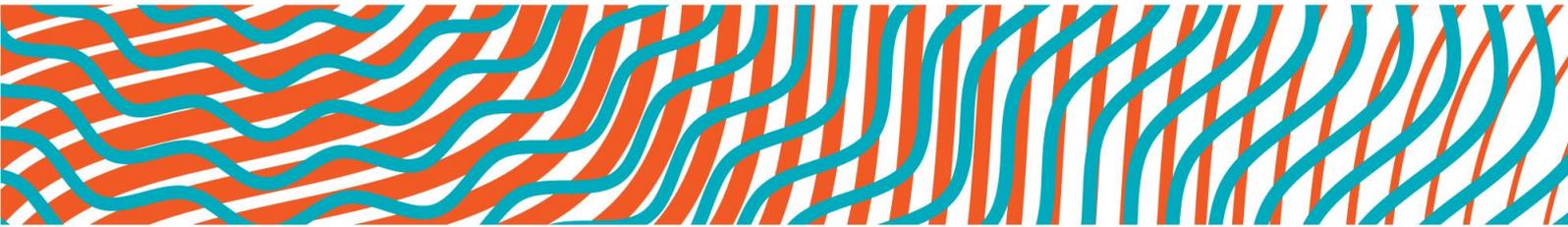


transformative social innovation theory



WP4 | CASE STUDY Report: Hackerspaces

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1 Introduction to Hackerspaces

'Hackerspaces are community-operated physical places, where people can meet and work on their projects. In short, it is a real location (opposed to an online meeting place) to gather with like-minded people and hack' (Hackerspace website, hackerspaces.org 2010). Projects are mainly grounded in software and hardware developments, whilst experimenting with computing and digital fabrication machines, (such as laser cutters) and getting engaged in areas like technology, science and art (including robotics and electronics).

Hackerspaces (as they are known today) started in the late 1990s and have become more widespread in the second half of the 2000s (Moilanen 2011). Since then, members of Hackerspaces have started to focus on the more social aspects of their activities and created physical spaces in which they could work. Areas of discussion and project work have focused on topics such as 'free software development, computer recycling, wireless mesh networking, microelectronics, open hardware, 3D printing, machine workshops and cooking' (Maxigas 2012, p.5). Several events and talks have enabled the steady development of new Hackerspaces all around the world since 2007. For instance, a project called 'Hackers on a Plane' brought together hackers from the USA and Europe. Discussions became more globally shared and coherent through setting up the hackerspaces.org website in 2006.

Today, the Hackerspace community encompasses about 400 member locations all around the world – half of them are under construction or inactive (Troxler 2010). A coherent and agreed upon definition of Hackerspaces does not exist within its own 'network' or in the academic literature (which is still scarce) (Moilanen 2011). After conducting a global survey of Hackerspaces, Moilanen(2011) has come to suggest that most participants do not want to rigidly delineate the 'network' and its activities, and even regard the non-demarcation as one of its main features. Some of the members are concerned about non-members reactions to the word 'hacker' (considering past connotations to illegal activities when referring to the term), and therefore prefer not to use it. Several definitions have therefore evolved over time with varying emphasis on the spaces' activities, ethics and aims.

Although this is the case, in his study Moilanen(2011) derives at several criteria to which most of the Hackerspaces comply: 1. They are self-declared communities that are independent, not for profit and membership based (i.e. the set up, ownership and governance of Hackerspaces are within the hands of its members); 2. Members have a common space in which they share their tools and knowledge; 3. Activities often have a strong emphasis on technology and science issues that are explored through processes of trial & error and sharing information; and 4. The space is open to the public (at least for some of the time) (Moilanen 2011).

The life of a Hackerspace is influenced by the way it evolves over time and mixes with others and whether the space currently lives or hibernates (Moilanen 2011), and how it has been set up and is being run (Maxigas 2012). These developments partly depend on the members' interests, efforts and aims (e.g. not all members are interested in the same set of technologies such as phones, hardware, biohacking and games), their projects (e.g. whether they are collaborative or not), their relations to other Hackerspaces and their own governance structure. Investigating these structures, Kera(2012, p.2) has argued that

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'The physical location of the space (from industrial buildings to office spaces, private garages or even heritage houses) or legal status of the organisation (non-profit, company, informal gathering) are secondary to the actual processes of governance and innovation, which are rigorously tested and described on the wiki'.

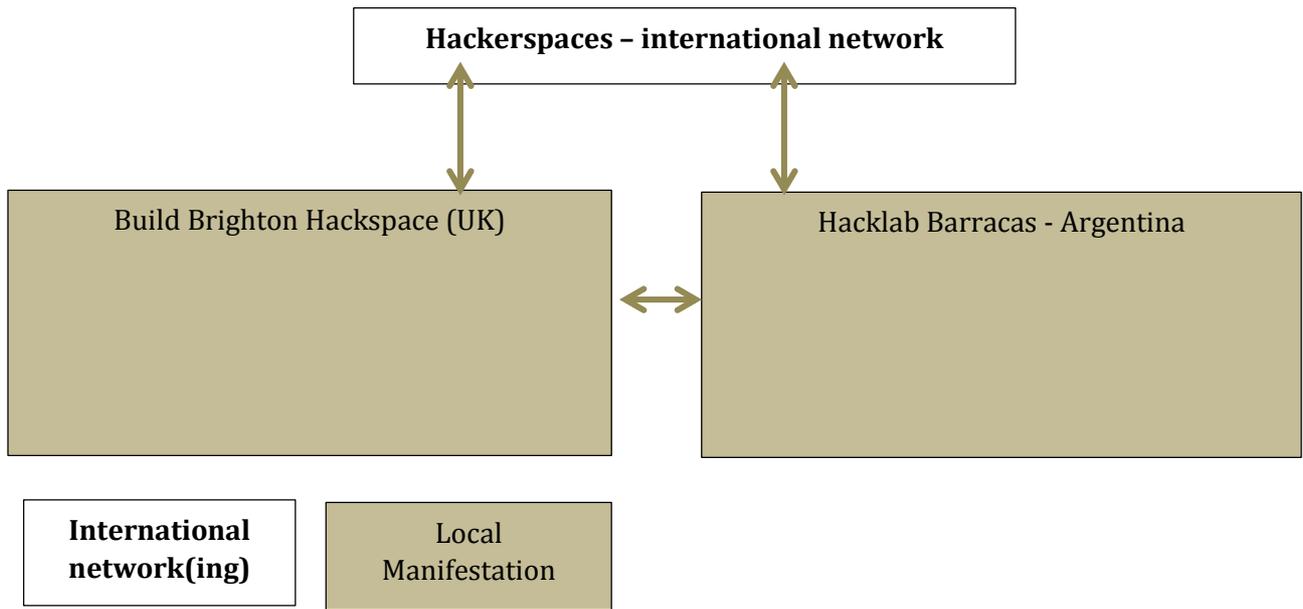
An open membership model has been widely advocated from the start, including the engagement with old and more novel technologies and the focus on learning, sharing, and cooperation. Membership fees and donations (without any conditions attached) seem currently to be the most preferred way of funding spaces. Company donations and government support mechanisms are frequently associated with losing the independent status of workshops, as members might have to comply to several conditions attached to the support, and therefore are a less preferred option (Moilanen 2011). The ambition to keep Hackerspaces independent from other institutions is also partly reflected in members' motivations to join and be part of a space. In addition to wanting to meet other like-minded people, and to have fun together, members often have altruistic motivations for joining a space and a strong commitment to the community (Moilanen 2011). A typical Hackerspace member spends on average about ten hours a week on Hackerspace related software and hardware projects. This 'member is a 27-31 (29%) years old male (90%) with college level or higher education, committed to one hackerspace' (Moilanen 2011, p.8).

Although most members are not keen to develop a shared definition of their activities, the collection of members and 'micro' spaces are interwoven, networked with each other and make up a global, transnational community (Kera 2012).

'The global network is simply a platform that enables hackers worldwide to share best practices concerning how to manage independent spaces based on open access, open source software and hardware ideals, while working on their individual and collective prototypes' (Kera 2012, p.2).

Common activities (and their magnitude) vary between members and spaces. They consist of sharing information, knowledge and equipment, conducting competitions (such as 'Hackathons', 'Call-in-s', and 'Tuesday meet-ups'), visiting each other's spaces and collaborating on projects. These events give people the opportunity to share information, knowledge and experiences, intending to address numerous skills and technical issues (such as soldering skills, biohacking, and programming languages) (Moilanen 2011). In addition, they are important to confirm social ties, 'to perform and thus confirm what are otherwise more frequent, though more prosaic forms of virtual sociality... [and in the process highlighting] how social enchantment and moral solidarity... is central' to their activities (Coleman 2010, p.47).

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2 Methodology

2.1 Researcher relations to the case

Previous to the Transit project, the research team had an interest in Hackerspaces but had not deeply engaged with any of the practitioners. The team therefore decided to have an explorative and flexible approach to identifying local initiatives and transnational network interviewees. Events have been crucial to develop informal relations with practitioners that could be followed up at a later stage. This has particularly been the case for approaching Build Brighton Hackspace and the Hacklab Barracas - Argentina. The research team had acknowledged the interactive dynamic of the relationship between the researcher and practitioner. This includes the recognition that during the data gathering a researcher is part of the creation of reality, as knowledge is produced through the interaction between both. The research team offered all of the practitioners who participated in this fieldwork to be able to read and comment on this report.

2.2 Methods

2.2.1 Overall methodology

Over the period of May 2014 – December 2014, the research team has conducted interviews, participants observations and a document review (see details below) for the transnational network: Hackerspaces and two local initiatives: Build Brighton Hackspace and Hacklab Barracas Argentina. As part of these research activities, the team tried to cover all of the research questions in similar depth but leaving enough flexibility for other themes to emerge. For instance, although, the interview topic guide provided some foundation to each interview, unexpected themes were allowed to emerge, whilst researcher's responses happened spontaneously and in response to the informants' answers. During most of the interviews, it became apparent that there were too many themes to cover within the guide. The researchers had to go through a long list of topics. Some of the answers therefore felt a bit broad and more depth was missing. The researcher had to strike a balance between covering all the themes and gaining enough detail to develop an understanding of the network. Similarly, some of the key conceptual and theoretical terms were frequently 'translated' into terminologies the practitioners used themselves.

2.2.2 Interviews

Transnational network:

Sampling: A list of a wide variety of actors (such as researchers and pioneers) and some organisations (such as the Chaos Computer Club) associated with the network was assembled through attending a Hackerspace event and conducting long internet searches and initial interviews. This list aided the process of choosing the first possible interviewees and developing a sampling strategy. Identifying practitioners who had an overview of the 'network' and not only of their local initiative turned out to be extremely difficult. This is partly the case because of the informality of the 'network', creating hardly any structures and organisations and dispersed infrastructures. Watching YouTube videos of Hackerspace events and talks and reading up about

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events on the internet was a way to slowly identify some of the key actors and then approach them for a possible interview.

The first interviewee consisted of a researcher who had conducted research in the area for the last year (and had an substantial overview of the network) and practitioners with whom the research team had previous informal conversations in order to gain some first insights into the network and who to interview (drawing on a snowball sampling). The final nine interviews consisted of two university researchers, two practitioners who also are involved in studying Hackerspaces within an academic institutions, one practitioner is connected to the Chaos Computer Club and another who was involved in setting up the hackerspace.org website, and three practitioners who are heavily involved in a local initiatives and have a good overview of the 'network'.

The small sample size and difficulty of identifying and contacting key actors meant that it was not possible to incorporate all aspects of diversity. The absence of some practitioners might limit the possibility to show the full picture of the network and skew some of the results. Moreover, some topics and themes, including the history of the network, are being told in several different ways depending on the interviewee's own experiences and interpretations. The telling of multiple narratives makes it challenging to identify one interpretation of the network aims, structures and history. Whenever possible such limitations were addressed through listening to practitioners on internet-based videos and/or looking at secondary data.

Conducting the interviews: Three of the interviews were conducted face-to-face and the other half was carried out over Skype, between August 2014–October 2014 (some of them were conducted earlier since May 2012). The length of the interviews varied between 1-4 hours. Three interviews were transcribed verbatim whereas the rest consisted of detailed notes and quotes (some had to be translated into English because two of the interviews were conducted in German).

Sampling local initiatives:

An excel list of Hackerspaces, based in Latin America and the UK (and other European labs that have written English or German websites) was assembled, drawing upon the hackerspace.org website (i.e. a site where each lab has the option to introduce their space). The site was used to familiarise ourselves with a variety of spaces (i.e. their aims, activities, projects, technologies used) to formulate a sampling strategy and select the two local manifestations (for more information on these Hackerspaces see: <http://grassrootsinnovations.files.wordpress.com/2014/08/gdf-rb24-uk-web.pdf>). From this list several sampling strategy ideas (whilst considering the Transit aims) were brainstorm such as selecting cases that were particularly influential in the network or typical (representing several labs). Attempts to categories these labs into groups often felt like an impossible task because of the sheer diversity in aims, partnerships, resources, etc.

