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## **COLLECTIVIZATION OF DESIGN AND DIGITAL MANUFACTURING: SOCIAL LABORATORIES**

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### **ABSTRACT**

With the growing popularization of digital manufacturing, a sector of society has generated many expectations on how this can contribute to the development of social welfare. These expectations are reflected in a series of initiatives from the public sector, which seek, through the implementation of spaces dedicated to these technologies, to benefit the community. Taking as a starting point the analysis of the objectives of some of these projects, this research reviews the proposals of some authors that provide tools for understanding how a digital manufacturing space can become a public service for the benefit of communities. The research reveals that, although there are many possibilities opened by digital manufacturing, it is necessary to first problematize some ideas that are taken for granted when thinking about these new technologies as a contribution to the quality of people's life.

## COLLECTIVIZATION OF DESIGN AND DIGITAL MANUFACTURING: SOCIAL LABORATORIES

I'd like to start out by showing a presentation on my previous work to help chronicle how I landed on this particular subject of research. My background is that of a sound engineer, and, after working in various different areas within the field, my research started to gear itself towards the construction of electronic musical instruments.

Through this research, I started to give workshops on electronics geared towards musical projects. As a result of these workshops I was able to travel throughout Chile and South America, teaching at a variety of spaces that were both institutional and independent. During these trips I also had the opportunity to get to know a group of like-minded individuals working on similar projects within various multidisciplinary fields such as: visual arts, music, engineering and programming. All of these individuals work under an Open Source philosophy and share their artistic production as well as pedagogic activities in art and technology.

Following this experience, the motivation arises to begin a research project regarding the question "how is it possible to generate a long lasting impact through these spaces that goes beyond simple workshops? by doing so, how do we generate critical thinking with regards to the subject matter dealing specifically with technology?"

Additionally, one might ask:

Through these subjects of interest, how does one go about fomenting the democratization of technological knowledge? It is with this intention that I enrolled in the Industrial Design masters program at UNAM.

During the first stage of my bibliographic survey, I realized that these technologies for digital manufacturing have gained increasing interest worldwide, especially in latin america, generating a growth in their use as well as in the spaces in which they are developed and presented.

There are even initiatives from public institutions for the implementations of communal spaces for digital manufacturing, as a form of citizenship empowerment and the generation of social innovation. This is a similar phenomenon to the implementation of spaces with public access to the internet a few years back. Everything points to the this phenomenon, which we can see clearly illustrated by the projects: Ateneus de Fabricación in Barcelona and FabLab Libre in Sao Paulo. These projects will henceforth begin to be replicated in an array of places around the world.

Alongside these spaces, a great opportunity arises, now with the expansion of these design spaces along with the rapid growth and diversification of their members, rather than limit mobility for designers, they expand a wide field of work for the creation of structures that propagate, catalyze, and speed up these processes of technological appropriation by the public.

It is by identifying this phenomenon that I reformulate my research questions and decide to focus on the opportunities that arise.

Questions:

- How does one make a space for digital manufacturing an integral element of a social infrastructure?
- How do we turn these spaces into centers for social innovation that respond to local needs?
- The objective of this presentation is to analyze if tools for digital fabrication promote processes of fabrication and design that are more democratic, if so, how do we foment them? what role do public spaces of digital fabrication play in this context?"
- Do new tools in digital fabrication allow for new ways of socialization and democratization in the processes of design and production? If so, how do we foment this potential?
- What role can public spaces for digital manufacturing play in this context?

In order to understand these phenomena, one must first learn about the contexts that brought them into being, both in the realm of ideas as well as in technological development.

Through this analysis, it can be inferred that, although there are many ways that these new modes of fabrication allow for new possibilities, another way of looking at them is seeing how they join the advantages of automated modes of artisanal production at a small scale.

When one brings together the process of prefabrication and execution; there is a potential to break through the separation between design and production that industrialization has imposed on artisanal processes. Thought this process, and after two centuries of separation, the conception and execution of these daily objects can once again return to the same hands.

