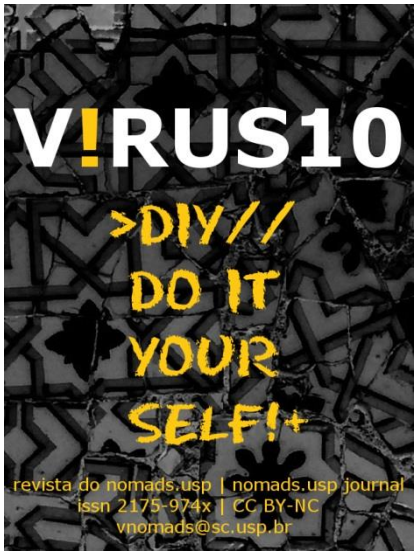

Hackerspaces: collaborative spaces of creation and learning.

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ABSTRACT

This paper aims to understand and present the hackerspaces as a contemporary and expanded manifestation of a ethos hacker, revealing specific ways of creation, collaboration and learning. This approach is related to the constant exercise of observing rethinking and reinventing through the direct action upon our more and more technology-mediated world. The investigation relies on discursive and theoretical contributions and on the empirical experience of participant observation with the Tarrafa Hacker Clube hackerspace, which is located in the Brazilian city of Florianopolis. We point out the importance in understanding the hackerspace movement through a historical, social and ethical standpoint. In this way, these issues are no longer purely technical and are being taken as opportunities for new ways of relating to the world.

Keywords: Hackerspaces; ethos hacker; hacking; social appropriation of technology; technological collectives.

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Introduction

An updated emphasis in participatory patterns of production and learning is changing our social realm. From the simple act of making developed by artists, artisans and hobbyists, the technologic augmented DIY became the prevailing metaphor for a variety of social and economic practices. These practices require extensive cultural transformations for which new spaces for action are conceived.

Hackerspaces are, in a simplified manner, community-operated physical places that afford sharing of tools, resources and knowledge. In these spaces, people can meet and work on their projects, often related to technology. They present themselves as one of several grassroots organizations (Schrock, 2014) associated to rapid changes in the context of information society. These transformations points towards new ways of relating with the world. Facing this increasingly technologically mediated reality the image of the hacker condenses different discourses, desires and expectations in contemporary imaginary.

The hacker ethos, which dates back to the 1960s in the university context of the Massachusetts Institute of Technology - MIT (Levy, 1994), relocates ideals of freedom and autonomy of the individual (Coleman and Golub 2008) in an era marked by transience and the emergence of new productive paradigms and models of knowledge construction. The hacking articulating this ethos can be seen as a direct and critical-creative approach (Busch 2008). It is a form of acting capable to be extended to multiple levels of the social field and different areas of knowledge (Busch and Palmås, 2006).

This paper aims to present hackerspaces as a contemporary manifestation that expands a hacker ethos, revealing specific ways of creation, collaboration and learning. This approach is associated with the constant exercise of rethinking and reinventing through the direct action. Our investigation relies on discursive and theoretical contributions and on the empirical experience of participant observation with the Tarrafa Hacker Clube hackerspace, in Florianopolis, Brazil.

We begin this exploration by establishing a historical context and pointing from its early origins into the further development of the global hackerspaces' phenomenon. Hereafter, we describe the process that led to the formation of the Tarrafa HC hackerspace in Florianopolis. Then, we analyze their practices and activities within the overall context of the movement that defines these spaces.

Accordingly, as architects, our interest rely in specific aspects raised by hackerspaces. We understand them as an extremely relevant reference in many levels that cross training and professional practice as well as our own attitude towards the contemporary world. Our partial perspective - contaminated in some degree by our experience as architects and members of a hackerspace - is the filter through which we seek to understand this movement.

Hackerspaces – A Movement Emergence

Hackerspaces, in similar settings to what we know today, emerged in Germany in the mid-1990s under the Chaos Computer Club's (CCC) influence, an association of hackers among the oldest and largest in the world, founded in 1981. Among the first hackerspaces are the CCC's local division, CCC Berlin, along with the c-base, both based in the capital. In 2006, following the German inspirations, the Metalab hackerspace was founded in Vienna, beginning the spread of these spaces in Europe. Those spaces followed the same principles, with a focus on building an open space infrastructure for social gathering and project development.