In Argentina, we did an exploratory interview with Agustín Zanotti, a local researcher on Hacker Culture and Free Software Networks in order to get a panorama of trends and spaces in the country. As part of the initial research on Fab Labs we were also able to contact a long standing hackerspace: Garage Lab. However, successive attempt to meet them were unfruitful, in part due to the time of the request at the end of the year. We then reached to Hacklab Barracas, through a personal contact with one of the participants in the lab. Hacklab Barracas was interesting because it has previous links with free software networks and shared space with other initiatives in a Public Library in the south of Buenos Aires city, this includes an urban farm and an open bicycle workshop. Some of the members of the Hacklab were also in the process to form a software cooperative, a movement that according to Agustín Zanotti was shared with other free software groups along the country (Agustín Zanotti interview). Overall, these elements made the choice of Hacklab Barracas interesting to explore different aspects of social innovation. We conducted an interview with a representative of the Hacklab Barracas in September. The interview lasted for 1

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hour and a half. We also have informal conversation with other members during the visit to the lab and after the visit. In ideal conditions the research should have been completed with some more interviews in other local hackerspaces, however we have been unable to reach other hackerspaces in the region.

The research team had been in contact with a major UK Hackerspace and were hoping to use this as our local initiative case study. Unfortunately, despite best attempts, this possibility fell through, and the team had to recruit another space at short notice (mid-November 2014). The team was able to use local connections to arrange a collaboration with Build Brighton, a Hackspace local to Sussex University. This had the advantage that one of the researchers could draw on observations and discussions with Build Brighton members at two Makerfares in the city, as well as attend an Open Evening at the space. In-depth interviews were arranged with a founding Director of Build Brighton, and who is also a prominent member in the UK Hackspace Foundation, and with a newer Director of Build Brighton active in the UK Hackspace scene. Interviews lasted 1.5 to 2 hours and were transcribed for analysis. Ideally, the researcher would have conducted in-depth interviews with other members of Build Brighton but were unable to in the time remaining for case study research.

2.2.3 Participant observation

Transnational network:

Participant observations were carried out at the UK based Electromagnetic Wave event in London 2013, in three Hackerspaces (single visits) in Denmark, Germany and Holland and at the Brighton Makerfaire in 2013/2014. In addition, the research team conducted a World Café discussion with local practitioners about digital fabrication at the 6th Living Knowledge Conference in 2013. During these events, the research team was able to gain an overview of network, in particular its structure, debates, and activities, was able to use and experiment with the technologies in these labs themselves, get an overview of the diversity of local manifestations and talk to a variety of different actors through informal conversations.

Local initiatives:

As pointed out above, Build Brighton participant observation included the Brighton Makerfaire that they are heavily involved in organising. One of the researchers observed attendance at the stall Build Brighton had at these events (something the team also did for other Hackspace stalls at the Makerfares), participation in a workshop on hacking toys, observing how the public interacted with displays at the Makerfaire. The event was also used as an opportunity to discuss with Build Brighton members about their participation in the space, the kinds of projects they are involved in, and their views on the community at Build Brighton. Finally, one of the weekly Open Evenings at Build Brighton was attended and discussions held with members and other visitors. In all cases notes were taken.

In the Hacklab Barracas we were able to do non-participatory observation during one of the open days on Saturday. We observed the process of organization of the space, from the opening to the arrangement of activities and the dynamic of relation with the rest of the workshops at the public library. Most observed during the visit included programming and some tinkering with technologies, in particular a book scanner. The visit was used to conduct our interview and have informal conversation with some other members of the Hacklab.

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2.2.4 Document reviews

Transnational network:

A literature review of journal and media articles and practitioner reports was conducted in from January to May 2014 in order to examine existing analytical themes, methodologies and debates addressed by previous research and practitioner work relevant to community-based digital fabrication workshops. The review provides reflections on three critical issues: sustainability, inclusivity, and creativity. For more information and amount of documents see: <http://grassrootsinnovations.org/2014/09/01/grassroots-digital-fabrication-a-literature-review/>). In addition, various web-based materials, including videos, wiki pages and more general searches (collated for each interview to familiarise ourselves with the interviewees) were added to the analysis.

Local initiatives:

The Build Brighton website and public email discussion lists were studied in order to get an understanding of the organisation and working of the space. In addition, research team looked for material on personal web-blogs of people involved in the Hackspace scene in Brighton.

In Argentina we began by a small review of publication of the free software movement at the region. We then revised documents posted in the webpage of the Hacklab Barracas. This included the Hacklab Manifesto and a wiki line of projects. Finally, we also reviewed some interviews posted in the website of the local hacklab.

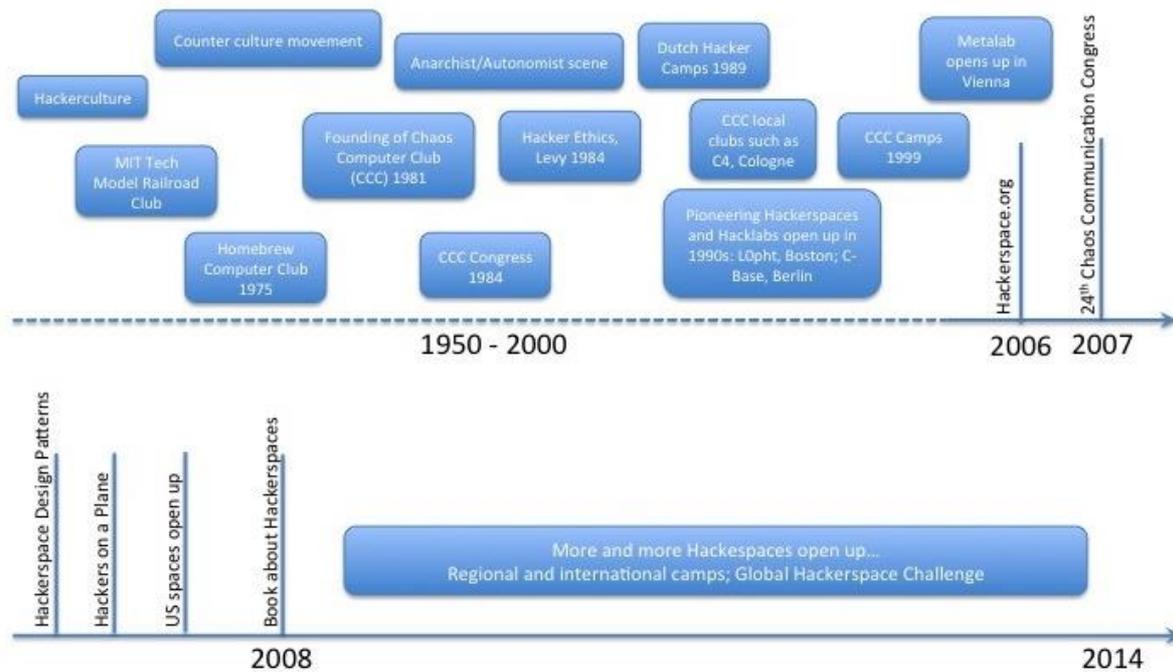
2.2.3 Analysis of the data

The qualitative analysis programme 'Nvivo' aided the process of indexing the interviews, notes coming from observations and secondary data documents. All of the themes were based on the Transit topic guide. The development of detailed descriptions derived from the emergence of patterns and repetition were identified across the interviews.

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3 Analysis of transnational network(ing)

3.1 Transnational networking: Hackerspaces



Timeline Hackerspace 'network'

Identifying the origins of the Hackerspace 'network' is not a straightforward process. Interviewees and internet-based accounts of Hackerspaces provide mixed versions of their history. A few accounts go as far back as 1961, to the MIT Tech Model Railroad Club, which some say are the beginnings of the hacker culture. Other accounts tell the history by either drawing upon the Homebrew Computer Club, the free software movement, hacker ethics or Hacklabs. The Homebrew Computer Club, founded in 1975, created several clubs where people could take apart and build their own computer and are sometimes considered to be the first inspirations for Hackerspaces. The free software movement was born from the followers of the hacker ethics in the early 1980s. The term hacker ethics originated out of Steven Levy's 1984 book 'Hackers: Heroes of the Computer Revolution' where he associated the term with freedom of information and improvements to quality of life. Early forerunners of Hackerspaces are also considered to be spaces such as New Hack City and L0pht based in the US that at the time did not publicise their work and mainly consisted of a close-knit group of people.

To be able to make sense of the history of Hackerspaces (and the variety of stories surrounding them), one of the interviewees makes a distinction between Hacklabs and Hackerspaces (in one of his publications) as for him they share the same cultural origins but often have different historical and political starting points (Maxigas 2012) (both, labs and spaces came up in the 1990s).

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Hacklabs originated out of a broader anarchist/autonomous movement (confronting a capitalist society) and are often based in community media labs and squatted social centres. These communities have developed an overtly political and ideological orientation whereas Hackerspaces focus on advancing innovations through digital tools for social and economic goals. He acknowledges the entanglements of accounts to tell the history of Hackerspaces but also points to a shared cultural heritage in the following interview quote,

'There are several things that mix here, and it's hard to separate them in the writing of the history, because there is north and south, there is Hacklabs and Hackerspaces, there is Germany as a centre, and then there is the other countries at the periphery, but one thing that I found was that there were communicating through the American hacker culture... all of them refer to MIT, to the Home Grow Computer Club... they [spaces around the world] made sense of this message from far away in a way that interprets that context of their everyday social life, and their culture and so on' (Academic researcher and practitioner, interview, 29th September 2014).

The important role of Germany in the development of Hackerspaces, in particular of c-base, a Hackerspace in Berlin and the Computer Chaos Club e.V. (CCC), was mentioned by several interviewees and internet-based accounts. The CCC was founded in 1981 and has become the largest association of hackers in Europe. They provide information on 'technical and societal issues, such as surveillance, privacy, freedom of information, hacktivism, data security and many other things around technology and hacking issues. As the most influential hacker collective in Europe we organize campaigns, events, lobbying and publications as well as anonymizing services and communication infrastructure' (CCC website, <http://www.ccc.de/en/>). In addition to setting up their headquarters, the CCC created physical regional spaces across Germany that some regard as the recent forerunners of Hackerspaces (such as C4 in Cologne). Such spaces were different to earlier versions in that they started to open their doors to a wider public.

'Hackers could be perfectly open about their work, organize officially, gain recognition from the government and respect from the public by living and applying the Hacker ethic in their efforts' (Farr 2009).

'They [CCC] took the brand of hacker and turned it into something positive... and just showing that you can institutionalise these places, they created amazing spaces and more or less by accident, because it just somehow grew out of it' (Paul Bohm, interview, 4th August 2014).

To summarise some of the key historical developments, Moilanen (2011) identified three waves in the history of Hackerspaces. The first one occurred during the 1990s and was characterised by attempts from hackers to move from their homes into larger physical spaces where they could share an infrastructure (this included spaces such as L0pht in Boston). The second wave happened during the late 1990s. Some spaces were already established and first discussions about the ideological and theoretical development of Hackerspaces emerged (such as c-base in Berlin). Some of the hackers were keen to be open about their work (in particular, through promoting free access to the internet) and wanted to gain some wider recognition for their activities. The third wave started at the beginning of 2000s and includes the more recently established spaces.

The transition from the second wave to the beginnings of the third probably is the most well documented time within the 'network'. The turn towards meeting up in physical spaces (rather than

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creating internet-based communities) and the creation of several organisation forms (frequently based on open membership models) was partly initiated through an increased interest in electronics and the established trend of tinkering with computers, including the invention of Arduino in 2005 (a programmable microcontroller board for amateurs) that made these activities accessible to a wider audience (Academic researcher and practitioner, interview, 29th September 2014). Hackerspace members wanted to connect more closely with their surrounding community to offer knowledge and skills, sometimes as parts of classes, discussions and courses, around technologies. Members of Hackerspaces started to regularly meet up at congresses, camps and Makerfares to work and socialise together. Repeated hacker camps have been organised in the Netherlands since 1989 and Germany since 1999 (mainly by the CCC). For example the Chaos Computer Congress has become one of the largest annual hacker conventions.

At the 23rd Chaos Computer Congress, Nick Farr attended several Hackerspace sessions. He was fascinated by the idea and wanted to bring it to the US. A few months later, he had the idea for the 'Hackers on a Plane' project and applied for funding to get several people from the US over to Germany to the next Congress. In August 2007, Nick Farr, Mitch Altman, BrePettis and a few others flew over to attend the Congress and visited Metalab (Vienna), c-base (Berlin) and C4 (Cologne).

