

**transformative
social innovation
theory**

TSI Narrative - Hackerspaces



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About TRANSIT:

TRANSIT is an international research project that aims to develop a theory of Transformative Social Innovation that is useful to both research and practice. It is co-funded by the European Commission and runs for four years, from 2014 until 2017. The TRANSIT consortium consists of 12 partners across Europe and Latin America. For more information, please visit our website: <http://www.transitsocialinnovation.eu/>.

About this Document/ Disclaimer:

This report provides a very short summary of a full case report that includes in-depth case-studies of Hackerspaces. Both, the full case reports and this summary, were guided by four empirical research questions based upon a preliminary conceptual framework of the TRANSIT-project. The four questions concern:

1. the overall development of the local cases and the transnational network(ing);
2. how they relate to different types of change and innovation (incl. social innovation, system innovation, game- changers, narratives of change and societal transformation);
3. how actors are empowered and/or disempowered in and by the local cases and the transnational network(ing), including topics such as governance, learning, resourcing and monitoring;
4. what are other relevant emergent issues with regard to understanding the dynamics of transformative social innovation.

This summary document focuses on the first three questions. It presents – in a highly reduced and generalised format – the interpretations of the researchers, and does not necessarily reflect the views and nuances of the initiatives and respondents themselves. For a full account of each transnational network and local case, including interview quotes and expressed nuances by respondents, we refer to the full case report, which is available via the contact person indicated below or via communication.transit@ihs.nl Both the full case report, as well as this summary document, are the basis for future research activities and publications.

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Transformative social innovation narrative: Hackerspaces

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As part of the European Commission FP7 research project TRANSIT (Transformative Social Innovation Theory), we have been instructed to produce a narrative account about the development of hackerspaces, and to consider how this relates to themes of, innovation and change, and empowerment and disempowerment. Hackerspace activities cover issues wider than TRANSIT research themes. Indeed, the diversity of hackerspaces globally and the varied participation of individual spaces in different networks is a key finding that makes generalising to TRANSIT research questions quite challenging. Moreover, it is important to bear in mind how the methodology developed for TRANSIT research has affected the way we have viewed, engaged and interpreted hackerspaces.

Hackerspaces do not exist in a world of clear networks and governance structures between workshops, and there is considerable diversity in the characteristics of individual hackerspaces. Such realities contrast with a TRANSIT methodology that seeks network representatives and in depth case study limited to two local initiatives. In working with the methodology, we have therefore tried to interview people who have observed or participated in the scene for some time, rather than identifying people representative of a position in a clear network structure. And we have chosen local initiatives that are quite contrasting in history and approach, rather than representative poles in a clear spectrum or map of hackerspaces.

This is not a criticism of the methodology, which works for the TRANSIT project, and which has generated considerable information about hackerspaces and some fascinating local studies. But it does mean our analytical interpretation has to be treated reflexively, contingently and with care, since what works well for revealing themes for TRANSIT does not necessarily permit definitive conclusions for hackerspaces. Our narrative should be read accordingly.

Development of Hackerspace networks and two local spaces

Hackerspaces are community-run workshops where people meet up to engage in projects that are mainly technological, but which can also link to the arts and science. The workshops provide tools and space for people to share skills and

ideas, and to go about their projects in a sociable way. Hackerspaces grew out of (initially online) networks of people interested in software, computing and electronics, and who wanted space to meet up physically and share activities. Over time hackerspaces have extended into fabrication of other objects. Whilst there is an obvious extension into digital fabrication, such as laser cutters and 3D printers, some hackerspaces are also developing competences in more traditional craft and making techniques, including lathes, welding, woodwork, and sewing.

Hackerspaces have no common definition. Whilst some spaces do form loose networks and associations, such as the UK Hackspace Foundation, groups generally resist more formal institutionalisation. What hackerspaces do share is a common set of core principles, though there is considerable diversity in how these principles are emphasised and implemented in practice. There is also diversity in the kinds of physical workshop and workshop cultures such varied implementation creates. Variety can be seen in the governance arrangements, suites of equipment available, size of membership, degrees and forms of openness, financial models, philosophical positions, values around political and commercial orientations, whether any societal issues are of interest or not, and which ones, and so forth. The common principles they work from are: hackerspaces are organised and run by the members; they are not-for-profit; they share tools and knowledge; and they are open to the public.

We adopt the term hackerspaces in our study, although not all spaces use this term. Some are called hacklabs, hackspaces, and makerspaces. Some actors make a clear distinction between terms whereas others use them more interchangeably. For example, makerspace is adopted as a term out of a belief that it is more welcoming and inclusive than the term hacker, which some worry as having deviant, geeky, even illicit connotations (in practice, even governments organise hackathons nowadays, and the verb and noun 'hack' is entering mainstream usage). Whilst some hackerspaces profess a socio-political agenda, associated with original hacker ideals for free culture, liberatory technology, and autonomy, many spaces are more about having fun, and tinkering with technologies within a community of like-minded people. Independence, self-funding and the community created to tinker are sources of pride for hackerspaces.