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Fig. 1 - Metalab, 2012. Source: Mitch Altman (CC BY-SA 2.0) - Available at: <https://www.flickr.com/photos/maltman23/8260407658/>.

In 2007, those European hackerspaces shared their experience with a group of American hackers who carried out a trip to the international meeting *Chaos Communication Camp* in Germany. After the organized visits to various German and Austrian spaces, members of C4 hackerspace, from Cologne, presented the document *Hacker Space Design Patterns* (Ohlig et al, 2007). The document contained a set of general guidelines for the creation and organization of a hackerspace, developed by the Europeans from empirical learning. Back to the United States and stimulated by what they saw on the trip that became known as *Hackers On A Plane* (Tweney, 2009), several members of that group decided to found hackerspaces in their own cities. We can emphasize the NYC Resistor in New York, the HacDC in Washington and Noisebridge in San Francisco (Pettis et al, 2011).

In late 2008, the year that followed the *Hackers On A Plane* trip, the *25th Chaos Communication Congress* (25C3) took place in Germany, with a panel *Building an international movement: hackerspaces.org* (2008). Several people representing different new hackerspaces reported the growth of these places, now seen as parts of an international movement. They also introduced the online platform of hackerspaces.org consisting of a wiki page, blog and mailing list, with the motto "build! unite! multiply!". Since 2008 hackerspaces.org wiki keeps a register of hackerspaces around the world and currently (July 2014) has about 1000 listed spaces - spaces that consider themselves part of the movement, since the registration is free and done by the groups themselves.

The first hackerspace in Brazil, the Garoa Hacker Clube, appeared in 2010 in São Paulo after about a year of planning and discussions. Early discussions began in June 2009 and in the end of August 2010 a permanent physical space of 12m² in the *Casa da Cultura Digital* in São Paulo was inaugurated. Since February 2013, the Garoa HC is located in its new headquarters, a house in the Pinheiros neighborhood (Garoa.net wiki, 2013). The Garoa HC paved the way for the creation of several

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other hackerspaces in Brazil, including the Tarrafa Hacker Clube in Florianópolis.

Although the history presented may seem clear and objective, this line of events is a point of view that inevitably leaves out significant parallels and other past developments. Thus, we can identify a number of precedents of spaces and groups with similar conformations. Although they do not fully match this model, they certainly influenced in a decisive way and in many respects what would be this global movement. Aspects related to the hacker culture "technological" DIY, date back to amateur radio from the 1920's (Galloway et al. 2004), through the '50s with the TMRC (Tech Model Railroad Club) model railroading enthusiasts at MIT. This group eventually transported the concept to the computing context (Levy 1994). Coleman (2013) reports that the growth of this movement takes to a new context the practice of hardware hacking, already remarkably present in the Homebrew Computer Club activities in California in the mid-1970s. However, Grenzfurthner and Schneider (2009) argue that the first hackerspaces are directly connected to the countercultural protests of the 1970s post-hippie movement. They combined micro-political tactics or, in other words, the construction of tiny "new worlds" within the old world, seeking to create new relationships and spatial appropriations.

We can exemplify that, alongside the emergence of hackerspaces in Germany, the hacklabs also emerged more related to the tradition of squatting and media activism (Maxigas 2012). With a remarkable ideological difference, Maxigas (2012) also points out that most hacklabs were part of an explicitly politicized scene. In Italy, the hacklabs emerged under the influence of the autonomist movement (Bazzichelli, 2008) while in Spain, Germany and the Netherlands, they were related mainly to anarchists movements (Yuill, 2008). From that period, while active, the Dutch hacklabs ASCII (*Amsterdam Subversive Center for Information Interchange*) and PUSCII (*Progressive Utrecht Subversive Centre for Information Interchange*) were especially relevant. In contrast, hackerspaces that have developed under the libertarian influence of the Chaos Computer Club did not necessarily positioned themselves openly about politics. People involved in both scenes probably consider their own activities as oriented towards the liberation of technological knowledge, but the interpretations of this "freedom" are divergent. In this sense, the genealogy of hackerspaces could also be seen from the point of view of hacklabs.