'I was really inspired by the Congress and c-base... realised what was missing that in the US we did not have Hackerspaces that were open to the public... to have a physical space where people could meet up... we had private spaces such as The Loft that were very hidden' (Nick Farr, CCC congress, you tube, 2008).

'I went on Hackers on the Plane... it was magical. We went to C4, Tropia... we did as much as we could in two weeks... then I spoke to George and we realised we are from the same place so we decided to set up a space... so we decided it should be called NYC Resistor' (BrePettis, CCC congress, you tube, 2008).

Some say that the 'birth of the Hackerspace movement' (CCC congress, you tube, 2008) was instigated at the Chaos Computer Camp and Congress in 2007. There were a series of talks at the Congress on how to set up a Hackerspace, in particular one, called 'Hackerspace Design Patterns' given by Thorsten Haas, Lars Weiler and Jens Ohlig (from the C4 in Cologne) that became influential in supporting the set up of several spaces after the event. The Hackerspace Design Patterns consists of a list of challenges that might occur when setting up a space and suggestions how to overcome them.

'In Cologne we had the idea not only to show how the space works but also give them a blueprint out of which derived the Hackerspace Design Patterns. The Design Patterns originally came from architecture... this concept was then translated into coding language... and a lot of people could understand it' (Transnational networker, interview, 3rd October 2014, translated from German).

After their return to the US, the participants of the 'Hackers on the Plane' project widely presented their experience under the title 'Building Hacker Spaces Everywhere: Your Excuses are Invalid'. The doors of NYC Resistor in New York, HacDC in Washington and Noisebridge in San Francisco were opening between late 2007 and early 2008 and many where to follow the years after.

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'People took it and then they ran with it and then they gave it their own touches' (Paul Bohm, interview, 4th August 2014).

'Suddenly you have all these spaces and each of them has a different flavour. None that I've seen are really alike, you know. Some are very innovation focused and others are very socially focussed and some are very design focused' (Paul Bohm, interview, 4th August 2014).

Whilst setting up the Metalab in Vienna, Paul Bohm and a few others had the idea to buy the hackerspaces.org domain and make a Wiki page out of it in 2006.

'I remember that it was basically a one night job of just pulling up the thing and I think one of the guys suggested we can use Semantic MediaWiki... and then people of the Metalab started seeding this. And then we sent it out... It suddenly was everywhere' (Paul Bohm, interview, 4th August 2014).

It took until 2008 for spaces to populate the website (there were around 72 Hackerspaces listed on the site). In particular, during the following few years the website became a way to communicate between Hackerspaces (including mailing lists, a list of Hackerspaces, support material, etc.), displaying the slogan 'build! unite! multiply!' (Hackerspace website, hackerspace.org). In 2008, a book of Hackerspaces came out, including the description of the key spaces, interviews and the Hackerspace Design Patterns written by BrePettis, AsteraSchneeweisz and Jens Ohlig.

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3.2 Aspects of 'innovation' and 'change' of the transnational network(ing)

The years of 2007/2008 marked for some of the interviewees and internet-based discussions the 'birth of the Hackerspace movement' (CCC congress, you tube, 2008). Spaces were set up all over the world and an infrastructure for exchange started to emerge. Nowadays, interviewees are much less enthusiastic about calling the collection of Hackerspaces a movement.

'Well, they are not part of a social movement for several reasons. One is that I don't think that a social movement theory works very well on them... When you ask them, they say they are not a social movement. They don't have any explicit goals to change society for the worse or for the better. Generally, a lot of them actually don't really care about other people, and what is happening to them... it's wrong to say that they are a social movement, because then you give them too much credit, and they should, if they are any kind of social movement, they should try much harder to be one' (Academic researcher and practitioner, interview, 29th September 2014).

Although Hackerspaces engage with each other, such interactions are rather opportunistic and ad hoc. Because of most spaces key belief against centralised organisational forms, efforts to mobilise towards common goals or unified infrastructures are not really pursued. Currently, Hackerspaces make up a 'loose network' (Jarkko Moilanen, interview, 5th September 2014) where any space can join (through an introduction of the space on the Wiki page), visits to each other spaces are welcomed and several events (not only linked to Hackerspaces) allow people to get to know each other. This 'loose' network is also signified through a diverse set of spaces that vary in relation to governance models, financial models, philosophical models, membership size, values around commercial and political activities and interest in societal issues, just to mention a few possible categories. In a recent Hackerspace survey (conducted by Keiller and Charter 2014) one of the respondent commented that 'every (Hacker)space has its own taste, so no two are exactly alike'.

To talk confidently about a 'network' and how it relates to 'change', 'innovation' and 'empowerment' is consequently a near to impossible task when trying to make sense of the collection of Hackerspaces. Even during the fieldwork, interviewees seemed more comfortable talking about their own local space than the 'network'. Sometimes when making statements about the 'network' interviewees were careful to point out that these might be assumptions, stating 'I don't have proof of this' (Jarkko Moilanen, interview, 5th September 2014). The below accounts should therefore be read with this in mind, questioning the accounts representativeness and keeping in mind the diversity of spaces and interpretations.

When listening to the interview accounts and reading internet-based materials, some themes emerge around the existence of Hackerspaces. Firstly, they are spaces where like-minded people can come together to work on (technical) projects free from any external structures and norms, secondly, most projects seem to be driven by a fascination of how technology (i.e. hardware and software) works and what else could be done with it and, finally, these activities are done to have fun. Other themes that emerged but their role is less transparent are in how far the collection of Hackerspaces adhere to hacker ethics (and open source ideas) and relate their activities to commercial, political and social activities. It seems that each space has its own norms and interpretations. The following paragraphs try to give some flavour of these themes and relating discussions.

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A place to work on projects, take things apart to understand them and have fun together

Reasons for joining a Hackerspace have become broader over time. Political motives have often been sidelined and replaced with the purpose of having fun with technology (Jarkko Moilanen, interview, 5th September 2014). Such fun is often interpreted as having a shared 'curiosity: they want to know how things work and how can I change it... showing what is possible' (Paul Bristow, interview, 8th August 2014). Some observers link this curiosity with ideas of demystifying technology, to make it more accessible and therefore easier to repair (Keiller and Charter 2014). Others see it as a way to control technology and to be able to shape its future developments, 'it is a very radical thing to take technology and use it in a way that is utterly non-economic... take the thing that may shape our future out of the economic sphere and control it' (Jens Ohlig in Schneeweisz 2009). Nevertheless, taking technology apart is not always linked with ideas of repairability, accessibility or controllability but often relates to experimenting together and having fun. Nowadays, most of the time it seems Hackerspaces are physical places where people can share knowledge, machines and expertise in order to create, experiment and invent things with technology free from any work or family related constraints,

'It's a place outside your home and your work, it's a place where you can be free and do whatever you want and have fun. Free from family ties, free from your normal daily lives, your own obligations and your job related everything, and you can come to a space where you meet people like you, and you feel relaxed, and that's what they are looking for. So you can let your mind go and be creative and do whatever you want, for that moment, do what you actually desire. If it's something that even a lot of people want to do, then it's even more fun' (Jarkko Moilanen, interview, 5th September 2014).

'I think at the start it was just a cost-effective thing... it makes more sense to share tools than to buy a big, you know, CNC machine or a lathe and all of this stuff... we thought at that point it would be more interesting or cheaper for us to share a space and have one space where all the tools were that we could then use. Honestly, I think at this point we hadn't realised the social aspects of it... it would be more interesting, we could learn from each other, everybody brings something to the party' (Paul Bristow, interview, 8th August 2014).

Some of the literature and one of the interviewees refer to Hackerspaces as 'third places'. A third place is a social setting that is not home or work (Moilanen 2011). These spaces are therefore seen to 'break through the dualistic scheme of bourgeois spatial structure with places to live and places to work' (Grensfurthner & Schneider 2009). In relation to Hackerspaces, this is not only about doing something in your spare time but is highly motivated by having fun with others. Instead of working in your garage or shed on your own, these are spaces to meet like-minded people, socialise and sometimes do, make and experiment together,

'It gives you, at least for me, it gave me a community, a group of people that I identified with. It was a group of people that I wanted to do stuff together, and I trusted them. I knew the way that they were thinking alike, I knew the logic that they are going to have, most of the time, always there is discussions and arguments and stuff, but it's something, it's like a second family' (Jarkko Moilanen, interview, 5th September 2014).

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Finding a group of like-minded people is something that most of the interviewees could relate to when talking about Hackerspaces. Like-minded because people share an interest and curiosity in technology but interviewees also referred to a similar way of thinking. This similar way of thinking is difficult to define. Some of the interviewees referred to open source ideas (such as openness and peer production) (Jarkko Moilanen, interview, 5th September 2014), others to a shared philosophy of being free from theoretical and methodological constraints (Transnational networker, interview, 3rd October 2014) and some of the internet-based material to hacker ethics (including beliefs such as openness, decentralisation, sharing and sometimes even distrust in authority and world improvement) when describing a shared way of thinking between hackers. A variety of different interpretations of these can be found in Hackerspaces.

'A space that tries to advance thoughts, where it is allowed to think freely in particular in relation to technology and society... to freely let the thoughts flow and to spin up stuff together, wired stuff to have completely new ideas' (Transnational networker, interview, 3rd October 2014, translated from German).

'Seriously, the open source and Hackerspaces are too alike, because in both sharing is one of the key elements, that's also in Hackerspaces, you don't share just your time, you share your knowledge, you probably share even your resources' (Jarkko Moilanen, interview, 5th September 2014).

Some of the spaces have started to engage in outreach work to 'spread the way of thinking like a hacker' (Jarkko Moilanen, interview, 5th September 2014). They give workshops, presentations and lectures around a variety of topics to the local community (and in particular for children) and organise social activities including game nights and parties. Such activities have helped to increase the visibility of spaces, inform people of certain technological issues (Transnational networker, interview, 3rd October 2014) and create local acceptance around their space (Paul Bristow, interview, 8th August 2014).

'And now we're, sort of, the weird group that's down in the basement but we're not a threat, so that was one of the early things we did [organise an event for the neighbours]' (Paul Bristow, interview, 8th August 2014).

Hacking the system or commercial endeavours

Some of the interviewees referred to the way of creating decentralised organisational structures as a unique common aspect of most Hackerspaces.

'The new ways of making decisions, the new ways of working together as distributed groups of people, people working together without bosses, you know, self-organising and just getting on and doing things much more than worrying about hierarchies' (Paul Bristow, interview, 8th August 2014).

For one of the interviewees, such way of organising within Hackerspaces was just a first step towards creating new cities in which people co-live with each other and organise themselves in a decentralised manner. During the interview, he referred to the 'Burning Man' festival and co-living spaces in San Francisco that already portrayed such moves in this direction 'because it makes them

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happier, wealthier, more effective, more productive, more creative, more surrounded by people they love and enjoy' (Paul Bohm, interview, 4th August 2014). Another interviewee talked about how some consider hacking not only as an activity that you do to technology but also an idea that related to hacking societal systems,

'We can always extend hacking from the technology, to the society, for example, squatting the houses, you can see that as a hacking as well, and that's not what the majority of the Hackerspace members think of hacking' (Jarkko Moilanen, interview, 5th September 2014).

Similarly, Haywood (2012, p.4) has argued, 'Hacker ethic' has had an influence upon areas beyond computer hacking. This can be seen, I would argue, across a range of interrelated emergent practices including crowd-sourced data, 'the clean web', open-data, open-government, open-education and even democratised activism of the 'Arab Spring', Occupy and Anonymous 'movements. Rather than being purely the result of technological advances then, these practices might be seen as indicative of wider social and cultural changes.'

Such views and activities are rare in the network. Similar at the fringes and debated within the network is the idea that activities in a Hackerspace are political. 'There are some discussions and conflicts between people who believe in politics and who believe in technology' (Academic researcher and practitioner, interview, 29th September 2014). In Germany, in particular in relation to the Chaos Computer Club, Hackerspaces are generally considered to be more politically active. Here, politics is framed around technology and its uses. Topics that are up for discussion usually are copyright, intellectual property, resistance of surveillance and cyber security, just to mention a few. For instance, when politicians discussed the possible introduction of a passport fingerprint sensor in Germany, the CCC organised a stunt in which they copied the fingerprints from the foreign minister and made them publically available for anyone to use. Such political activism cannot be found everywhere and even the CCC has had to start thinking about its role in society, seeing that the role of technology and its acceptance has extremely changed over the last fifteen years (Transnational networker, interview, 3rd October 2014), in particular with the arrival of social media on the internet such as Facebook. Yet, most interviewees felt that social and political activities within Hackerspaces occur at the fringes. One even said that these activities have been pushed out by a more commercial, innovative outlook on what is happening in Hackerspaces,

'At the moment what is becoming more and more prominent is a kind of entrepreneurial outlook. Basically, I think that from the moment when innovation becomes part of the discourse, the whole political analysis behind it goes astray' (Academic researcher and practitioner, interview, 29th September 2014).