Hackerspaces, as known today, began in the late 1990s. However, their genealogy is complex and there are confusingly different accounts. Part of the broad history goes back to the origins of computer hacking in the labs of MIT in the 1960s and groups like the Homebrew Computer Club in the 1970s, the Free Software Foundation and Chaos Computer Club in the 1980s. Associated with this hacking scene was a widening free software movement in which people share their code, and believe all people have a right to access the source of any software package. More recently, these 'free' principles have been extended into hardware projects too, and into ideas for commons-based peer-production of all goods and services. So, for example, freely sharing designs and instructions in the fabrication of a wide variety of objects and the construction of a knowledge commons, or the right to open up hardware to tinkering, repair and repurposing (and therefore demands for all goods to be designed to enable such activity).

Hacklabs enabled hackers to meet up physically, code together, and engage in free software and hardware activities. The Chaos Computer Club was influential in helping to spread ideas for hacklabs around Germany, for example promoting them at its annual congress. Some hacklabs were associated with social centres in the anarchist and autonomous scene, and interested in the free culture possibilities of ICT. As more hacklabs and hackerspaces opened, so they began to network and organise events (e.g. hacker camps in Netherlands and Germany). Ideological and theoretical issues were discussed alongside practical hacking activities. The scene combined geeky thrill in coding in ways subversive to the rising software corporations, and a political-ethical position on rights to free knowledge about technologies.

A design guide for creating hackerspaces was developed by activists in Germany, and attracted interest globally. Groups began forming and using the guide for their own hackerspaces around the world. In turn, the growing number of spaces variously began exploring other kinds of technology and different issues.

The design guide was originally produced for an event that gave a further impulse to hackerspace developments. The event was a visit by US hackers to hackerspaces in Germany in 2007. On their return, the US activists opened hackerspaces in New York, San Francisco and elsewhere and, importantly, began promoting the concept around the country and internationally. By 2008 there were around 72 hackerspaces listed on the hackerspace.org website (there are hundreds listed now, though not all are active). Interviewees considered 2007/08 to mark the birth of the 'hackerspace movement'.

An interviewee from our UK hackerspace local initiative case study reported hackerspaces like them started up a couple of years after the movement's 'birth', and was inspired by experience in the US. Indeed, it was Mitch Altman (one of the US 'hackers on a plane' to Germany in 1997) who directly encouraged the Brighton group to get going. Hackerspaces in the UK have grown consistently in recent years, and now number around thirty or so. These more recent spaces, in the UK but also elsewhere, appear much less political in orientation compared to some earlier hacklabs and spaces. The emphasis rests in the fun of tinkering with technologies and developing devices and making things, and creating a community of like-minded people, and in some cases doing some outreach workshops. Fewer hackerspaces seem to retain a socio-political sense of engaging in technology politics or seeding and participating in social change. This impression is based on our interviews with participants and observers of the hackerspace scene. A survey by Keiller and Charter (2014) found twenty-four per cent of hackerspace respondents included 'being part of a movement that challenges wider societal norms' as a reason for participating in hackerspaces. The same survey found 20 per cent of hackerspace respondents reporting commercial activity – although response rate in this survey was low.

Whilst numbers of hackerspaces have grown, networks between them have remained fairly loose. Informal and voluntary networking is consistent with a commitment to autonomy and, in some cases, even resistance to being categorised and delineated into associations. Interviewees found it easier to talk about their local space than about a 'network'. Nevertheless, hackerspaces are in touch with one another. Members of hackerspaces meet at events, like camps

and conferences. Members also visit other hackerspaces, and especially high profile ones, such as C-base in Berlin and Noisebridge in San Francisco. The hackerspaces.org website provides a site for listing hackerspaces and hosts some chats, but interviewees familiar with the scene said the site had become marginal to the development of hackerspaces. Other listservers provide additional forums for discussion, sharing information and links, and comparing experiences on issues. For example, UK hackerspaces chat online about issues in the running of their spaces. Our interviews also suggests that networking is ad hoc, probably more intensive at local or national scales (though not to the exclusion of international connections), and use of networks associated with particular needs, such as building 3D printers, or working on Arduino projects, or free software, or issues in running a space.

Our two local initiative case studies exhibit some of the differences amongst hackerspaces. Hacklab Barracas in Buenos Aires started in 2011. It was one of the first spaces in the country, initiated by people already active in the free software scene. Informed by their political commitments, they decided to become a hacklab in preference to a hackerspace because for them the latter was associated with entrepreneurship, whereas hacklabs were associated with hacktivism, anarchism and self-organisation. Hacklab Barracas is located in a social centre, Barracas Public Library, alongside other projects, such as an urban farm. The Hacklab is strongly committed to anarchist principles of non-hierarchy and self-organisation.

In contrast, Build Brighton adopts a non-political stance. Its creation in 2009 was inspired by the hackerspaces developed in the US, and some of their promotional work. However, Build Brighton has also had to learn how to organise itself, particularly after moving to larger premises, and with a growing membership. It has created a board of directors who oversee financial and legal matters, as well as managing any disputes. The space is nevertheless self-organised: there is a commitment to remain accountable, inclusive and run by the membership.