Recently, the designation makerspace has gained strength - especially in America. Although it is also often seen as a synonym for hackerspace, this change in denomination is actually a indicative of a greater association with the emerging maker movement (Anderson, 2012) rather than to a strictly hacker culture. The maker movement that Anderson (2012) refers is the junction between the DIY spirit, the sharing culture of the web and digital tools, reaching a surprising new global scale. Discussions on differences between hackerspaces and makerspaces have been initiated and in some cases include comparisons with other community spaces such as FabLabs TechShops that also offer public access to shared equipment and tools (Cavalcanti, 2013). Despite the possible association of the term makerspace with the MAKE Magazine - already criticized for promoting the sanitization of the maker movement (Hertz, 2012) - differences between hackerspaces and makerspaces are not clear or consensual, and many of the involved make no distinction. However, FabLabs and TechShops have very specific origins and motivations, referring respectively to the academic and professional/commercial environments. Also with different characteristics, are medialabs and citizen laboratories, both dedicated to promoting digital inclusion from the access and training to the public, usually with the support of government (Sanguesa, 2013).

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In general, under different patterns and denominations, backgrounds and goals, we are following the growth of a global trend of collaborative spaces for creating, working, learning and activism related to the democratization of digital culture.

However, we emphasize that, in the midst of this trend, hackerspaces have specificities associated with a hacker ethos that should be explored. In recent years this ethos begins to reach an increasing number of people from different areas, no longer restricted to undergrounds subcultures. We perceive an exploratory, creative and critical position in relation to technology and its relationship with society in practices and operations found in hackerspaces.

Analytical Overview

A precise understanding of what is a "hackerspace" does not exist even among people directly involved with the movement, which is reinforced by Mitch Altman, founder of Noisebridge in San Francisco. According to Altman (Oh, 2011), it is possible to recognize when you are in one, but all are unique, as are unique the people who build these spaces. Schrock (2011) agree that individuals who attend hackerspaces cannot be uniformly classified, being quite heterogeneous in their motivations to use the space. According to this author, a collective identity defines the specificities of every hackerspace and is generated by its members' momentary interests, their activities and common events.

Although consensus has not been reached, discussions on the issue within the community have made possible for Moilanen (2012) to list five general criteria on what to be a hackerspace means: (a) is owned and managed by its members in a spirit of equality; (b) non-profit organization and open to the outside world; (c) is a space where people share tools, equipment and ideas without discrimination; (d) has a strong emphasis on technology and invention, and (e) has a shared space (or is in the process of acquiring one) as the core of the community.

On the other hand, members and scholars seem to agree that hackerspaces can be understood as a "third place" (*Building hackerspaces Everywhere* 2009) (Moilanen, 2012) (Schrock, 2014). This concept defined by Oldenburg (1999) refers to the informal meeting spaces and informal connections outside home (first place) and work (second place), that facilitate and foster broader and more creative interaction.

Esther Schneeweisz "Astera", member of the Viennese hackerspace Metalab, reminds that as "third places", hackerspaces can manifest themselves in very different ways according to the interests of those involved. They have greater or lesser focus on areas such as hardware hacking; reverse engineering; electronics and microcontrollers; programming and computer security; technology and art; etc. On the other hand, Schneeweisz emphasizes that the activities are not limited to these examples, since hacking can be directed to any area. It is about a looking from a different perspective, rethinking and reinventing a particular topic. (*Building hackerspaces Everywhere,* 2009)

Eriksson (2011) identifies and categorizes some of the productive activities found in hackerspaces into three groups. The first group that he identified as "modification of closed systems" comprehends the traditional meaning of hacking, and basically refers to the understanding, modification and extension of a given system functionality. The second group "composition by simple means", refers to the creative process that makes use of basic components and elements (eg. sensors and actuators) often obtained from scrap and from other objects. As a third group of activities, "experimenting with open hardware and software" reflects the growing use of open source devices like Arduino and 3d printer kits for the developing of

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new projects.