During a recent survey of Hackerspaces, the result showed that in over 20% over the surveyed spaces commercial activities were an accepted and practiced activity (Keiller and Charter 2014). Some say that the challenge Hackerspaces face is the tendency to become mainstream, 'hacking practices consisting in the modification and subversion of digital devices' have become commonly accepted (Magaudda 2012) whereas others welcome these activities. It might be possible to say that what role these spaces will play in the future still is unclear. Maybe it is, as outlined by one of the interviewees, a transitional phase for Hackerspaces,

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'I think for the last two years I feel that Hackerspaces need to find a new role within society and the other way around... they engage with technologies in a very different way and no longer have to explain what is technology in our society (Transnational networker, interview, 3rd October 2014, translated from German).

3.3 Aspects of empowerment and disempowerment of the transnational network(ing)

3.3.1 Governance

3.3.1.1 Internal governance

Although the idea of Hackerspaces was not a new one in 2007, some of the interviewees and internet-based accounts talk about how the global spread of Hackerspaces created the impression that an international movement was being built during this time. A book about Hackerspaces, the Design Patterns and the hackerspaces.org Wiki website manifested these feelings. A few key actors (such as Jens Ohlig, Paul Boehm, Nick Farr and others) started to present how to set up a space to several audiences worldwide which further supported the very quick global spread of Hackerspaces. Nevertheless, attempts to create more formalised organisational structures never materialised,

'I think, honestly, I was never a big fan of turning it, like, really into a movement and, like, trying to fit it, like. I like the decentralised aspect' (Paul Bohm, interview, 4th August 2014).

Nowadays, members are aware of the worldwide existence of Hackerspaces (and some of the informal infrastructure surrounding it) but feel less connected to it.

'Every Hackerspace is totally independent, they do whatever they want. No one can come from the outside and say that you are doing it wrong. So it's really a loose network' (Jarkko Moilanen, interview, 5th September 2014).

'I would say Hackerspaces are even more autonomous than the Fab Labs' (Paul Bristow, interview, 8th August 2014).

One of the interviewees pointed out that at present 'there is less exchange between the 'worldwide community' maybe because it has become too big and there is no aim any longer to work towards' (Transnational networker, interview, 3rd October 2014, translated from German). Another interviewee went as far as saying that in the current global mailing list those members mainly talk to each other, who are more interested in the organisational aspects of the Hackerspace 'network' rather than working in a space, considering them as highly non-representative of what is happening in lists,

'I mean, there is a mailing list associated with hackerspaces.org. But if you really look at it, there's maybe a bunch of people from some, probably not all spaces on that list, and most of the members

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of the spaces don't even properly follow their own space's mailing list, right? Much less do they participate in the larger culture. The people who really keep – who really make the spaces work are the people right there, and they're just not represented... That's also the problem, why I thought it was a really bad idea to do this centralisation, is because the people who actually do stuff are not going to be represented. It's the people who really like organisational or democratic structures who are going to be represented' (Paul Bohm, interview, 4th August 2014).

Interviewees talked about interconnections between spaces that occur more nationally and regionally where sometimes more formalised organisational structures are created to support the activities of several spaces. For instance, in the UK a few members set up the UK Hackspace Foundation in 2009. A few initiators of Hackerspaces and key members got to know each other well over the years, as they frequently socialise at events. They have organised Makerfares, EMF Camp weekends and other activities to be able to work together, share experiences and swap project ideas. Similarly, Hackerspaces in Finland, Belgium and probably other countries are more connected with each other locally rather than globally.

'At the moment in Finland I think there's five or six hacker spaces, and two of those are the biggest ones and the most active ones, and Tampere is one and Helsinki is the other and those two are having constant discussions in mailing lists and in IRC channels. They are sharing again some kind of projects... The one form of co-operation is that we have this annual Hackerspace summit in Finland, here in Tampere... then play games and do stuff, the whole weekend, have fun' (Jarkko Moilanen, interview, 5th September 2014).

Such partly regional and national focus and decentralised, informal and worldwide 'network' allowed members to freely interpret the aims of their Hackerspace and how to run it, creating an extremely diverse set of spaces. 'Suddenly you have all these spaces and each of them has a different flavour. None that I've seen are really alike' (Paul Bohm, interview, 4th August 2014). Nowadays, most of the spaces are loosely organised and governed by consensus, debates or a good willing dictator with an overall spirit of sharing and cooperation. Responsibilities and privileges granted to members vary between Hackerspaces. Most spaces are run on the basis that members pay a monthly fee to cover the rent and expenses and share the responsibilities in relation to administration, publicity work and other duties attached to the running of the space. Some of the spaces have decided to have an elected board that represents the interest of the members.

For example, a Hackerspace in Tampara, Finland has a board consisting of some of their members. There is no formal process of electing the board members whoever would like to have the job can pretty much do it. The members can keep being on the board until they no longer want to be on it. So there is no official process of re-placing the board. When decisions have to be made instead of voting, all of the members discuss the issues until they reach consensus. This can sometimes take weeks,

'We discuss, and there's not going to be a vote, never, we don't believe in voting, because that always divides, and that's the least thing we want to do... Then the other option is that we talk, and talk and talk and talk, and then we sleep and then we talk, until we have a mutual understanding and agreement. So sometimes it takes weeks to make a decision' (Jarkko Moilanen, interview, 5th September 2014).

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Similarly, in the Vienna Hackerspace, called Metalab, a board of elected members help to run the space. But a key difference is that the board gets regularly elected in order to have a turnaround of people. The organisational structure was built in such 'a way to easily kick out dictatorships'. Only 10% of the members 'could ask for a mistrust vote'. They tried to create a 'power vacuum' so that people who mainly contributed to the space could make key decisions rather than so called 'leaders' (Paul Bohm, interview, 4th August 2014).

'We made almost no forceful decision as directors, and so, basically, we tried to make the board disappear so that people who just built things got credibility within their organisation and then other people listened to them and all the real leaders in the group just organically evolved out of being awesome...the power is implicit in such a way that people simply respect you' (Paul Bohm, interview, 4th August 2014).

'In Hackerspaces, you get respect by doing, not by talking' (Jarkko Moilanen, interview, 5th September 2014).

Creating a structure that works and a group of people that likes to share a space together is not always a straightforward process. As pointed out by one of the interviewees, even after having joined several spaces and being part of Hackerspaces for years, he has not seen one specific way to structure the space in order for people to get along with each other. He highlighted that it is important to find enough members that pay a monthly fee to keep the space financially going but additionally have some members who are happy to get engaged in the more organisational aspects of running it (Transnational networker, interview, 3rd October 2014). Once the membership reaches over ten people cliques can appear where it becomes difficult to work as a whole group. Moreover, new members, although they might seem like-minded, can disrupt the group if they do not regard endeavours as a collective effort.

Some spaces have therefore decided to get to know potential members first before handing out the membership or restrict people's voting ability for a while until they know the person a bit better and how they fit into the group. Overall, Hackerspaces vary in relation to the openness and closeness of the space (i.e. who can join and use the space). Some spaces are much more restricted than others. For instance, some spaces create regulations where only members are allowed into the space. So there are no open nights. This way group dynamics can be more easily foreseen and group members can protect their anonymity and security. Within other spaces the decision was made not to introduce membership charges. Such charges are considered to be against the belief that any type of information should be kept free. Conflicts around these structures and regulations can lead to the creation of new spaces where the rules can be different and suit anyone who had issues with the previous ones.

Although most members of Hackerspaces believe in decentralised structures and an ethos of sharing, it is possible to find a real diversity of different interpretations of these structures and values across them. It might be possible to say that there is not one model either for the 'network' or the worldwide collection of spaces and there seem to be no aspiration even towards developing one.

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3.3.1.2 External governance

Studying the interactions between the open source community RepRap and the start-up company MakerBot, Söderberg(2013, p.130) has described a 'symbiotic yet constrained relationship' between Hackerspaces and external companies (or more commercial endeavours within spaces). The open source 3D printer from the RepRap community has been closely interlinked with the start-up firm MakerBot. MakerBot modelled their first 3D printer on the RepRap printers but taken only some of the open source values on board. The relationship between the two parties became tense once the RepRap community realised that some of the parts of their second-generation 3D printer could not be printed on the MakerBot printer. As a result, the MakerBot printer could not be used to print out a RepRap one, at a time, when the MakerBot products gained increased interest (Söderberg 2013). MakerBot partly commercialised the RepRap model whilst losing some of the open-source ideas in the process (Bohne 2013).

The development of MakerBot has not only caused disagreements with the RepRap community but also with the Hackerspace (NYC Resistor) out of which the company originated. Although Hackerspaces have developed sustainable financial models that make them independent from the need for external funding, the development of novel technological products are not uncommon within these spaces. Some of the interviewees pointed out that several people who were involved in the development of the MakerBot kit did not have any say in its commercialisation, creating a real division of members within the space that nearly led to its shutdown,

'These guys just decided to take it outside and make a company, make a business out of it, and even make a success, and then people got really pissed off, you have taken the work of the community, you have even closed sourced it... That made people very angry... Some of them were like, well who cares, and some of them were like, that's violating the basic principles of community... that almost killed the Resistor' (Jarkko Moilanen, interview, 5th September 2014).

Similar discussions occurred during a recent hacker camp in the Netherlands where the organisers wanted to accept sponsorship money from a corporate surveillance company. Some of the participants thought that 'people who think differently should feel comfortable there and they should not feel restricted through a wrong sponsoring' (Transnational networker, interview, 3rd October 2014, translated from German) whereas others did not see any problems with taking such sponsorship money.

Considering such possible disagreements that can occur within Hackerspaces when commercial endeavours are pursued, Söderberg(2013, p.130) has argued that some projects derived from these Hackerspaces set 'themselves the task of building an alternative infrastructure, only to be pulled in by the commercial logic that they sought to undo'. A lack of more explicit ideology within Hackerspaces might lead to wider diffusion of spaces but also 'to the reproduction of dominant power structures' rather than providing alternatives. Petschow et al (2014) have suggested that technological developments in Hackerspaces will not necessarily lead to an economy based on commons-based do-it-with-others ideas, but rather be characterised by hybrid formats that create in-between centralised and decentralised, commons and market, etc. spaces. It is possible to suggest that some of these workshops already fulfil some of these more commercial characteristics (such as TechShops) whereas others pursue more overtly political aspirations (such as Hacklabs).

'Many if not most people who do things at Noisebridge subscribe to the Burning Man idea that life

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is better in a gift society free of commercial interests, and they have varying degrees of tolerance for Techshop... we're probably never going to have certain classes of equipment like really nice CNC gear or laser cutters due to the commercial relationships required' (Altman 2010).

Nowadays quite a few of the Hackerspaces have a more relaxed attitude towards commercial activities and actively encourage entrepreneurship in their spaces. During a recent survey of Hackerspaces, the result showed that in over 20% over the surveyed spaces commercial activities were an accepted and practiced activity (Keiller and Charter 2014). And 40% of the respondents believed that their Hackerspace is likely to support business start-ups in the future. One of the interviewees explained how they deal with commercial endeavours within their space,

'If you make an innovation here, in the Hackerspace, are you allowed to sort of take the decision and the IPRs related to it and make a business out of it. If you were allowed, are you supposed to take it outside the community and act as a company, or are you still allowed to stay inside the Hackerspace, still have the business, but sort of living in symbiosis or something and utilise the community again, and continue the development or something like that. That is different in different Hackerspaces' (Jarkko Moilanen, interview, 5th September 2014).

Allowing for business start-ups and encouraging entrepreneurship has allowed some spaces to create closer links with some external partners (such as local authorities). Only a few years ago such actors were 'very nervous' (Paul Bristow, interview, 8th August 2014) about supporting Hackerspaces and members also struggled to explain what they were actually doing and their aims might be. For some spaces this however has changed. External actors become increasingly interested in ways to encourage local manufacturing and innovation and regard Hackerspaces as potential spaces for such activities. It is too early to say what type of hybrid companies, relations with external actors or counter activities will be developed over the coming years.

3.3.2 Social learning

The sharing of knowledge and resources is one of the core values within Hackerspaces. These are not only spaces to tinker with technologies on your own but also to have fun and share with others.

'Oh, we did this and we did that, oh, you did this as well and... yes, every time somebody comes in we learn something new, you know... and that works on the membership level too; we've got members that have come in that used to be members of a Hackerspace in the US and the first thing that happens is people say, oh, so, you know, how do we compare? And he says, well, actually, you're just as untidy as everywhere else' (Paul Bristow, interview, 8th August 2014).