Around 20 or so people participate in the daily activities of Hacklab Barracas. In addition to developing projects, they participate in activism for free software. They have also developed projects consistent with free culture such as book scanners. Hacklab Barracas also organise workshops, for example for people to install free software. Throughout, the emphasis is on people learning for themselves in a supported environment. If people want to install free software on their laptop, then they come and do it at the hacklab, and members can help if they get into difficulties. The members are not technicians providing a service. Rather, the space is for people to develop their own technical capabilities in solidarity with one another. Visitors either appreciate this philosophy, are comfortable with the hacklab's expectation, and become protagonists in their own learning and development; or visitors do not, and find the unstructured introduction to the space to be challenging. It is an approach that contrasts sharply with the formal training institutions in which people are customarily schooled.

As such, Hacklab Barracas has a manifesto, but no formal hierarchy or organizational structure. Instead, they practice, according to one member, 'ad hocracia' or 'magical anarchism', whereby if people want something to happen,

they can make it happen by the space being open to people to initiate projects, though sometimes the projects won't get anywhere, and other times they can be extraordinary. The free and open approach to organisation mirrors the founding commitments to free culture and anarchy in action. Introducing this style of governance to others can be challenging.

Most recently, some hacklab members are developing a cooperative selling software programming and IT services. The idea is that this will enable them to quit their day jobs, and devote more time to the hacklab through related activities located in the space. A number of software cooperatives have emerged in Argentina from the free software movement, and in the context of renewed interest in cooperatives and solidarity economies in the country. The space already hosts website servers for other organisations. It will be interesting to see what impact the cooperative's engagement with possibly more commercial activities has on the space.

Build Brighton confronts some similar issues, even though its location, history and culture is quite distinct. It was borne out of a meet-up group interested in robotics and connections in the digital culture scene in the city. Even though Build Brighton has a board and some formal organisation, it is nevertheless a membership organisation, and run quite openly. So new members, more accustomed to norms at home, or working in formal organisations, can be perplexed about whom to turn to for permission to do things or to suggest things. It takes time, and sometimes encouragement, for people to appreciate they can propose things themselves. As the hackspace membership has grown, so processes have had to be developed for deliberating on important decisions, disputes, and cajoling one another into the less interesting tasks like cleaning the fridge and pushing the vacuum cleaner around. Attempts are being taken to better introduce new members to how the space works and their roles in those processes.

As with Hacklab Barracas, projects in Build Brighton are self-directed. People learn by teaching themselves and asking or helping one another in the hackerspace. The interviewees emphasised how some members really do enjoy sharing their knowledge and skills. We observed this when at the hackerspace itself, but also at some of the workshops they run for public events, and amongst other hackerspaces participating in Brighton Mini Maker Faire, and which Build Brighton helped establish. Outreach work like this, run by volunteers, provides revenue for the purchase of equipment and materials in the hackerspace. At Build Brighton, commitments to sharing and supporting is borne of the enthusiasm and fun members have for tinkering with technologies. Commitments to free culture or social change are not part of the picture here. As with other UK hackerspaces, and consistent with recent trends claimed by interviewees, Build Brighton is non-political. Some members have visited C-base in Berlin (as well as other spaces) and are aware of more political orientations, but this is not something of interest to Build Brighton. As such, the organisational requirements in place are seen pragmatically and as necessary for everyone to benefit from using the space. And they remain under the control of the membership. Similarly, if people wish to use the hackerspace to help develop entrepreneurial and commercial activities then that is fine.

The links these spaces have with other groups seems to confirm the ‘network’ findings more generally. They are involved in networks in a fairly loose way, and on a like-minded rather than organisational basis. Hacklab Barracas is not so connected with other spaces in the country, but linked more to hactivism internationally and participates in coordinated free software events. This reflects their interests and priorities. Build Brighton is well connected with the UK hackspace scene, and regularly meets up with them at the growing numbers of maker faires around the country. These links seem to be about sharing cool projects and experiences in running their hackspaces. Attempts are beginning to make the Hackspace Foundation more operational, but this too is in terms of helping hackspaces to get started or keep running on a practical level.

Overall, whilst there are generic patterns, Hacklab Barracas and Build Brighton remain different. Though they engage in similar activities in technical learning and community building, the way they go about those activities, the meanings these activities have for participants, their symbolism, and their purposes are all different. Hackerspaces take some core principles and run with them in a wide variety of ways in diverse settings and for plural purposes. Nevertheless, even in the most geeky, club-like, apolitical instances, we think it important to remember that hackerspace principles derive from political ideas for free culture, autonomy, community, and the right to hack technology. Interestingly, perhaps it is in the more apolitical spaces and outreach activities where these ideas might become normalised?

Figures 1, 2 and 3 provide time-lines for hackerspace networks, Build Brighton and Las Barracas respectively.