However, hackerspaces are community spaces where different activities occur simultaneously, many of which could not be considered productive in the usual sense of the word. People share the space to interact, establish casual conversations or simply meet without any specific purpose. Rather than be seen as a means to accomplish previously defined goals, hackerspaces should be seen as places where goals, motivations and desires can be explored, discovered and built (Eriksson, 2011).

For Blankwater (2011), hackerspaces function as places of learning. Without a formal hierarchy but with a flexible horizontal structure every person is a potential sender and receiver of information: "Hackerspaces offer different modes of learning that involve being creative, searching for own sources, out-of-the-box thinking, decentralization, collaboration and mixing of disciplines." (Blankwater, 2011, p.115)

The Tarrafa Hacker Clube

The Tarrafa Hacker Clube (Figure 2) constitutes today the only active hackerspace in Florianópolis, housing in its space events, workshops and regular open meetings. Its structure follows the trend initiated by spaces like c-base and Metalab, strongly incorporating references of american hackerspaces like Noisebridge and NYC Resistor and with great influence from the Brazilian Garoa HC. In its formation process, we can identify many common elements to other hackerspaces around the world. Among these elements, we can mention the conformation of a community, this eager for a space to establish collaborations, intense activity through mailing lists and a strong interest in joining the local community.

Fig. 2 - Overview of Tarrafa Hacker Club, 2014. Source: by the authors.

History

Tarrafa HC started out with the formalization of a small group through the creation of a mailing list in late November 2011. At the beginning of 2012 the mailing list raised a greater participation, with the entry of new interested people and the beginning of the search of a physical space and the dissemination of the project to the general community.

The offer of lectures, workshops and courses in the first semester of 2012, was very important for the Tarrafa HC consolidation process as a group. A first lecture was held in March 2012 at the Federal University of Santa Catarina addressing the concept of hackerspaces and aiming to present the proposal to create such a space in Florianópolis. The participation of some members in the International Free Software Forum (FISL) in Porto Alegre at the end of July 2012 allowed the meeting with participants from other hackerspaces in Brazil, as the Garoa HC of São Paulo and the then recently formed MateHackers from Porto Alegre. That event pushed the group to prioritize even more the realization of projects and activities, alongside

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the search for a proper headquarters, at the expense of association's bureaucratic formalization aspects.

Therefore, in August 2012 the first collective project of Tarrafa HC called Beer Counter (Figure 3) was started, which involved the creation of a digital counter incremented by the touch of a button that holds the final value stored in its memory. To continue with the project and also to study and develop electroacoustic instruments, some meetings occurred weekly at the house of one of the members. From these meetings the first regular event of the group was created in the same month, the "Night of Reverse Engineering and Deconstruction" (N.E.R.D. - *Noite da Engenharia Reversa e Desconstrução*).