The other pillar on which this investigation is based is openness as a value in the design process as well as the participation of using in this process.

The point of departure of this investigation is the incipient interest of public institutions to make available tools for digital manufacturing as a way of citizenship empowerment. (Smith, n.d.)

Although there aren't many referents of this type, nor in-depth studies, the idea has emerged that these technologies by themselves are able to better quality of life.

This is related to innovation that has installed itself as a paradigm of the new century, planting itself as an ideal in all areas of human action. One can simply take out a random magazine to find proposals such as "five way to innovate within marriage" or "business innovation", however, in the same way that this has become popularized, the idea has become equally vapid.

Despite the lack of concrete references of this kind, if we examine the objectives of many of these initiatives, we can see that they're pretty ambitious and cover a wide range of themes. The following table shows the objectives exposed by

two spaces, public laboratories of digital manufacturing that are currently operating in Barcelona (Proyecto Ateneus) and in Sao Paulo (FabLab Livre) and a third that is being implemented in Cuernavaca, México. What technologies?

If the socialization and democratization of technological knowledge is to be established, first it's necessary to realize certain definitions and position them within the subject.

Now I want to reflect about a few of the aspect to keep in mind when thinking about how the socialization of digital manufacturing can turn become valuable for society.

Technologies are not neutral, they respond to ideologies and worldviews, this is why we must begin to ask ourselves "what are desired technologies and how can they help resolve current problems while simultaneously evading the charm of futuristic scenarios seen in science fiction and fomented by the entertainment industry and are tech companies. These scenarios are found everywhere, from communications to medicine.

These visions make it so that technological development is more preoccupied with generating devices that, for example, allow quick communication between our home appliances than generating a response to concrete problems such as hunger, environmental degradation, or bettering the quality of life for millions of people that, although there is talk of economic dematerialization, must make their living realizing works that could be hazardous for their health and that could be subject to automation, like, for example, transportation of heavy loads, mining, or work in trash dumps.

Here we add Ivan Illich's idea of Conviviality

In his work, beyond realizing a critique towards the monopolization of technological knowledge by way of industry and specialists, which we can see in the medical and transportation industry, plants that technology and scientific progress have to serve towards building a postindustrial society in which a person's creative exercise won't impose labor, understanding, or forced consumption upon anyone else.

Human beings are in need of a tool with which to work, not instruments that work in their place. They need a technology that takes out the best parts of personal energy and imagination, not a technology that subdues and programs. The tool is convivial in that each one can utilize it without difficulty, as frequently or rarely as they desire, and for the ends that they determine. The use that anyone makes of the tool does not intrude on another's freedom to do the same.

For this investigation, tools are not the technologies of fabrication, rather, we see the space for digital manufacturing as a tool for conviviality.

This is why if the democratization of the tools of digital manufacturing are to be established, it is necessary to go beyond the idea that "everyone can do anything" and think about how these technologies add to the democratization and means of production. The potential of this paradigm-shift in fabrication is to return to different communities, the possibility of managing their own necessities and in this way adding to their autonomy and self-determination.

These aspects have to be taken in mind during the design and implementation of this type of space, above all in the articulation with the different organizations of the society of which it is to be a part of. Due to this, the challenge is not to assemble the greatest quantity of individuals specialized in these themes, or to generate a new group of specialists, but rather it means finding ways for these technologies to be at the reach of the community and at the resolution of their needs. What is more interesting than an army of people capable of operating a 3d printer is a group of people with these understandings integrated in communal networks of knowledge, that dialogue with the rest of the community in search for integral answers with regard to the social problems within the territories, respecting other ways of doing things that might not be so efficient within contemporary parameters, but that have other sorts of values and characteristics that make them important for the community.

In order to carry out in practice these ideas, it's proposed that these spaces open on three levels.