Figure 1: time-line for hackerspace networks

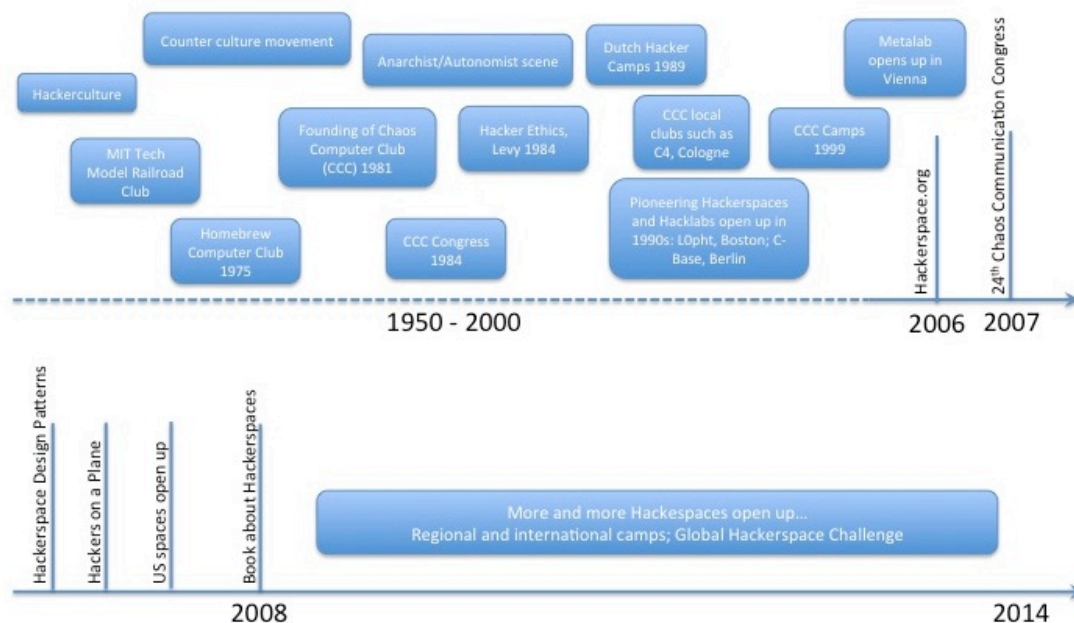


Figure 2: time-line for Build Brighton

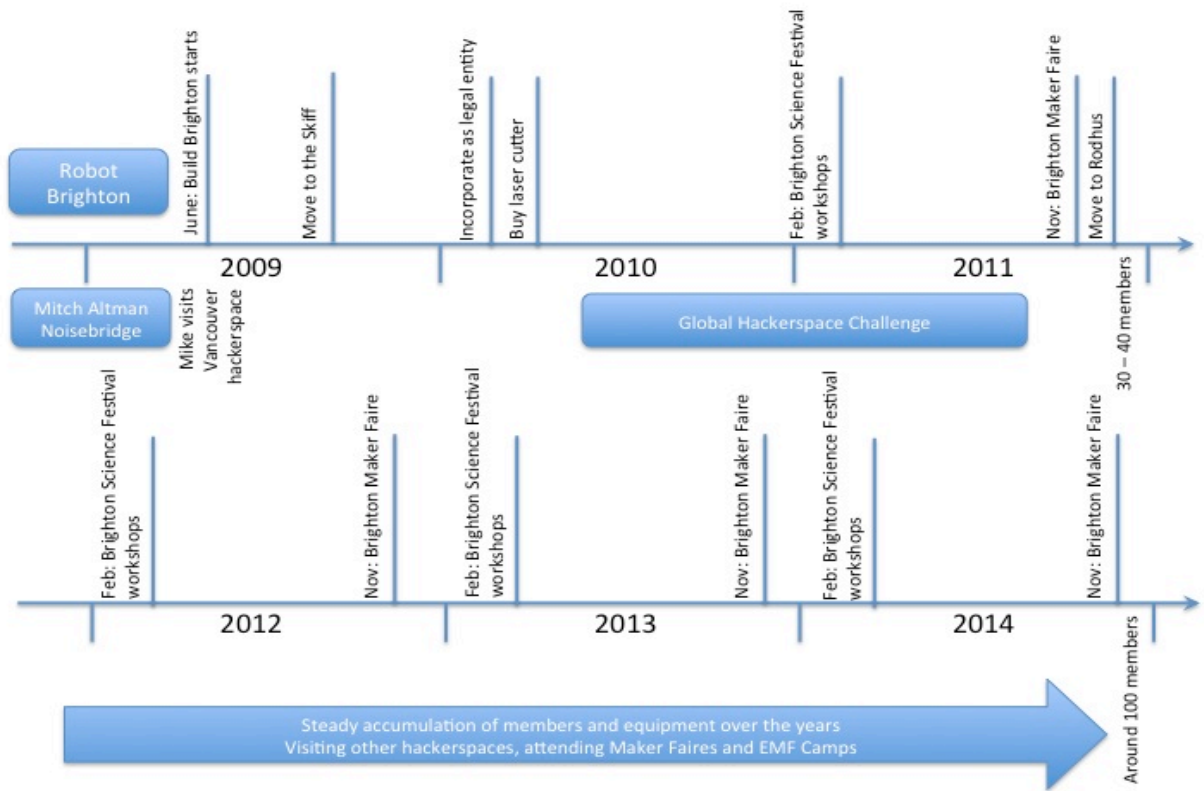
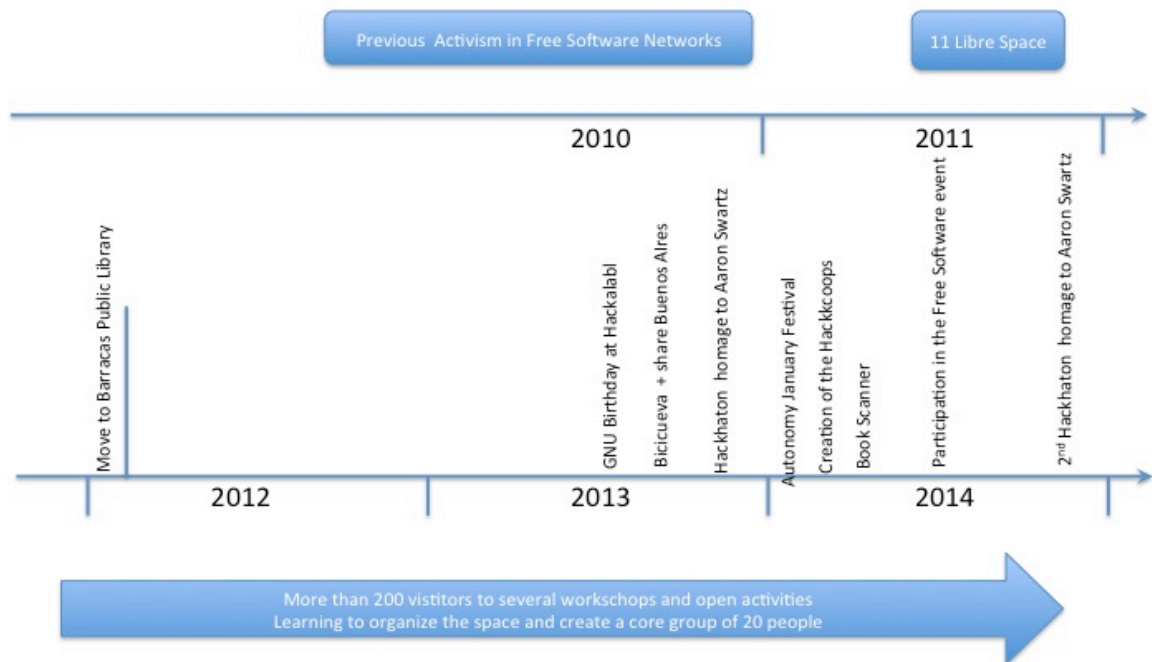