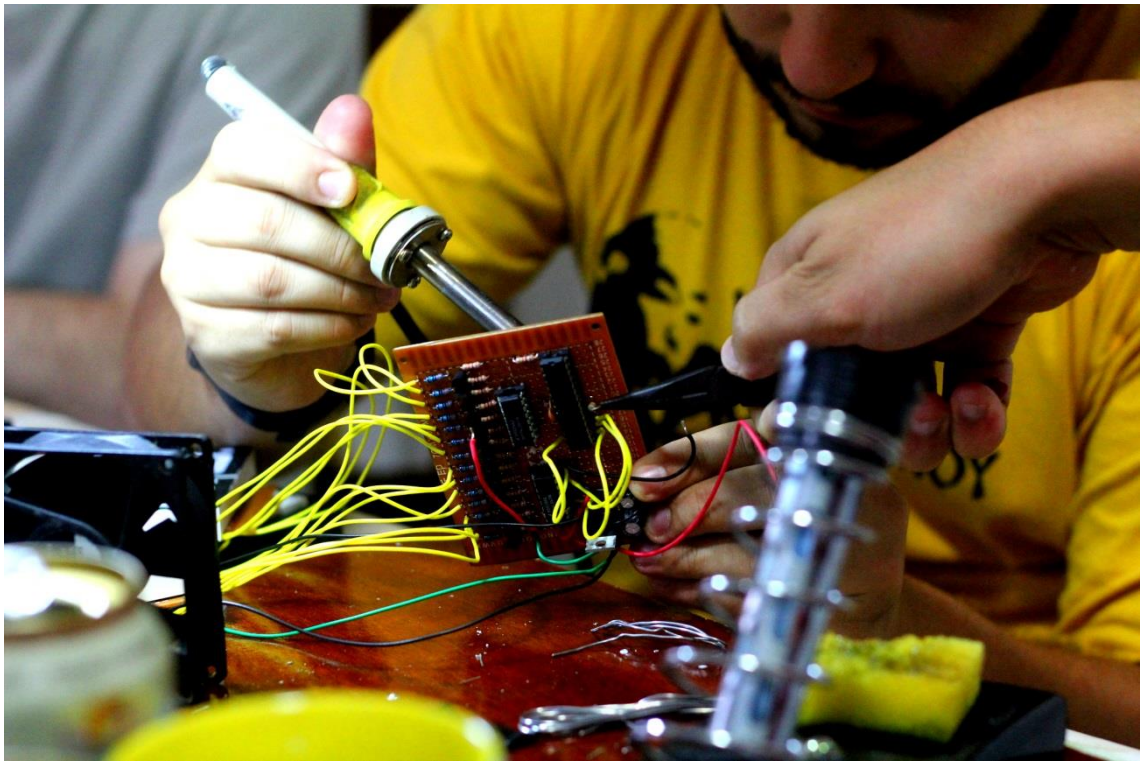

Fig. 3 - Beer Counter development meeting, 2012. Source: by the authors.

In the next September, the Tarrafa HC offered talks and workshops as part of the program of a university course called *Ateliê Livre Tecnologias Interativas e Processos de Criação*. This elective course was a design studio created in the curriculum of the Architecture and Urbanism undergraduate program of the Federal University of Santa Catarina with the goal to plan and construct projects of urban interventions using accessible technologies of physical computing. In mid-October 2012, the course took place in an available room in the old building at the Department of Architecture in order to allow a space for continued work for the students. In exchange for the permanent support to the discipline, which had a second edition in the following semester, the Tarrafa HC started to use that same space for other activities, like meetings and events, establishing a temporary base there. This collaboration with the design studio has been described in greater detail in a previous work (Mattos et al, 2013).

Currently the Tarrafa HC remains in that space, sharing it with the academic project Laboratory in Emerging Technologies and Innovation. The room has 46 square meters, divided between work and meeting space, a wood workshop, a 3d printing area, deposit for materials and scrap and a small entrance hall (Figure 4). We note that this setting is always going through changes to better accommodate the

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activities developed, which gives dynamism to the space.