During 2007-2008 ad hoc attempts were made to create an infrastructure to be able to share learning across Hackerspaces and in order to help set up new ones, in particular through creating the hackerspaces.org website and developing the Design Patterns. The Design Patterns were created by Jens Ohlig, Lars Weiler and Thorsten Hass as part of the 'Hackers on a Plane' project (see above). They consist of a collection of patterns/solutions to common problems and outline some of the best practices from Hackerspaces in Germany and Austria. For example, the infrastructure patterns are based on discussions whether initiators of spaces should firstly create an infrastructure or rather projects. The need for a flexible infrastructure is highlighted in the Design Patterns and to find rooms and build up a network of people at the same time. Other

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patterns are called conflict resolution, independence, community, and sustainability, just to mention a few. During an interview with Lars, he talked about the after effects of giving a presentation about the Design Patterns at the Chaos Computer Congress in 2007,

'Bre did listen to the presentation and published it in the Make Magazine... after that it went to BoingBoing... and over night it became worldwide movement and that was fantastic and I had never witnesses something like this. I still get nowadays goose bumps... all over the world there were groups who wanted to start something like this at the time there were about 50 spaces now there are about 1500' (Transnational networker, interview, 3rd October 2014, translated from German).

In the same years the hackerspaces.org website was created to provide information about the management of spaces, benefits and risks, the establishment of spaces and many other topics. The Wiki-pages consists of a list and map of Hackerspaces, various mailings lists individuals can sign up to (such as finance list, discussion list and global theory list), event announcements (such as Global Hackerspace Hackathon Challenge), a list of mentors and Call-ins (where Hackerspace members can call in to a global telephone conversation and ask questions), providing a global infrastructure to share ideas, learning and experiences. In addition, members in Hackerspaces use IRC channels, Github and other internet-based communication channels to be in touch with each other.

'We started the hackerspaces.org website that I'd registered right around that time. So, like, I bought the domain name because I knew what we were doing was really cool and was going to have an impact way beyond us. I didn't suspect that there would be 700 to 1,000 Hackerspaces in the world just a couple of years later' (Paul Bohm, interview, 4th August 2014).

Nowadays, the influence of the website on Hackerspaces and learning processes is not easy to follow. The mailings lists still seem to be active, as people regularly post discussions or questions into them. Nevertheless, one of the interviewees reckoned that the people who participated in the lists were far from being representative of the network and probably quite a closed group. Another interviewee felt that the discussions never really go into too much depth and that for him it seemed that the overall website was rather inactive.

So it's, the discussion list in hackerspaces.org is that basically it's useless at the moment, because there's nothing useful in my mind going on, it's only some kind of popcorn discussion. So when you are actually a big thread on Hacker Space.org mailing list, I know that I need to go to the microwave and make more popcorn, take a cocoa and sit on the computer and start reading... somehow I see that the website has sort of gotten stuck three or four years ago, because it hasn't been evolved to something new. You probably need some kind of kick in the ass, sort of, to get it to life again, it seems so static and dead to me' (Jarkko Moilanen, interview, 5th September 2014).

'It used to be, it used to be, probably more about getting information that there is a lot of other Hackerspaces... and getting the message out, but what it is now, I don't know, does it even matter any more... So possibly for me, it doesn't have any meaning, but for someone who is getting into the scene, or wants to find the Hackerspaces that is probably the place to go still' (Jarkko Moilanen, interview, 5th September 2014).

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Most of the interviewee considered physical meetings at camps, congresses or through visiting each other's space as a crucial part of creating interactions between members and share experiences and learning.

'The way the Hackerspace network seems to work is based on physical visits, so you said you'd just been working on Argentina; well, we've had somebody over here from Argentina for two months and he just came in every Tuesday to work on stuff with us. And some of our members have visited other spaces' (Paul Bristow, interview, 8th August 2014).

Interaction between members also occur at international meet-ups (such as Chaos Computer Congress) and national or regional events (EMF Camp in the UK and Makerfaire) that are sometimes combined with visiting a few spaces in the local area. Here, people do not only come together to talk but often to make stuff and to show off what is happening in Hackerspaces back home. One of the interviewees went as far as saying that interactions between people within Hackerspaces are mediated by the devices that they make and use,

'What happens is that you come in [into a Hackerspace], you put a technological device on the table, and this enables, it's a kind of social lubricant that enables two people to contact with each other. But, when we think about collaboration, at least in my sociological imagination, we think about this kind of Christian heaven, where people hold each other's hands and so on, and talk to each other, and hackers do talk to each other a lot, but they talk through devices and about devices. So, it's much more mediated, even if they talk directly, it helps a lot if there's a concrete device between them, that connects them' (Academic researcher and practitioner, interview, 29th September 2014).

One of the local Hackerspace memberstalked about how some of the Dutch Hackerspaces often get together during camps to set up the wireless network on a field, demonstrating interactions through making and creating. Recently, they went to the EMF camp in the UK where they took their gear to build stuff together. On the way back they visited a few UK Hackerspaces and went to the Brighton Makerfaire to meet some other people. Here, projects are being picked up and being discussed and maybe taken home to do experiment with,

I think that it's the same, inter-hacker space collaboration... but mostly it is just like a kind of copying behaviour, no? And, of course, you cannot really make perfect copies, so you always end up making it worse or better, or modifying it (Academic researcher and practitioner, interview, 29th September 2014).

In addition to engaging with other Hackerspaces, some members have started to become interested in learning and teaching hacking to the wider public through outreach project, including public talks, classes and workshops (see local initiatives for more information).

3.3.3 Resources

Hackerspaces create a rather loose network that requires little resources for its upkeep. Mailing lists, the hackerspaces.org website and various other activities are usually maintained on a voluntary basis. Camps, congresses and other meetings often rely on donations, entrance fees or finance each other. For instance, the Chaos Computer Camp often gets paid through the money that

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was made during the Chaos Computer Congress. Donations from companies are not always welcomed by all, as they can be considered as compromising some of the values represented in the 'network' (see Dutch hacker camp example above).

Individual Hackerspaces usually are more reliant on a variety of resources, considering that they are often based in rented spaces that hold several machines, tools and furniture. It is also not uncommon to find kitchens in these spaces. To be able to keep their autonomous and self-organising nature, the members of the Hackerspaces are responsible for financing and managing the spaces and the resource. They have therefore come up with financially sustainable models in that they charge a small monthly or yearly membership fee. Some of the Hackerspaces run on a pay as much as you think/can basis or ask their members to volunteer some of their time, possibly indicating that the running costs of certain spaces are less critical for the survival of the group.

'Most members pay dues to cover rent and expenses and share the obligations of administration, publicity, documentation and other duties essential to keeping a space open and flourishing. Without these members, the Hackerspace itself would cease to exist' (Farr 2009).

'That kind of spirit, that you think of the community first, and you do for the community, not for yourself, because this is sort of, something that the Hackerspaces have taken from the open source ideology or way of thinking, that you share and you don't expect to get something immediately back' (Jarkko Moilanen, interview, 5th September 2014).

This membership model is also used when trying to see whether it viable to set up a space. It has been called 'The Rational Street Performer Protocol' (see http://en.wikipedia.org/wiki/Threshold_pledge_system#Street_Performer_Protocol) and has adapted by the initiators of Metalab in Vienna,

'The simple solution is to say, well, let's make a list and ask people, who would be willing, say yes, if this space existed I would totally pay \$20 for it a month. But if I don't think it's going to exist because you're not going to find enough people, you just tell those people, all right, you just told me exactly that, right? So if we find enough people that the space can actually exist, you would be willing to pay, so can I just put your name on a list saying, like, if we find 50 other people who pay \$20 a month because then it is affordable, you would be interested in being one of those people. I don't even need a strong commitment from you but, I mean, I know you would want to be a part of that space, and so we did that and it's, kind of, a little bit of a trick' (Paul Bohm, interview, 4th August 2014).

In addition to membership fees, other ways of making money for the space have been developed without having to rely on external support. For instance, the brewing of a space's own organic beer and the bulk buying of Club Mate (a soft drink popularised in German Hackerspaces) allows members to resell the drinks for a slightly higher price, as highlighted by Paul (Paul Bristow, interview, 8th August 2014),

'One of the business models for our Hackerspace is actually the fridge full of beer, so we buy in the beer at one franc a can and we sell it at two, and that actually funds a surprising amount of expenditure.'

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Moreover, Hackerspaces rely on donations and fundraising activities to keep their space running and membership payments low. For instance, the Geneva Hackerspace was able to gain quite a few donations when they started up the space,

'But people started, you know... companies started to say, hey, yes, I've got some cupboards I'm getting rid of, you can take those... It's amazing what you can get for free. And then tables and chairs arrived, and then some old... some sofas and gradually we built up the sort of infrastructure that you see in most spaces; some comfortable seating, some conference type seating, tables and chairs for eating at, etc.' (Paul Bristow, interview, 8th August 2014).

Fundraising activities are important to keep membership fees low and buy or maintain some of the machines or get projects started. They can take standard formats but often have a technological angle to it such as all-night computer programming parties or Pac-Man game nights. These activities are crucial in keeping the physical infrastructure of spaces going but also to create bonds between members, take pride in looking after ones space and be able to keep autonomous.

3.3.4 Monitoring and evaluation

The topic of monitoring and evaluation was not mentioned during the interviews and overall fieldwork. The autonomous and self-organising nature of current Hackerspaces allows them to not engage with external monitoring and evaluation criteria. Two interviewees mentioned an increased interest in their Hackerspace from local governments, as they regard them as possible innovation centres. It is therefore difficult to see whether external measures will play a larger role in the near future if these spaces will increasingly start to collaborate with governments and businesses. Such collaborations, in particular in relation to evaluation, might not be conflict free when considering the clash of cultures (such as centralised versus decentralised).

Within Hackerspaces 'evaluations' are rather informal and probably mainly consist of reflecting on the running of the space within meetings: 1) A sustained amount of members and good group dynamic, 2) Financial independence, 3) Good working condition of tools and machines, and 4) Space allows people to have fun and be creative. Considering the great diversity of spaces, it is difficult to say whether these are common discussion points or the list is comprehensive.

3.4 Other issues about the transnational networking

There probably are several issues that have not been explored within this report or during the fieldwork. This was mainly because of the length of the topic guide. At times it was challenging enough to go through all of the topics provided in the guide. It was therefore near to impossible to follow up other issues. Within Hackerspaces it would have been interesting to explore the material culture of these labs in more depth. How does the making relate to change and innovation.

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4 Local initiative 1: Build Brighton – Brighton, UK

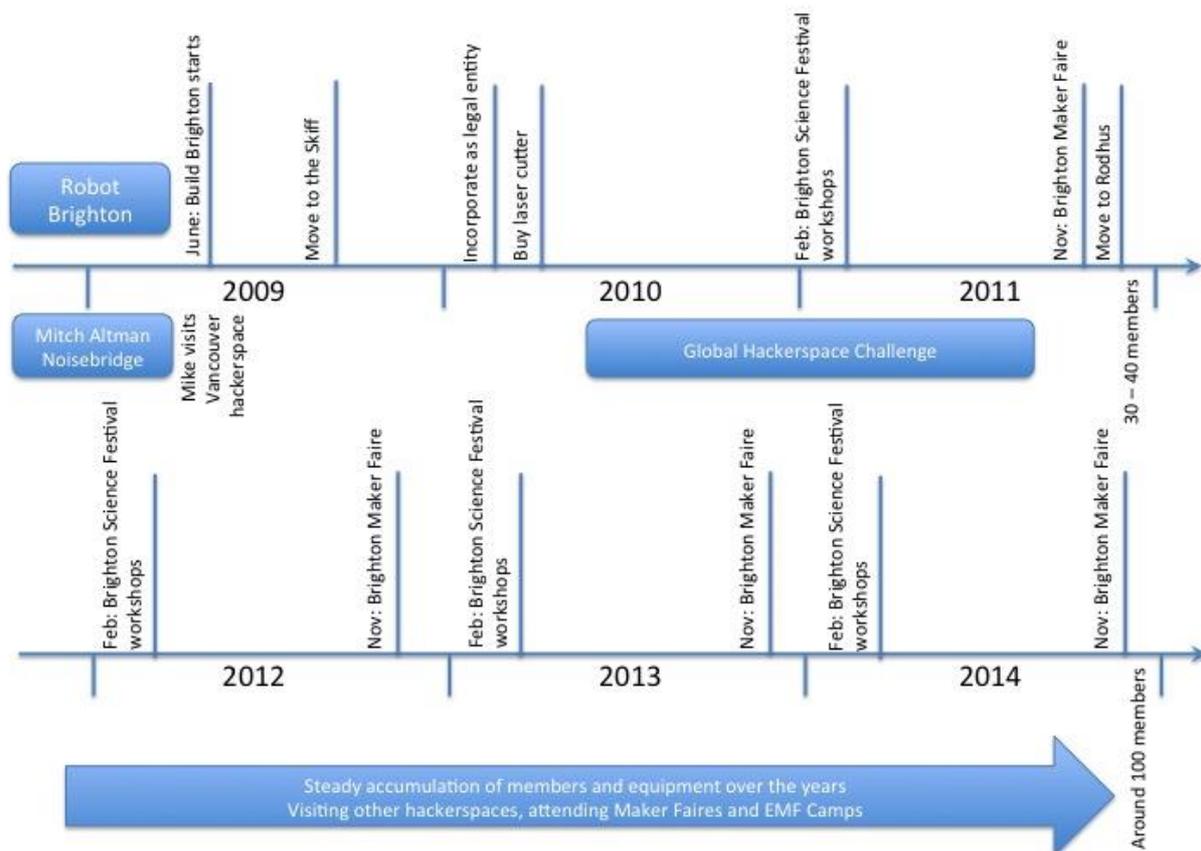
“Build Brighton is a communal workshop run by, and for, like-minded people who love to build stuff with electronics and technology, engineering or good, old-fashioned craft skills.