Figure 3: time-line for Hacklab Barracas



2: Aspects of innovation and change

Pinned to the wall of Makerspace Madrid is a Banned Word List. Members have added words prohibited in the workshop. Second on the list when a TRANSIT researcher visited in November 2014 was 'innovation'. Top of the list was 'empowered' (other banned words included big data, smart city, co-creation, internet of things, and bitcoin; handwritten additions included cloud, cutting-edge technology, coaching, and open). Innovation was not a term that came unprompted in many of our hackerspace interviews, and when it did, it tended to be associated with commercial entrepreneurship, which some took to be ok, and others saw negatively.

When we asked Build Brighton interviewees about innovation, they mentioned a few members that had developed products, or used the space to help them prototype and develop their work as designers and makers. This was considered fine: there was a pragmatic attitude to the purposes to which the space was put. Emphasis rested more on the community in the space, and a commitment to sharing. Build Brighton helps cultivate capabilities amongst its members, whether for fun (the case for everyone) or (less frequently) for market, or (infrequently) social aims. Innovation as a term or goal was also absent at Hacklab Barracas. Here, a stronger desire for social change amongst founding members continues through participation in hacktivism and seeking cooperative approaches to developing economic activity around the hacklab.

The real innovation therefore rests in hackerspaces and their networks being a space that promotes an ethos of sharing, inquisitiveness, exploration, fun, knowledge and capabilities in technologies. A space whereby people can easily access new and traditional tools, learn how to use them informally, through self-directed projects, and explore possibilities in a sociable setting. Importantly, these are spaces relatively free of explicit structures and norms in relation to technology: people are free to hack and tinker in their own way, to learn how things work, and explore what else can be done with these devices and materials. What, if anything, people read into the social change potential of such relatively unstructured technological activity is varied.

The Directors at Build Brighton do not see significant social change arising from their hackerspace in its current form. That is not to say it is insignificant as a community or for its members: it does a lot of work introducing people to technology and encouraging them to hack, tinker and open up - have agency over - technologies. But they see hackerspaces and the maker movement as insufficient for transforming the means of production and initiating a revolution that, by definition, affects everyone. Nor do they see that as a priority for members. It is simply not what the Build Brighton community is about. At Hacklab Barracas, core members consider the relations they are developing between participants and with technologies as a physical embodiment of the ideal of free culture and software. It is magical anarchism or ad hocracia in action that challenges current social and economic norms. Autonomy is seen in much more political terms and the creation of social alternatives to neo-liberalism in the country.

An important relationship in hackerspaces is sharing. Sharing takes varied forms. There is sharing in terms of openness and support for self-directed development. At Hacklab Barracas this is part of the ideology. People coming to the lab have to be prepared to take the initiative and have a go. If they get stuck, then help is to hand. And if they wish to do something collaboratively, then they are free to seek it and organise it. Throughout, there is an attempt to enable self-organised interchanges free of hierarchical structures and based in solidarity. Change is measured in the growing numbers of people participating in this free culture.