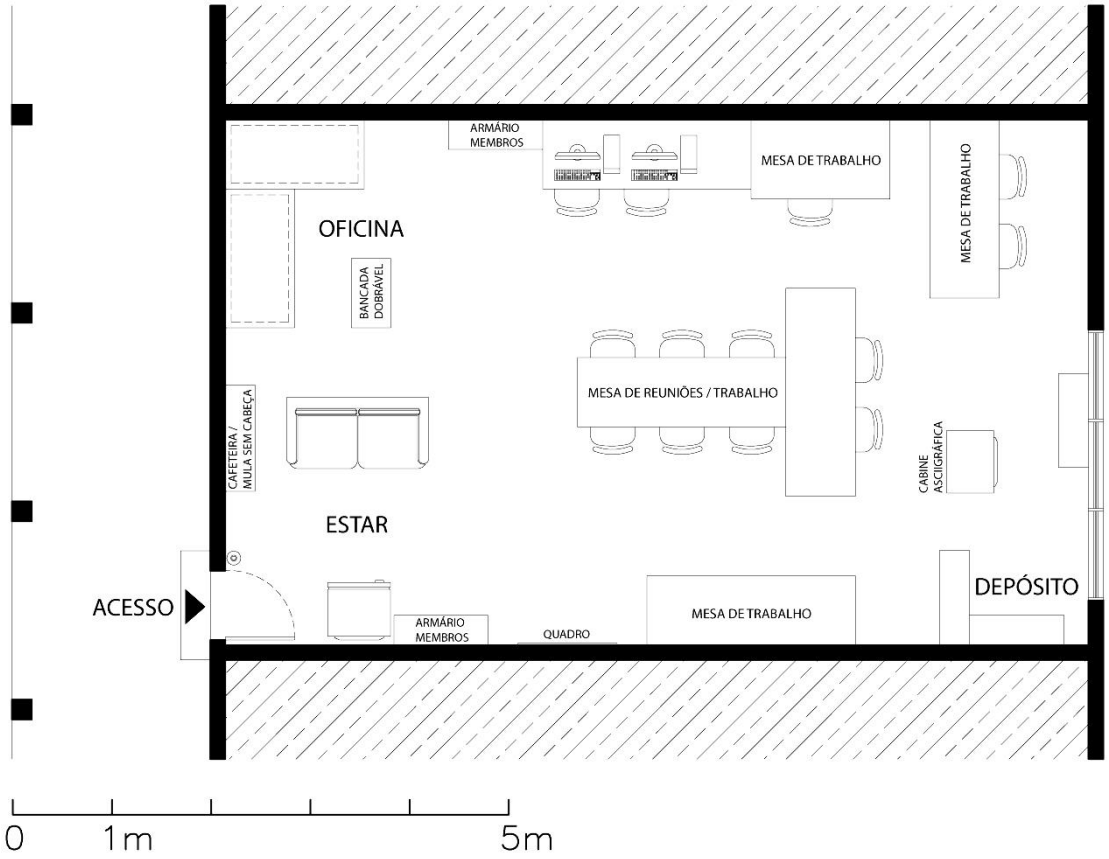

Fig. 4 - Floor plan of the Tarrafa HC, 2014. Source: by the authors.

We should also point out that the Tarrafa HC online activities accompanied its growth. Currently the mailing list has 285 subscribers (July 2014) and includes participants from other hackerspaces and individuals interested in discussions, even if not directly involved with activities that take place in the space. The hackerspace is also present in hackerspaces.org wiki, and many of its most active members have participated in the mailing list of the platform and on lists of other spaces, which promotes an important exchange of experiences and ideas.

Activities e Practices

The activities, initially centered in electronics by the influence of some members, were seeking practical experience as opposed to the high theoretical level of the academic environment. Programming was also present from the early activities, but rather linked to electronics through the relationship with microcontrollers and physical computing. These practices are also in conjunction with the popularization of the Arduino platform and the open hardware movement. They are also in line with those developed in other spaces like the NYC Resistor, which started its activities with study group in microelectronics.

From those interests have arisen the aforementioned workshops and the first regular and frequent event, N.E.R.D., based on the reverse engineering method that seeks to understand systems from the opening and analysis of its elements and connections. During the N.E.R.D.s, a closed object is chosen to be dismount and investigated from its parts, its operation and its creation process, as well as from the exchange of ideas and knowledge among the participants. Eventually such

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activity can lead to the modification of the object or system, changing it for other purposes.

This attitude oriented to direct intervention associated with hacking (Busch, 2008) was gradually expanding to other areas as sewing, urban agriculture (Figure 5) and art & technology. This is not an exclusive feature of this hackerspace, but a general condition related to what Blankwater (2011) points out as the mindset associated with hacking practiced in these spaces. Tarrafa HC currently has sewing machines, 3D printers, and many tools and materials obtained through donations.