We provide a playful, friendly and encouraging environment, along with tools and space, for our members to socialise, inspire others or start an exciting, new group project.

We are a not-for-profit community; all subscriptions go towards paying for the space and providing the best mix of equipment, amenities and the odds and ends that help make us something great. Build anything!”

(Build Brighton publicity material, undated)

4.1 Overview of development in the local initiative



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Build Brighton started in June 2009 and was amongst the first wave of hackerspaces to emerge around the same time in the UK. Other spaces included London, Nottingham, Birmingham, Sheffield, and Leeds. A more recent wave of spaces has opened over the last two years or so. The number of active hackerspaces in the UK now numbers between twenty or thirty, although fifty-three are listed in the UK Hackspace Foundation website.

Organisers and key members of these spaces are well known to one another: it is a sociable scene. They regularly meet up at events around the country, such as Maker Faires organised in a growing number of cities, and EMF Camp weekends for hackers and makers, and which provide an opportunity to share experiences with running spaces, as well as swapping ideas for projects, and socialising more generally. Members of Build Brighton are involved in this scene. The scene has developed simultaneously with the spaces themselves.

“...the number is just kind of mushrooming over the last year or two. And it is going to be interesting to see how that has an affect on some of the more established hackerspaces, and whether there is any new ideas coming out of it, and maybe change how we’re doing things, or whether it starts moving in different directions. And I guess it is growing from a very closed, niche community to a wider community, as more people find out about hackerspaces, and join them, and start their own, and do their own sort of things. So I guess perhaps solutions won't come from some of the old guard, it might come from the new ones that are popping up.”
(Emma O’Sullivan, Director, Build Brighton, interview, 5th December 2014)

A UK Hackspace Foundation was set up in January 2009 to provide a supportive platform for the creation of hackerspaces, and there has been recent discussion about boosting the support provided. A concerted effort to get the Foundation working is now being embarked upon. One of the founders of Build Brighton, Mike Pountney, is involved in developing the Foundation (see later).

Some UK spaces refer to themselves as hackerspaces, following terminology first used by London Hackspace. Others call themselves makerspaces; consistent with the term used in North America, and from where much of the inspiration came for the first UK spaces. The UK scene is considered less political than the German hackerspaces; whose origins are considered to come from commitments to open/free hardware, resisting surveillance, and concern for the politics of technology. UK hackerspaces are more pragmatic and try to avoid overt politics. Indeed, some UK spaces prefer the term makerspaces, with the belief that this term is less loaded than ‘hacker’, and thereby more inclusive towards a wider variety of people.

In practice, terminology gets used interchangeably at times, even if each term signifies different orientations to the basic idea of giving tools to people. At Build Brighton, some members describe it as a hackerspace, and others call it a makerspace. Consistent with criteria for membership of the UK Hackspace Foundation, the key defining principles (irrespective of the label of the space) are:

- Organised and run by the membership
- Not for profit
- Open to the public
- Have at least ten members

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Build Brighton began as a hackerspace with these principles in mind. It emerged out of an earlier meet-up group interested in robotics called Robot Brighton. The group was coordinated by Emily Toop and met once a week to hold talks and discussions.

Robot Brighton had been running for about a year when Emily was contacted by Mitch Altman from Noisebridge San Francisco and encouraged to start up a hackerspace. Noisebridge was a pioneering hackerspace, and Mitch and others had already helped popularise the idea, and were promoting their model for community-run workshops in the US. After a couple of years of that, Mitch began trying to spread the word globally. He has subsequently visited Build Brighton a couple of times. Jimmy Rodgers from Artisans Asylum (a large makerspace in Cambridge, Mass.) has also visited Build Brighton.

Emily mobilised people from the robot community group as well as other technologists in Brighton. A core group decided to commit to the idea of setting up a hackerspace. As well as an organisational model in Noisebridge, the core group also benefitted from a work-related visit that one of them, Mike Pountney, made to Vancouver, which also had a hackerspace.

“So I went there immediately to see the hackerspace and brought that experience back with me on my return ... It gave me a mind’s eye of what we were trying to build ... a clear idea of what we needed to acquire and how to grow the equipment that we had, and what the space would look like when we had a space where we could expand fully. And yeah, so I started quite rapidly to acquire work benches, tooling and things like that, and sort of drove that side of it. Whereas I think we would have possibly stayed a little more just electronics for a while if that hadn’t been the case.” (Mike Pountney, interview, 5th December 2014)

Along with Emily, Mike became one of the Directors that drove the development of the Build Brighton space and community. They began with around twenty people, who were able to commit enough money in membership fees, lending of kit, and payment for equipment, that Build Brighton could begin. In August 2009 they began renting a small back-room in the Skiff co-working space. The space was only really big enough for two people to use it for making things at any time. But importantly the Skiff provided a focus and space for everyone to meet on Thursday evenings for discussions, and somewhere to store and build up equipment. A laser cutter was an early acquisition that the group bought together.

In April 2010 the group incorporated as a legal entity. A key motivation for this was that they had the opportunity to move into a space of their own. Formal status would help in negotiations with the landlord. However, discussion about renting the space fell through when the landlord got nervous about the prospect of his tenants welding on the premises.

Property is very expensive in Brighton. The group did not find another opportunity for affordable space until the following year. Meanwhile they continued their Thursday evening meetings and the group slowly grew and formed into a community of around 36 people.

During this period the group developed. They began doing projects together. One activity was developing and running workshops for the public (see later). A significant group project, led by four or five people, was an entry Build Brighton made for a Global Hackerspace Challenge launched in the summer of 2010. The Challenge was sponsored by electronics suppliers Element 14, and had

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quite substantial prizes in terms of kit. Build Brighton entered the competition and was selected to participate in the challenge. As such, they received a lot of electronics equipment, which really helped the space with other activities, such as running electronics workshops.

“And we made a product. It was kind of a learning tool for children to make ... to teach them spelling by phonetics phonemes. So there was this like owl with cubes that they had to arrange in the right order to kind of spell the word that the owl had just said. Anyway, they loved that and we came ... well, we were one of the runners up for it. Which meant that one of our members got flown to San Francisco to attend a ceremony there, which was at a maker faire in San Francisco. It was a worldwide thing. I think something like 30 spaces entered it. And we amongst the chosen projects that were reviewed. It was quite a big deal.”

(Mike Pountney, interview, 5th December 2014)

The award ceremonies were in August 2011. Mike went on to say,

“[T]he group projects are really good. They tend to get people together. It’s nice to have a common goal. They don’t happen very often, and they are not something that people strive to do. Even working on the hackerspace infrastructure itself there’ll be a small group of people that are focused on the space as a project: or the space as a community as a project. There are a lot of people that want to go and noodle about on their own thing, or talk to people, and use it as a social thing.”

(Mike Pountney, interview, 5th December 2014)

In September 2011 Build Brighton was finally able to move into a larger space and where it continues today. This is Rodhus: a workspace for artists and designers. Build Brighton rents a space there (1300 square feet, around 121 square metres), and is about to expand into a neighbouring unit at Rodhus.

Moving to Rodhus presented a big opportunity and change for the group. More space meant they could finally function as an unrestricted workshop. An electronic key system provides access 24/7. The move generated a lot of interest. New members joined, and older members came out of the woodwork. Membership numbers have grown steadily and currently stand at around 100. An open question for the future is what happens if numbers continue growing. Since space is so expensive in Brighton, the answer will depend upon what opportunities are available for expansion, whether into a larger facility, or by splintering the group.

Moving and growth provided a challenge for how the group was organised and grew. Originally, the founding members, who were now Directors, took decisions in consultation with the group during their Thursday evening meetings. Moving to a more open access workshop where members could come and go, socialise and do projects whenever they want has meant the weekly forum is less viable.

It was not just the numbers of people involved, but also the variety of activities and issues that grew as the group evolved from a weekly meet-up interested in hackerspaces, to a workshop where members could make and hack a wider variety of things. The decisions and issues that needed addressing put strain on the organisers, who were the two or three Directors of Build Brighton. At

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the same time, new members were uncertain what changes or activities to suggest without consulting the Directors.

So, over time, guidance for members has been put in place, better communication systems have been established (e.g. through email lists), and different open meeting formats experimented with, so that the workshop can run as smoothly as possible under its voluntary basis. There are still issues. Governance develops on an on-going basis.

“That is the overall thing that happens on the community side as it goes. And now as we’ve matured, there is a great degree of our members who see the space as a shared resource, and less of a community as old. Because when we were in the Skiff we really were a community group that met on one day. So there was no avoiding the fact that was a community of people.

Now that we’ve got a space that you can use 24/7, you can use the space and not see anyone else ever. It can be your workshop, when you want it to be. We see a lot of that nowadays. People are using it more as a space that they can’t have themselves. And that has always been the intention. It’s not just about it being a like-minded group of electronics enthusiasts. It’s been provide a space to see what happens. That’s probably the mission statement originally.”
(Mike Pountney, Build Brighton, interview, 5th December 2014)

A big impetus for growth was the increasing profile of Build Brighton in the city. Even whilst at the Skiff, some members of the group had run workshops and been involved in activities in the city under the name Build Brighton. Workshops not only helped with outreach, but were also a way of raising money for the group. Members ran workshop activities voluntarily and fees charged returned to the group for purchasing equipment and other developments.

Public workshops included soldering, Arduino, programming workshops, making guitar pedals, and whatever members felt they wanted to run. Build Brighton have also been invited to run workshops as part of bigger events, such as the city Science Festival each February. And for one festival, White Night (held in October on the night the clocks are re-set one hour backwards for winter) they designed a badge kit for festival-goers.

“One was the White Nights badge kits, which we got a little bit of funding to do. So that became a soldering workshop and gave people a zombie badge. The badges would communicate with one another and spread a zombie curse basically. A game for White Nights.”
(Mike Pountney, interview, 5th December 2014)

As the group has grown larger, and membership fees have made running the space more financially stable and predictable, so the pressure for workshop revenues has diminished, and activity reduced a bit. Though they are still undertaken, and can provide resources dedicated to raising funds for certain projects in the space, such as improving the lathe.

Another big outreach and profile raising activity for Build Brighton has been their involvement in bringing a ‘mini’ Maker Faire to the city – the first independently organised fair in the UK. Maker Faire developed in the US, and was organised by O’Reilly, publishers of Make magazine and promoter of books, materials and events for the burgeoning ‘maker movement’. O’Reilly UK approached people involved in the Brighton Digital Festival to see if there was interest in

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developing a Maker Faire. A meeting was set up in December 2001. At the meeting, it turned out, coincidentally, that around half the people there were also members of Build Brighton. As Mike Pountney recalled, *“So it became pretty obvious to me that it could be something that the hackerspace could be heavily involved in”* (interview, 5th December 2014). Mike volunteered to organise the development of a Maker Faire in the city.

However, things did not really advance until he met Andrew Sleigh at one of the soldering workshops Mike was organising at Brighton Science Festival in February 2011. Andrew had worked as a project manager in Brighton’s digital industries. He was enthusiastic about hacking and making, and so together he and Mike agreed to make a concerted effort over the Maker Faire as part of the next Brighton Digital Festival. As Andrew describes it, *“It’s a festival of DIY technology, hacking, invention, creativity, craft, tinkering and innovation”* (Andrew Sleigh web-blog, accessed 8th December 2014).

Mike explained, *“And Andrew without a shadow of a doubt has been the driving force behind getting things organised. And I’ve been a kind of community element of it through knowing a lot of the maker scene in the UK, and the hackerspaces and so on’* (interview, 5th December 2014). The first event, in September 2011, brought in groups from various hackerspaces, and other people from Brighton, to set up exhibitions, display projects, run workshops, and so forth. The Build Brighton group provided a focus and resource for getting the event set up.