Some hackerspaces also include more structured forms of sharing. Build Brighton, for instance, runs workshops and outreach, where they do teach people in specific skills, such as wiring and programming Arduino microcontrollers. Change might here be related to growing numbers of people comfortable or even empowered in relation to technology. In neither case does this necessarily mean going as far as self-provision of technology, although abilities to actively construct technologies are cultivated; rather, changes in social awareness of technology, in ways of thinking about technology, and the right to explore and find out how technologies operate and their consequences. Participants move from identifying with technology as devices designed for them as consumers, to a relationship that is more open, creative and empowered.

Although we interpret hackerspaces for the purposes of TRANSIT to be innovative and involved in change through the provision of open, lightly structured, or even unstructured, spaces for collaboration and sharing in technologically oriented projects, it is important to recognise how surveys find hackerspaces to be heavily gendered. Moreover, the majority of men in hackerspaces are predominantly white and well educated. In this sense, some of the structured relations with technology in society more widely do get reflected and carried into hackerspaces.

Hackerspaces that have positively discriminated over issues like gender and race, such as one or two in the US, show these structures can be overcome. And there are instances of hacklabs engaging in technological issues relevant to marginalised communities and helping them overcome problematic assumptions in technological provision from outside. One example, in Puno in Peru, took a state-led implementation of an international programme for distributing one laptop per child, and hacked the devices in order to make them less alien and more socio-culturally relevant to local recipients (Chan 2014).

Hackerspaces are not limited to adapting and sharing knowledge. They share in material resources through the purchase and development of equipment. And they share in the development of conduct amongst members and how hackerspaces govern themselves. Hackerspaces are also about sharing in the community created, and socialising and having fun with people in that activity. Which is not to say there are not conflicts. One of the less comfortable governance issues at Build Brighton, and other spaces, has been to deal with disruptive members, troubled relations and problematic behaviours. Members have to participate in the development of decision-making processes and a culture in ways rarely experienced elsewhere, such as in work places or at home.