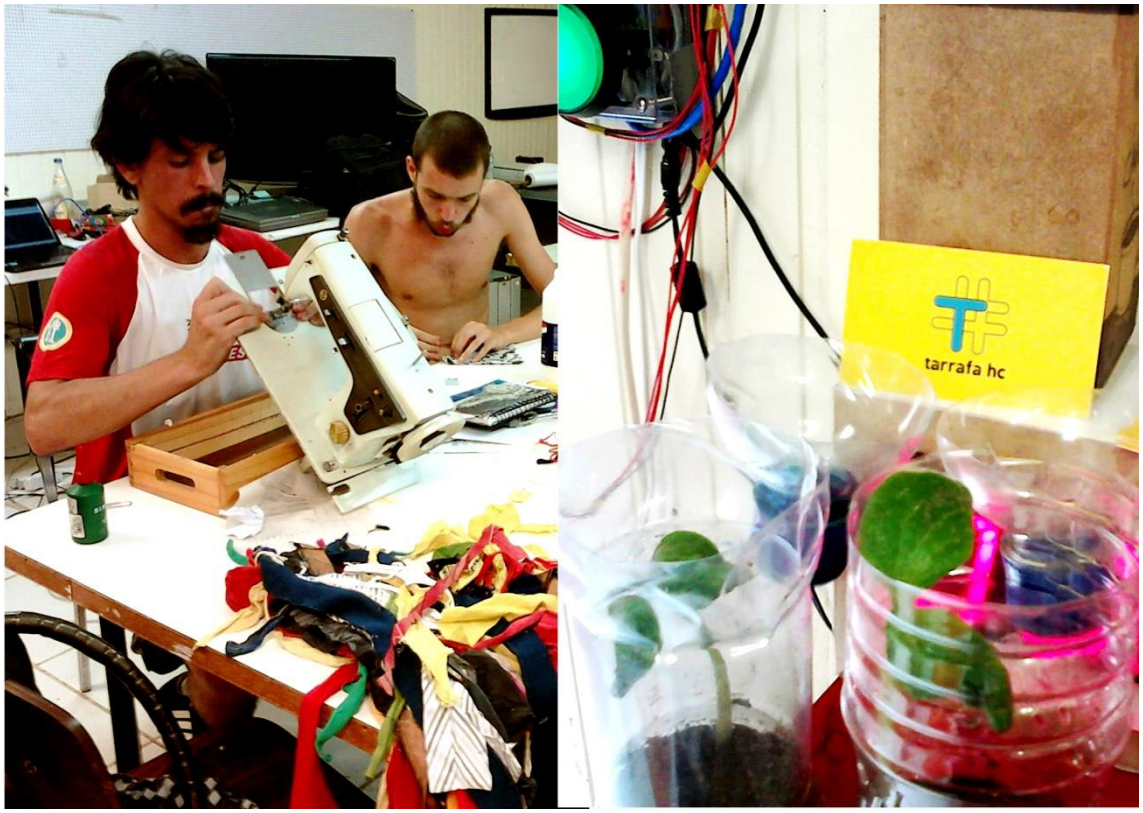

Fig. 5 - Sewing and urban agriculture activities, 2014. Source: Tarrafa Hacker Clube.

Another worth mentioning activity is Make: Electronics (Figure 6), a regular series of meetings that aims to promote the easy learning of electronics. The meetings follow the book of same name by Charles Platt (2009), in which knowledge about electronics are developed by participants in an exploratory way through experiments. Each meeting features "tasks" or challenges using simple and accessible resources. Of a similar character is the study group aligned with free software that develops their meetings following the Linux From Scratch (LFS) method, a series of step-by-step instructions for building a Linux system on their own, entirely from source code. During the process that also occurs in an exploratory mode, participants seek to learn about the workings of computer operating systems.

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Fig. 6 - Make: Eletronics Meeting, 2013. Source: Tarrafa Hacker Clube.

Among the projects developed at the Tarrafa HC we can highlight the *Revolta da Antena* (Revolt of the Antenna), carried out during the popular mobilizations that took the streets across Brazil between June and July 2013. Inserting itself in the context of free media and live independent broadcasting, the project intended to make a contribution towards creating and offering a framework of free internet network. The availability of wireless internet access for the protesters occurred through the creation of access points connected in a mesh network. The system structure was nothing more than battery powered routers installed in helmets that were transported by volunteers protesters called "anteneiros" connected to each other and to available access points on the path. The project was built with the participation of many people in a short period of time, articulated by the creation of a Facebook group. Contributions were made in the technical aspects like the development of the software used and the assembly of the equipment, the development of physical and digital posters, the internet campaign for opening up private networks, the project documentation, among others. This project received considerable attention in online media and social networks both local and national.

Revolta da Antena was essentially a collaborative, community oriented and libertarian project, both in its process of development as in the way it entered the public space of the city, proposing and modifying territorial relations. What we can identify, in specific cases such as the project *Revolta da Antena*, is a synergy that combined different aspects of a social and political context, individuals interested and engaged with a technical spatial infrastructure, in this case, the hackerspace Tarrafa HC. Not all projects have achieved such range, but we emphasize that initiatives of this nature reinforce the transformative potential of hackerspaces.

