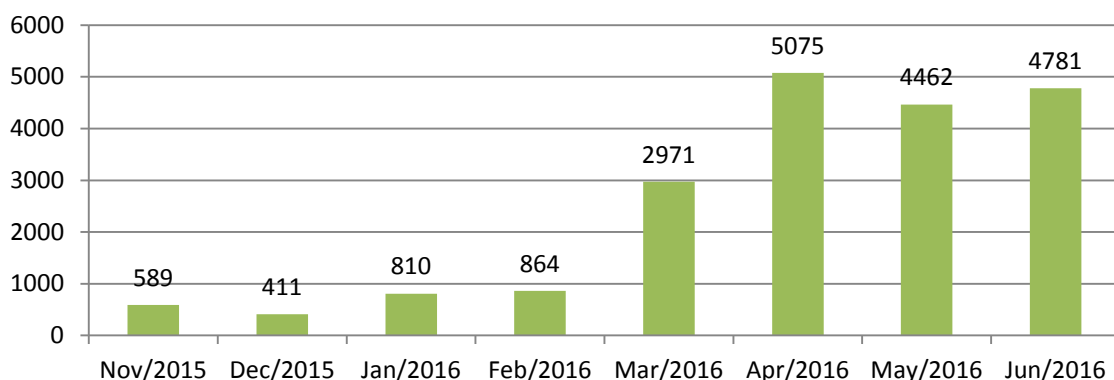
4   Activities and public attendance

The Term of Agreement specifies the minimum goal of public attendance that the network must reach (Cf. Table 3). There are two main categories, the awareness activities and training activity. The purpose of the awareness activities is to present to the population what a FabLab is, who can attend it and what can be developed there. This presentation can be inside the lab, as a visit, or as an external seminary in a public auditorium. The training activity is the courses and workshops, divided in short duration (4 hours) medium duration (16 hours) and long duration (96 hours).

Activity	Monthly attendance
External seminary	100
Visit in the labs	2080
Short duration course	1120
Medium duration course	120
Long duration course	16
Total	3436 persons

Table 3: The public attendance goal per month considering the twelve laboratories.

The network of laboratories was completed in the end of April, so the above total goal should be taken in account from there on, when all the labs are in operation. The report indicates that the monthly goal was accomplished already on April (Graphic 1), considering all the activities in the entire network. Since the beginning of the project in 2015, 2,104 persons attended external seminary, 11,892 persons visited the labs and 5,967 persons attended the courses and workshops, with a sum of 19,963 persons.

Graphic 1. The total of public attendance per month at Fab Lab Livre SP.

All the courses offered are related to the ecosystem of FabLab, like 2D and 3D design, digital fabrication tools, coding, woodworking, electronics, robotics, entrepreneurship (Cf. Figure 2). In average, the Public Network of Laboratories of Digital Fabrication offers about 38 different courses, with a total of 190 courses monthly. The courses open in the beginning and in the middle of the month, and usually they are quickly filled, sometimes in the same day.

On July 2016 the courses most offered were: 3D modelling; introduction to electronic; woodworking; coding with Scratch; and 2D drawing with Inkscape. On the same month, the participation in the courses was 67% by women and 43% by men.

Figure 2: Course calendar of August at Fab Lab Livre SP – Cidade Tiradentes.

The activities in the Fab Lab Livre SP are free of charge, there is no subscription fee or any kind of payment. The population can use freely the lab to attend the courses and to develop project. For personal project it is required that the user brings its own supply material, like plywood, acrylic and so on, but there are no cost to use the machines and the space.

Besides the regular courses, Fab Lab Livre SP promotes external activities and events together with organizations and universities. On March 2016 during the week to celebrate the Women Day, it was organized the "Women Make", an event for women conducted by women, with workshops and seminaries about coding, robotics, woodworking, design, wearables, augmented reality. The Faculty of Architecture and Urbanism of University of São Paulo, the Bartlett School of Architecture of University College London and Fab Lab Live SP did on May the workshop "Designing Interactivity"(Cf. Figure 3). There were also Scratch Day, Intel Maker Day (Cf. Figure 4), Fab Lat Fest (Cf. Figure 5), Ágora Fab Livre among others and new partnerships to come.

Figure 3. Workshop "Designing Interactivity" at Fab Lab Livre SP – Chácara do Jockey.

Figure 4. Intel Maker Day at Fab Lab Livre SP – CEU Heliopolis.

Figure 5. Fab Lat Fest 2016 at Fab Lab Livre SP – Chácara do Jockey.

5 Conclusion

The Fab Lab Livre SP is a governmental initiative to promote access to creative technologies, aiming a more inclusive society. Since it is a nonprofit project, the sustainability of the Public Network of Laboratories of Digital Fabrication depends basically on meeting the requirements of the Terms of Agreement. However, it is also important that the community get involved and occupy the labs to create and develop their ideas, to strength the relationship with Fab Lab Livre SP.

This engagement with the community can assure a great use of the potential of the laboratory, and the activities can be more focused on local demands. In this context, the staff of the labs stimulates the sharing of information and the developing of collaborative projects. As a public policy, the Fab Lab Livre SP aims to widen the horizon of innovation and to work as a mechanism of empowerment of the community.

The geolocation of the twelve laboratories Fab Lab Livre SP in the urban fabric of São Paulo reveals the purpose of the Public Network of Digital Fabrication Laboratories. To make the city more inclusive it is necessary to bring technology and innovation to those who do not have access. The permeability of the laboratories in the city can benefit the population of São Paulo, giving to them the opportunity to learn, design and fabricate many types of objects and at different scales.

In the short period of time that Fab Lab Livre SP is running, about twenty thousand citizens had the opportunity to get contact, develop ideas and create projects in the lab environment. The Public Network of Digital Fabrication Laboratories of São Paulo City Hall already started to democratize the access to technologies of digital manufacturing. The creation of twelve laboratories Fab Lab Livre SP is a disruptive initiative that benefits the community and the emergence of new professional opportunities.

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