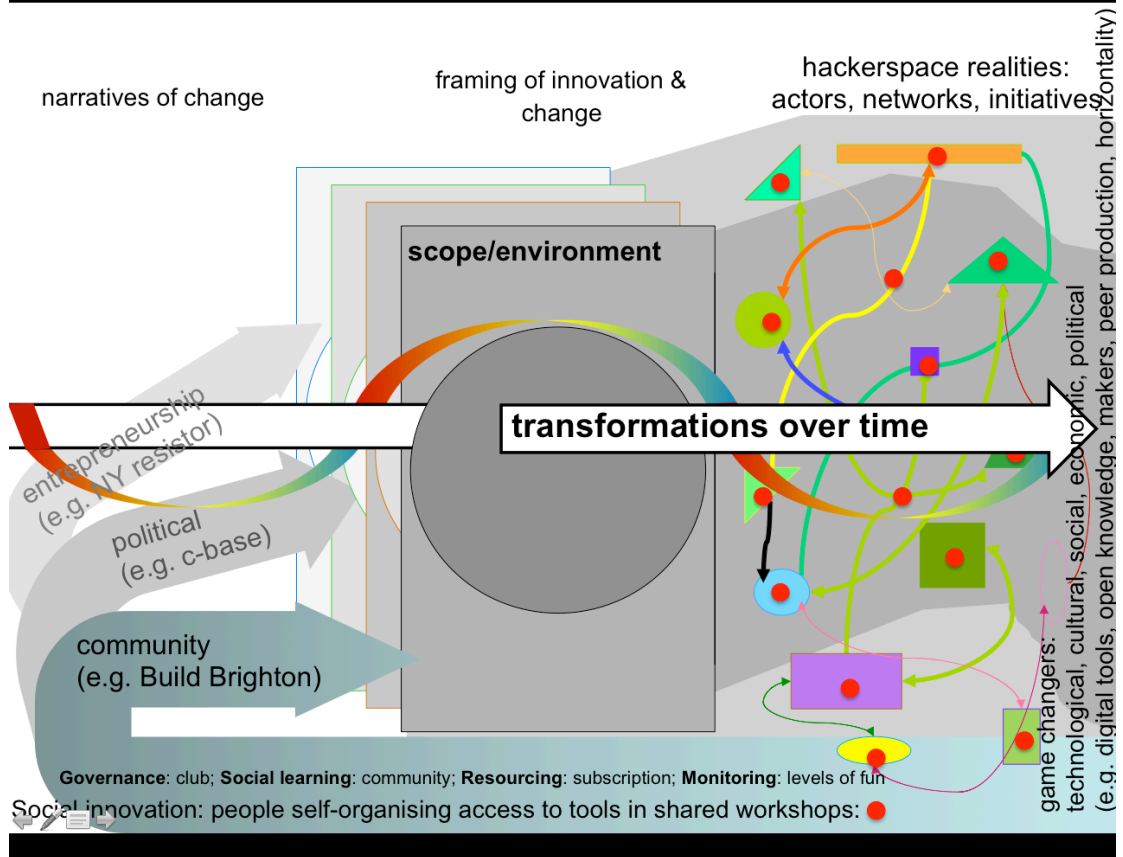
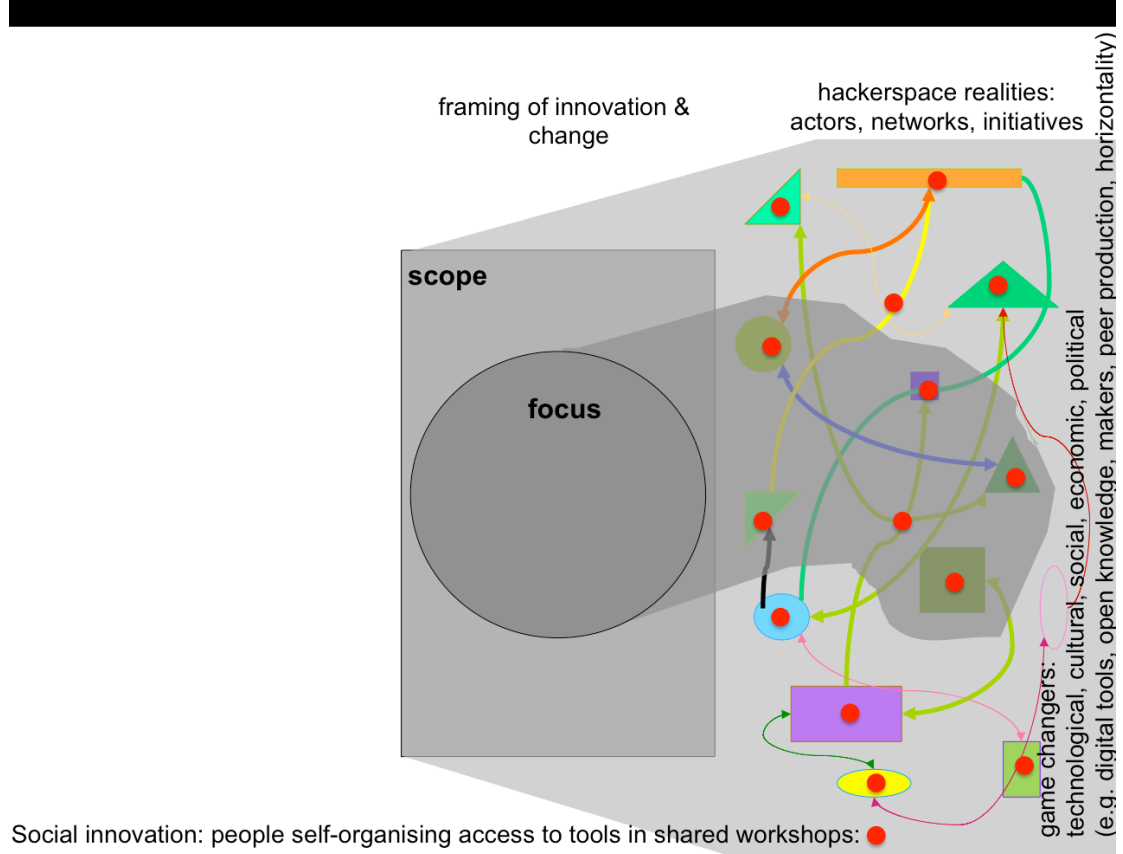
Perhaps some of the devices developed in hackerspaces will become disruptively innovative or contribute to technological revolutions, like the one hyped for 3D printing, and as an earlier generation of computer clubs helped with personal computing (many hackerspaces are active in Rep Rap 3D printing networks and open hardware, and the NYC Resistor hackerspaces provided facilities important to the founding of MakerBot industries). But in our view, the real change will come as the development of hacking sensibilities and ways of thinking and practicing, whether for free knowledge and sharing skills, or less hierarchical and more networked organising in relation to technology, diffuse into society beyond hackerspaces and sister initiatives.

However, on the basis of analogous radical attempts in the past (Smith 2014), then we believe strategies are required for addressing the structures extant in those societies. Such processes (or mechanisms in TRANSIT terminology) are beyond the agency of hackerspaces. We have pointed out that hackerspaces can work to suspend those structures in the workshops if they wish, such as Hacklab Barracas's commitment to ad hocracia or magical anarchism, or the feminist workshops in the US, and indigenous workshops in Peru. However, agency to take that outside workshops into society rests elsewhere.

One place where such agency might be found, in our view, could arise through aligning and joining forces with social movements and institutional reformers. However, the value hackerspaces place in autonomy and independence suggests to us that alliances and their compromises will be unwelcome by many hackers. Therein lies a paradox in hacking: here is a radically different way of approaching knowledge and technology, and yet built into that approach is an antipathy towards institutions and broad-based political programmes; even though the latter may be necessary for overcoming the incumbent social structures that embody and embed conventional approaches to technology in society. Some of our interviewees observed hacking being incorporated into entrepreneurial and mainstream activities, but with a marginalisation of the original political ethos. All this suggests to us that a hacker ethos will spread and develop in societies through cultural rather than political processes. And for many members of hackerspaces, that is just fine.