Discussion

Some aspects regarding the operation of the Tarrafa HC shown to be particularly relevant in the context of this discussion. We realize that our experience made possible to find common elements with the other hackerspaces, contributing to the

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understanding of these as a grassroots contemporary social phenomenon linked to access and popularization of technology. Therefore, we assumed hackerspaces as expanded manifestations of a hacker ethos. The ethos brings about values and practices of creation, collaboration and learning, prioritizing exploratory, free and horizontal processes and actions, as opposed to the systematic and hierarchical model, typical of formal institutions.

Beyond autonomy and appreciation of freedom, the hackerspaces reinforce aspects such as collaboration, exchange of experiences and sharing of resources, while also incorporating other influences such as the maker and DIY culture and the open source movement. In the process, these community spaces combine and trespass several areas - such as engineering, computer science, natural sciences, art, design, and architecture, among others - through the interests, prior knowledge and experience brought by the people involved. However, rather than reaffirming roles, such individuals are imbued with a questioning spirit that often expands the boundaries of their own areas of origin.

In our view, hackerspaces also fit into what Thomas and Brown (2011) refers as a new culture of learning. According to the authors, to cultivate such learning form, we need the combination of two elements: the first is access to the information network and virtually infinite resources, and the second one deals with the existence of a delimited environment that promotes complete freedom within its limits catalyzing the creation and experimentation.

It is also important to note that these structures rely on local communities and are strongly bound to physical spaces provided with material resources. On the other side, they also need a virtual global network that strengthens themselves as a movement and allows the information and experience exchanges, both in the form of common projects and activities as good practice recommendations for managing these spaces. Hackerspaces are trans-local structures (Eriksson 2011). We see that these structures would not be possible without the ubiquity of the Internet, which enabled the formation of collaborative models of empowerment and innovation. Standing between the physical and the digital we can recognize in hackerspaces an essentially hybrid nature of these spaces (Caldwell et al, 2012).

Conclusion

The challenges of the information society requires critical positioning as well as new processes for creation, collaboration and learning. The form of organization and practices associated with hackerspaces have great potential to affect many different areas of knowledge. Such spaces have challenged values defended by consolidated professional and academic structures, with revealed resistance to adapt to the complex social reality. Thus, they have provided us important clues towards redirecting the production processes and contemporary education.

On the other hand, we also understand that hackerspaces, as critical appropriation spaces, currently go through a mainstream assimilation process. In this process, there is the possibility of sanitizing and de-ideologization to make it accessible and palatable. This is natural, considering a typical mode of operation within this assimilation logic: transforming processes into products, services and goods. This procedure excludes any critical and subversive agenda, like the superficial and merely imagery cultural assimilation of countercultural movements of the 60s or 80s' punk movement. The challenge, where rests our particular interest, is to identify and eventually to be able to transport to other areas, some aspects of hackerspaces that actually are transformative and revolutionary.

Some practical and interesting elements found in hackerspaces begin to emerge

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also through other ways, as regards to sharing of spaces and resources for working and production, like the FabLabs, TechShops and coworkings, or even collaborative models of financing and ownership such as crowdfunding and open source. These models have already visible and even irrefutably affected architecture practice and the building of spatial relationships. However, even by sharing these practices and elements, we identified that one of the fundamental aspects of hackerspaces is precisely the most difficult to assimilate. We believe that this factor, understood here as the hacker ethos, is the key element that gives meaning, questions and transforms our relationship with the world.

At this point, our position as architects, participants in a very specific social ecosystem as the hackerspace Tarrafa Hacker Club, have leaded us to ask: what the architects - as well as designers, artists, engineers and other professionals - can apprehend from this type of manifestation, or; what are the effective contributions of each field of knowledge in this contemporary scenario. Questions still without clearly delineated answers, but that push us to go deeper in that process of deconstruction of our images and consequent relevance.

Hackerspaces are systems that de-structure certainties where, as in the CCC Berlin hackerspace, "things are always under scrutiny, under discussion, under attack. Nothing is taken for granted and everything needs to be revisited, taken apart, looked closer at." (Pettis et al. 2011, p. 7).

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