“So the hackerspace became a kind of whole pool of volunteers for kind of stewarding things and makers at the event. Making things for it. Decoration for stalls on the day. And that is kind of how it has continued really”

(Mike Pountney, interview, 5th December 2014)

Held in a couple of rooms in the Dome theatre complex, the event was a huge success; and in subsequent years has had to expand to make use of more of the Dome facility. The first event used Build Brighton as the organisational basis for the event, since it was an incorporated body and could handle the financial and contractual sides of the project. Subsequent Faires (running each year since 2011) have been run through an especially created non-profit company headed by Andrew and Mike. Build Brighton remains very involved.

Events like the Maker Faire and the workshops at other festivals have raised the profile of Build Brighton. Companies approach them at times, sometimes offering paid collaboration, but other times seeking free help in projects, or asking for help recruiting for vacancies. But there has also been a lot of interest from the public too. The Thursday Open Evening has become an important activity for fielding these queries. People are invited to come along, and meet members of the group, and see what they are up to. People can bring their ideas or interests, and see how the space might help them, or if others can join in.

Help can be provided without necessarily having to become a member of the space. A cat owner who came along, for instance, was able to get help with a personalised wheelchair for her pet. Some people who come along do end up becoming active members. A mother and daughter got involved looking for help to build an animatronic elephant to use in an event they were organising for the children’s field at Glastonbury Festival. They came to the Open Evening, and then became quite involved in Build Brighton for a while. They became interested in 3D printing, and got a

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machine. And whilst they are less active in Build Brighton now, the space has their 3D printer for the use of the rest of the group on an open loan.

Participating in an Open Evening and at events like the Maker Faire, we (TRANSIT researchers) observed Build Brighton members to be very welcoming, and clearly enthusiastic about their projects and the space. There is a willingness to share knowledge, and which means you don't feel like you need prior expertise to get involved.

“Some of the guys who are professional makers, they come to the open evenings every week. And they don't get any work done. It is too busy. And they kind of bring stuff that they have made. And they show other people how it works. And they answer questions about their projects. And they come to share their knowledge about what they learn”

(Emma O'Sullivan, Build Brighton Director, interview, 5th December 2014)

The space has continued in this way, growing steadily. Tools and equipment have been accumulating. So in addition to the original laser cutter and electronics equipment, they also have 3D printer, lathe, sewing machine, welding, and tools for craft, woodworking and metalworking. And there are ambitions to accumulate more equipment, especially moving beyond electronics and digital, and into the areas of crafts and traditional machining.

There are issues in running the space (picked up in later sections) that the group is still working out. One of these of note in this overview is interest by one of the Directors in linking with the local University of Brighton. The University has grants available for community projects, and the idea from Emma is to make a bid into that fund. Build Brighton would seek help from University technicians in maintaining the equipment and health and safety procedures (two tricky issues for the space). The grant bid has not yet been made. Discussions remain speculative. But there is something to go for here that is more concrete than other ideas held by some members for linking with other institutions in the city, such as local education authorities. For now, the space keeps evolving, and dealing with day-to-day issues of improving things for members, and whose turn it is to clean the fridge.

4.2 Aspects of 'innovation' and 'change' of the local initiative

The term 'innovation' rarely crops up in conversations with members and organisers of Build Brighton. A more recurring term and theme is 'community', understood as like-minded people who, as the publicity put it in the introduction, enjoy tinkering with technology and being involved in craft, and sharing the knowledge that develops through that. Founding organisers talk about building the community, rather than developing innovations.

As we saw in the overview, there are cases where members seek to commercialise products, or enter them into competitions, and so try and promote outputs from the projects in markets or as social innovations (e.g. the phonics owl). Product ideas have enabled some to start new careers in product design and technology development. So, for example, two members of Build Brighton developed a mini drum kit. It used laser cut parts, sensors, and a MIDI (musical instrument digital interface) system that they programmed to play samples. Another member of the space, who had a background in toy design, saw the potential in the kit (and other small instruments they were

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making) and decided to act as 'agent' in its commercialisation. Over the course of a year there was interest from toy manufacturers, including one large, well known company in the US, in buying the rights for the product. Eventually the product got nowhere. But the experience did prompt one of the developers to begin a new career as a toy developer.

To the extent that projects more generally in Build Brighton are novel to a member, which is often the case, and involves them developing and accumulating new skills in the process of designing, developing and / or following (or even copying) a project, then this is certainly innovative for them personally. Some members share their projects on line through sites including github.com/buildbrighton. And observation, interview and discussion confirm that member enthusiasm for sharing their knowledge, ideas and skills with others, both within Build Brighton membership and the wider community. Enabling is a term given to the space by its Directors.

So in that respect, Build Brighton helps cultivate capabilities amongst its members, whether for fun (the case for everyone) or, less frequently, for market or social aims. The real innovation therefore rests in hackspaces and their networks being an innovative way to promote an ethos of sharing inquisitiveness, exploration, fun, knowledge and capabilities in technologies in communities.

So, if there is innovation within that, then it is in providing 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. Members organise workshops and other outreach activities that, arguably, help diffuse this idea of community workshops, if we were to keep with innovation terminology.

Asked if Build Brighton was seeding social changes more widely, the Directors were unsure. They thought Build Brighton and hackspaces might be, but if they were, then it was in a subtle and indirect way. Both were familiar with the claims being made for grassroots digital fabrication and the maker movement, in terms of democratising or revolutionising manufacturing. But both were sceptical towards these claims.

"I don't know. It's a really difficult one to answer when you're inside it. There is a lot for manufacturing to be democratised like that, you've really got to solve a lot of problems. People think that 3D printers are a revolution, and they are, but not in a way that you can't just buy one and suddenly you're a manufacturer. Or suddenly you've got this ability. They take a lot of effort. Even buying one of the more commercially minded ones – they're fiddly things. And even if they work perfectly, you've still got to learn how to do 3D design, which is a very complicated subject. The fact that people can do this is amazing. But, whether it's the same thing as when everyone got their own printer, or when everyone got their own computer, I don't know if it as fundamental as that. Ultimately for people buying things is easy. Which is a horrible ... which sounds like a depressing view of it. I really want to encourage people to make things because making things is fun. I don't know if because it is fun creative and rewarding, its not necessarily going to shake up the world of large scale industry. There is definitely a kind of cottage industry popping up because of this. And that I really like. That people can make their own ... like a friend Ben who runs his own company in the Midlands area. He recently started ... he was doing a cottage industry components shop selling bits and bobs to makers ... But I don't think they'll effect everyone. And that is where revolutions, a real revolution in technology kind of happens."

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(Mike Pountney, Build Brighton Director, interview, 5th December 2014)

Wider change, if it is happening, is occurring through outreach initiatives like the Makerfaire, Science Festivals and workshops. Raising awareness and interest in how things are made, and perhaps contributing to a culture interested in how things are made.

“But in fairness, no one has really gone, hey, lets approach Nesta [a foundation promoting innovation in UK society], and lets get a tremendous amount of funding in to grow hackerspaces in libraries or run down areas, or in schools, or something like that. And I would expect that sort of driven activity to happen if there was a real impetus to change the world.”

(Mike Pountney, interview, 5th December 2014)

4.3 Aspects of empowerment and disempowerment of the local initiative

4.3.1 Governance

The governance of Build Brighton, how it is run, and its activities coordinated, has been an evolving process. The move between spaces transformed the group from a meet-up that did some tinkering into a fully-fledged workshop, as discussed above. And as the group has grown, it has had to think of new ways to hold on to the core principles of being a community-run workshop committed to allowing the public to access tools, hack and make in a sociable setting.

“I think there were only about 20 or 30 members then [at the Skiff]. And because they met every week, decisions would be made in the space when everyone was there. So everyone knew everyone else, and everyone knew what was going on. And then they moved to this public space. People had keys. You could go in whenever you liked [24/7 access]. Everyone wasn't there all at the same time. So it became a much more dispersed way of organising.”

(Emma O'Sullivan, interview, 5th December 2014)

Members, especially new members, were unsure about making decisions without the OK of the two Directors, and who were becoming overloaded. So three more Directors joined in June 2012, and the five Directors have set about introducing processes to move away from this 'pyramidal' structure and to improve the running of the space. The emphasis was placed on encouraging members to feel comfortable taking the initiative and suggesting things about the running and maintenance of the space.

“So we introduced a lot of processes for communicating on mailing lists instead of in person. Kind of if you want to do something, then send it to the mailing list, and see what other people have to say. If anyone is against it, then collaborate and try and come up with a solution that everyone is happy with.”

(Emma O'Sullivan, interview, 5th December 2014)

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The emailing system has since been modified in order to make it more workable. A word limit has been placed on suggestions, in response to threads that contained long and rambling messages, or terse and blunt ones, and which either way put people off following the communications. The shorter list enables suggestions to be posted, and members to provide short comments, and to vote without overloading peoples email. Many decisions can go through now, and any tricky ones get selected out for further discussion by those involved.

Organising meetings has been trickier. Holding meetings before the Open Evening meant attendance by members was OK, and who liked to be at the Open Evening. But these could run into the Open Evening, which was awkward for members of the public arriving in the midst of an overrunning meeting of the membership. Now meetings are called parsimoniously, and generally when bigger issues need discussing, such as whether and how to expand the space within Rodhus.

The Directors would also like to improve how new members are enabled to get involved. Some of the Directors are working out how to do this. Ideally, there would be inductions and introductions to the space by long-standing members. Even technically knowledgeable recruits need to know how the space runs and need to be encouraged to contribute. Currently, new members are asked to come along on an Open Evening, introduce themselves, and ask for an induction. The only other introduction to the space is a regular section in the newsletter, and that explains how things work, and the kinds of things members are welcome to do. Personal inductions place an additional demand on volunteer resources, and it increases as the numbers of member joining rises. So it is something the Directors are keeping an eye on.

Formally, the Directors roles are quite specific.

“What we actually do in a legal sense is look after the business. So we do the finance, we look after the insurance, we make sure that we are working in line with UK business and trading laws, and something that we’ve taken on – something that only the directors can handle that is not necessarily a legal issue – is dealing with disputes and grievance procedures.”
(Emma O’Sullivan, Director Build Brighton, interview, 5th December 2014)

Like any community, the space can have its difficulties. Grievance procedures can be difficult, and have even led to members being expelled from the space. And all roles have involved a lot of learning on the part of the Directors. Networking with other spaces has been helpful, since all can share experiences and ideas for how to run the space with the greatest felicity. As well as meetings there are on-line discussion lists for raising issues and sharing information, such as a reliable accountant, someone who can help with legal issues, and what to do about people who persistently fail to tidy up. Maintaining the equipment can also be difficult at times.

Health and safety and insurance are tricky areas for the space. It remains a bit of a grey area currently. Formally, the space does not and cannot train members to use tools. The members show one another. So far this has been ok. But the lines of accountability and liability can be hazy, and some reassuring clarity would be welcome. It would provide a kind of boilerplate assurance that might make it easier for more people to stand as trustees or Directors of hackspaces. This is one area for work by the UK Hackspace Foundation.

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The idea with the UK Hackspace Foundation is to provide an overarching service for all UK hackerspaces. Some of the larger spaces, such as Nottingham and London, but also Brighton at times, get approached with offers and deals from equipment and service providers, and the idea with the Foundation is to provide a contact point that might open these approaches up to other spaces that might welcome such offers. A related idea for the Foundation is that it can aggregate needs, and negotiate better deals for supplies to the spaces, or software licenses, and insurance deals, and so forth.

At the same time, the Foundation can share experience and provide advice between the hackerspaces. A UK hackspace mailing list already exists whereby organisers of spaces can post questions about recommended insurers, membership structures, cleaning and maintenance, running workshops, and other issues about running a space. The aim with the Foundation is to provide this advice more readily and easily.

Wider networks with other spaces have an additional importance for members of Build Brighton, which is that it helps give Build Brighton an identity and identification with a bigger community. Such connections can help with the internal governance of the space. Members feel like they would be at home in any other hackerspace around the world. And members do visit other spaces, and get visits too.

“Jimmy Rogers from Artisans’ Asylum [a large US makerspace in Somerville, Mass.], he sells kits internationally, and he came in to pitch on the last tour. So we sometimes get people visiting from other places, which gives us a definite link with them, we know someone there. It sort of makes you feel like a kind of personal link with them. So that is mostly how our connections work ... in Europe ... quite a few of us have been to visit CBase [Berlin hackerspace founded in 1995] quite a few times. And they are like ... everyone sees them as the original hackerspace. So you go in like sort of pilgrimage, to the father of hackerspaces around the world. People will go on a holiday, and they’ll pop into the local hackerspace, and they’ll come in and tell people about it”

(Emma O’Sullivan, interview, 5th December 2014).