In Figure 4 we attempt to visualise the complex realities of hackerspace actors, networks and initiatives. Hackerspaces as a social innovation is the self-organised provision of tools by people. The possibilities this brings to people and societies are framed differently (figure 4 – top). Each framing has its own narrative of change – whether in education, entrepreneurship, community or some other – and brings its own particular approaches and emphasis to governance, social learning, resource requirements, and indicators of success (monitoring).

Figure 4: visualisation of hackerspaces as social innovation and transformation



(after STEPS pathways approach)

Moreover, activities under each framing interact with one another, and with structural 'game changers' that are generative for the hackerspace phenomena, and upon which hackerspaces are acting and contributing. All these interactions operate reflexively upon the framings, and prompt reflection and, sometimes, reoriented action on the part of actors committed to the different framings (figure 4 – bottom). Social transformation is the result of these complex interactions over time.

3: Aspects of dis/empowerment

Even though empowered is not a word commonly used amongst hackerspaces, our interviewees did talk about some personal and group effects from hackerspace membership that one could interpret as empowering. Empowering effects took on a variety of personal and social forms. Examples include, an unemployed youth with a disadvantaged and troubled background finding their talents (and work) in digital fabrication thanks to participation in a hackerspace; people feeling part of a community; participating in a culture with greater confidence over technology; a degree of autonomy from mass production and an ability to self-provide in areas like furnishings, energy monitoring, or media systems.

The governance of our case study local initiatives has had to adapt over time. The initiation of Build Brighton and early development was helped by founders and early members already being situated in various relevant networks locally, and generally associated with digital culture and economy in the city. As Build Brighton has grown, however, so the governance of the space has had to adapt to increasing members, more activities and equipment, and other demands. In the case of Hacklab Barracas, the commitment to unstructured self-organisation is stronger, but even here there is recognition that this is not easy for everyone to embrace, and that they have to welcome newcomers into self-organisational approaches they learned through years of activism. At root in both cases, and across the diversity identified in network level interviews, is the desire to keep an evolving community healthy, respond to issues as they come along, without losing sight of the founding principles and ideas. It is not always easy. Many of these issues have arisen in the preceding section since the innovativeness in hackerspaces rests in cultivating freer and more open relationships with technology.

The non-hierarchical and open-ended approach to social learning typical in hackerspaces can be quite demanding for people schooled in societies with more hierarchical teacher-student power relations. Nevertheless, the conviction in hackerspaces is that attaining new knowledge and skills by sharing amongst a community of peers can be empowering. Collectively, members have deep knowledge about a wide variety of matters, or can work in different ways to find out from one another. Often this can be very geeky knowledge. But in our discussion with participants, and as researchers observing this activity, we notice something else going on here, which is how this pursuit of technical knowledge and fun in these workshops is tapping into another social need, which is to be part of a community, even amongst awkward geeks, and how the

object of hacking technology facilitates, mediates and satisfies a need for relationships and sociability. It is about material culture.

Hackerspaces are self-financing and develop their own resources autonomously. It is not only a matter of principle, but also a source of pride. Developing a space out of the resourcefulness of the community can also be empowering for that community. How far this goes however is unclear. Some hackerspaces are open to people moving into commercial activity. But views are mixed. The commercial sponsorship of events, for example, can become a source of debate for some spaces, and welcomed by others. At heart, hackerspaces rely on the enthusiasm and commitments of volunteers.

We found hackerspaces to network informally and loosely. Sharing between hackerspaces takes a variety of voluntary forms. Information, knowledge, skills, equipment, competitions/hackathons and joint projects, open evenings, workshops for the public, visiting other hackerspaces, meeting at events like camps. Some online chats and sharing of knowledge and experiences, but these are reinforced and facilitated by physical meet-ups at events and through visits. Hackerspaces are at liberty to do what they want. These are informal networks, no one can come along and say what a hackerspace is doing is wrong or contravenes the mission of the network. Hackerspaces are free to interpret the core principles as they wish, and prioritise those relevant to their communities and settings. So a wide diversity of spaces has developed.

As such, and unsurprisingly, there is no system of monitoring and evaluation for hackerspaces. Each space has a sense of how it is doing, and is curious about other spaces, in terms of the health of the community, memberships, how the hacker ethos plays out in spaces, and so forth. Projects are documented in some cases – a form of record of activity, but really about facilitating sharing through replicability, copying and adaptation. Success rests in a project working, and sometimes being taken up by others; the vitality of the community and a hacker way of thinking; and the tools and space being in good working condition.

A commitment to autonomy is probably the reasons why we found little evidence of hackerspaces subject to indicators or metrics of outside agencies and institutions. Some spaces have talked with local authorities and others in more open terms about partnering on some activities. But any more formal ties will, in our view, require institutions to really appreciate where hackerspaces are coming from. The openness, unstructured, and open ended and flexible purposes of these spaces can be difficult concepts for increasingly audited and narrowly instrumentally driven institutions. People do not come to consume knowledge, culture or services, as they do in libraries, arts or training centres. Rather, these are spaces with tools that allow people to produce whatever they want. So metrics of performance are challenging when institutions fail to understand the concept in all its open-ended and flexible possibilities.