### **Pedagogies**

The relationship between pedagogy and technology is also a theme about which a lot has been said and in which we find many different postures. For the purposes of this investigation many of the ideas that Gilbert developed through his work with Pacey will be used. Through this model, Gilbert takes to education, proposing three approximations:

Teaching for technology, that centers itself around technical aspects and is oftentimes the most common perspective, while also being the most restrained; (2) teaching about technology, which is more oriented towards socio-technological questions, meaning, towards those related with the organizational aspects and ideology/culture. and (3) Teaching within technology, which takes into consideration all the aspects of the model. Gilbert (1992) underlines that adopting this last point leads towards a comprehensive and holistic teaching of technology as well as a more balanced technological education.

The educational program of a public center for digital manufacturing should act within those three levels. Understanding where the technology that surrounds us comes from is a prerequisite for generating our own responses, that contain and express the values of the communities that generate them.

### **Communitary**

The second level in which a space of this type should foment the strengthening of networks and community groups. In order for this to happen, a participatory design is proposed, similar to a tool as it has been proposed since the beginning of the process. In order to determine the characteristics of the space, both physically as well as operationally, only with the information that the users themselves have over their own context, one could aspire to accomplish the ambitious proposals. On the other hand, the process in itself will be a form of empowerment for the participants

and will permit the exchange of learning between those who propose and those who will be the beneficiaries of this new infrastructure.

### **Economic**

This is the aspect that could turn these systems of production into the 4th industrial revolution that's been promised time and time again. The previous two points can be achieved among other ways, through other methods and technologies that get taken from practice into reality.

Only by effectively replacing systems of industrial production with these new systems will the expectations be met with regard to solving the problems associated with mass production fomenting sustainable economies with regard to their economic and social aspects. Direct digital manufacturing as an addition to industrial production only sharpens and intensifies the problems that the latter has generated.

The way in which the systems of direct digital manufacturing have been inserting themselves in the economy and have been generating a model based on distribution through platforms like kickstarter in which an individual, for example in Spain, designs a product, offers it on a global platform and through that method, they raise money for their production which could be realized in China or in another country. Then the products travel to the country of their design, to then be distributed globally.

## **CONCLUSIONS**

From this research it can be seen that the challenges and possibilities that the socialization of design opens for designers are many. The distribution of means of production poses a total paradigm shift for the discipline. This change goes beyond the "materiality" on which designers work: the design of experiences or that of services pose a change in this sense, but although the problems they face require skills different from those of designing products, their goals are still linked to economic systems that respond to industrial production modes, ie the service industry and the experience industry. Overcome the paradigm of industrial manufacturing with cleaner, more democratic, transparent and fair production systems it requires a total reconfiguration of the discipline of design, in its means, but above all in its aims.

Many of the social and environmental problems today are more related to the scale at which things occur than to the techniques used. This is why although economic parameters are extremely difficult to overcome the advantages of mass production, designers must seek new ways of relating to society more direct and low logics that give as much or more value than economic to social, environmental and cultural aspects.

The origin of Design as a discipline is inseparably linked with the industrial development of societies, so collecting the ideas of small, local, open and connected that Manzini poses, requires a change of mentality of design professionals in search of ways more sustainable, fair and democratic to manage the needs of society.

In a world where the ability to configure and produce objects is democratizes and expands, that is, everyone can design, the question is what is the role of the professional designer, that is, those people who not only want to design, everyone can do it, but also want their main activity and contribution to society be design.

In this sense short and long term challenges can be glimpsed. In the stage in which this evolution is currently the panorama that opens up for professional designers is quite broad if you know how to comprehend the situation in an integral way. That the field of design expands to more people opens many possibilities in the generation of infrastructures that are required to enable non-professionals to make their own designs. On the other hand, there will still be areas of design that, due to their complexity, should remain in the hands of experts in the field.

If you think long-term, Krippendorff with his speech design proposal can shed some light on the role of the designer when they all design. The designer can become an articulator of values and ideas in the configuration of the artificial world and social organization. Designing speeches does not mean imposing, such not even propose ideas, but be able to collect the concerns and values of a community and crystallize them into proposals that go beyond just the material configuration of objects and space.

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