Networking can help with the spread of project ideas, as well as ideas for governing the space.

“It will largely come out of people meeting up at physical spaces and showing projects and sharing ideas, and people taking them back to their own hackerspaces. And that sort of what fosters collaboration between hackerspaces. It is definitely a lot stronger within the UK, than it is between the UK and other countries.”

(Emma O’Sullivan, interview, 5th December 2014)

Internationally, members might find projects at other spaces and communicate with them on a one to one basis. Sharing is an important part of the ethos at Build Brighton.

Contrary to some hackerspaces, such as the more ‘political’ ones in Germany, however, there is no formal commitment to free/open software or hardware.

“Rather than it being open source as such, though an awful lot of what the hackerspace produces will be public domain or open source, or something along those lines. It will be something that

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a lot of people involved in the space believe in as a general ethos. However, I think in many cases, there is also kind of a bridge into the world of patenting good ideas. And so people won't necessarily be like, this is an open thing I want to share it. They'll be like, wait a second, I think this is a good idea, I need to push this through, with a view to it being a commercial thing in the future. What there is though is a culture of sharing. Which I say is more informal than an open source licence or legal structure. It is just that people will share what they know and tell you how things are made. And there's not a kind of ... there's not a lot of secrecy at the space. And I think that is the kind of culture that naturally generated."

(Mike Pountney, interview, 5th December 2014)

4.3.2 Social learning

Enthusiasm for sharing knowledge and learning new skills in relation to technology and craft is a fundamental part of Build Brighton. As already noted, members assist one another. And they participate in the Open Evenings as well as volunteering in the design and delivery of workshops.

"Some of the guys who are professional makers, they come to the open evenings every week. And they don't get any work done. It is too busy. And they kind of bring stuff that they have made. And they show other people how it works. And they answer questions about their projects. And they come to share their knowledge about what they learn."

(Emma O'Sullivan, interview, 5th December 2014)

Some members get a lot out of teaching others. One of the Directors thinks that the learning, sharing and skills swapping culture at Build Brighton is empowering in different ways.

Quite apart from learning technical skills, simply becoming part of the community is considered empowering. As with other community groups, becoming part of something and feeling like you belong to this interesting group.

"Everyone has stories of how they joined and made friends and found a new social life through it. Which I guess is pretty similar to most communities. But this is quite a geeky thing. Its like, oh man, you know like people who have a really deep knowledge of like acoustics, or potentiometers or something. It is really geeky stuff – and you'll find someone there who is really into it"

(Emma O'Sullivan, interview, 5th December 2014)

The significance that this can give to a person's esteem and confidence should not be underestimated. But there is also a belief amongst members of Build Brighton that people become more knowledgeably empowered within an increasingly technologically mediated world.

"Like people learning more about technology and making their own technology around their house. Like making home monitoring systems. Media systems. And things like that. And finding out more about open hardware and open software. And sort of taking control of their technological life back from big companies like Microsoft and Apple. So that kind of material empowerment is probably applicable across quite a lot of areas."

(Emma O'Sullivan, interview, 5th December 2014)

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For a few people, such as Emma, this expands into the self-provisioning, repair and maintenance of more material objects in their life.

“... something that I really enjoy about it – its not universal – but I have really enjoyed getting the skills to be able to be more self-sufficient. So something I do now a lot is I make my own furniture. Which I much prefer to kind of buying anything. I cannot imagine buying a piece of furniture again. And to be able to go kind of, oh, I don't need to go out and buy that, I can put some time and effort in to making it myself. I find that really empowering ... I find it empowering to have these skills to not be reliant on buying things, and buying into consumerism. Like I can make furniture out of scrap wood. I can buy tools that are reusable on different projects. And I can make things for myself that are unique instead of something that was mass produced for thousands of people, possibly made in a not very nice environment, I do not know where it came from.”

(Emma O'Sullivan, interview, 5th December 2014)

Others too hope involvement in hackspaces might encourage people to take greater interest and care in the objects and technologies in their lives. Perhaps making something, 'for the enjoyment of it, rather than the requirement of it' (Mike Pountney, interview, 5th December 2014). There is a hope that this can cultivate post-consumerist values and identities (see also, (Schor 2010; Thorpe 2012)). However, this is not yet a topic of focused discussion and activity amongst UK hackspaces.

“I think it has massive potential to be socially transformative. That hasn't yet been fully utilised as yet. Hackerspaces are still fairly new. There are a lot that are developing that are very new. We're still trying to find our feet. So our activities are limited at the moment to our own members and the surrounding local community that can sort of pop in to the space. What I would like to see is there are lots of hackspaces, they all know what they're doing. They all have enough resources, enough people and enough money to be self-sufficient. And they start directing their energy outwards, towards a wider community, and sort of implementing projects that spread all of this knowledge that is available within the hackspace to a wider audience of people. Or alternatively, for developing these relationships with other institutions at a higher level to be able to output our knowledge and skills in a way that they can use and spread.”

(Emma O'Sullivan, interview, 5th December 2014)

Links with institutions that might facilitate this have not really been explored yet. Ones mentioned in interview included local education institutions and public services provided by local authorities. The idea being that the hackspaces might be supported to help with some of these, or new services, for the wider community.

However, as a group, Build Brighton are probably also wary of being exploited. They get many approaches from firms seeking to involve them in projects as a kind of free labour. And whilst the workshops they run are enjoyable and done voluntarily that reason, any more consistent programme of workshops would need a more secure resource base considerate of peoples time. It is a tremendous source of pride and empowerment for those involved that the space has been created through their own resourcefulness.

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Like many hackspaces in the UK, Build Brighton is largely male and mainly white. Amongst the maker movement, the gender balance is considered to tilt less steeply. Some hackerspaces in the US have made conscious efforts to recruit more women members with some success. But directed outreach, whether to women, or to ethnic minorities, or more specific groups poorly represented in science and technology more generally, is not something Build Brighton has done. It is still a question of whoever turns up at the door.

4.3.3 Resources

The group has always been self-funded, and this is an important underpinning to the community.

“This is one of the things I am very proud of, and it is a common thread between ... certainly the successful hackspaces. Where we’ve kind of ... it seems taking on [external] funding early tends to lead people away from the voluntary communities, because when you get funding it leads people to work with a free money mindset. We’ve seen a pattern where if people get a space for free, they don’t respect it as much. It is less valued. People are less willing to pay into things. Our relatively slow growth. Pushing yourself to take on things that you can’t quite afford right now, but knowing that you can kind of find money from other sources.”

(Mike Pountney, interview, 5th December 2014)

Membership of Build Brighton was originally £20 per month. However, there was always some flexibility. Either because members were on low incomes, or because some sleeping members simply wanted to support the initiative without actually using the space, and because some wished to pay extra. So Build Brighton has now moved to a ‘pay-what-you-can’ policy. Income remains unchanged, with the average being around £16 per person per month (so around £1600 per month for the current 100 or so members).

With this income, plus funds from running workshops and other sources, the group has been able to build up the space and the equipment it has. Members also build their own machine tools, such as CNC routers, or 3D printers, and leave these for others to use at the space. There are still wish lists, however. The Directors in interview said they’d like to see more traditional machine tools and craft equipment. Some members are joining or becoming interested in more design and craft activities. There is growth out of the electronics founding interests. Though this is growth that will need members resourceful in these areas.

4.3.4 Monitoring and evaluation

Success for Build Brighton is probably measured in terms of the health of the community and the breadth of making and hacking activities possible. As a self-organised space, there are no external metrics or performance measures to worry about. Staying afloat financially is obviously important.

Something we picked up visiting other spaces, particularly those that do get outside funding, is how incongruous they sit within what funders are accustomed to. This was not discussed with Build Brighton. It appears that self-organisation and autonomy make this less of an issue. FabLabs, makerspaces and their sister spaces that do receive funding and hence performance expectations

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can confound and be confounded. They are not like spaces that public funders are accustomed to, like libraries or exhibition spaces. People do not come to consume knowledge or culture. 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.

4.4 Other issues about the local initiative

An important consideration in cities like Brighton is the high cost of property. This affects all community activities that need a space to function, but is particularly acute then those activities also involve tools, workbenches, and making activities. Build Brighton's numbers are increasing steadily. What they will do when they become too big for their current space is unclear.

Some observations:

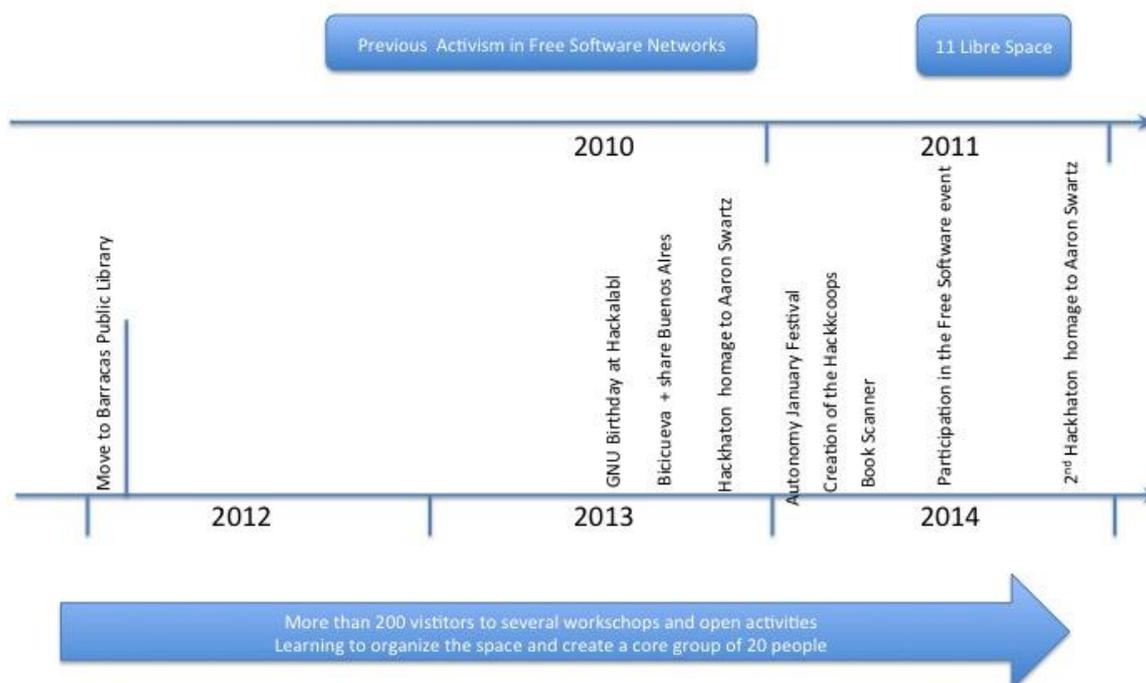
- The usefulness of personal networks locally when trying to start a space
- The importance of becoming involved in local projects
- Collaborations with others locally and participating in events can help with the profile
- Feeling part of something bigger is important
- The need to adapt governance with growth and development
- Keeping the founding ideas / principles clearly in view
- Dealing with conflicts and grievances sensitively
- Autonomy is important, and creating it from own resources is empowering
- Some features reflect society more generally in technology: gender ...?
- Do not under-estimate how projects in a collaborative setting can empower people (even if no new economies being built yet)
- BB has a lot of knowledge that could be helpful for others: at the moment it is tacit – institutional links might help, but double edged

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5 Local initiative (2): Hacklab Barracas – Buenos Aires, Argentina

A space where technology is subverted and we explore its liberating possibilities, experimenting with technology, sharing knowledge and searching for possible application and non-conventional uses (Hacklab Barracas Manifesto, web page)

5.1 Overview of development in the local initiative



Hacklab Barracas is based in the Barracas Public Library, an open, public space which also host other alternative initiatives like an open bike workshop called “Bicicueva” and a urban farm. Barracas Public Library is situated in the south part of Buenos Aires, almost under the highway, in what can be regarded as a popular neighbour of the city. The HackLab Barracas has been running there for three years.

The Hacklab Barracas is an open space, non-for profit and horizontal space of experimentation with technology and open culture. It grew out of a history of free software activism from different members as a space to overcome the limitations of the virtual world of e-mail list and chat rooms.

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The aim was to experiment with liberating possibilities of technology and design alternatives to proprietary systems. As such the Hacklab Barracas is well sit within the libertarian space of free software and hackactivism.

The members of the Hacklab knew each other from previous activism in the free software community, in particular they shared a lot of connection through local chat rooms and e-mail list like Solar (the free software e-mail list in Argentina) or the Pirate Party and other similar spaces. Before moving to the Barracas Public Library, there was a small attempt to create a new workshop in a shared artistic space called 11Free. However, 11Free (Oncelibre in Spanish) was a kind of artistic residency that offered them some space. But, since they were only borrowing this space, this put some constrains in terms of organization and possible activities. However, the passage through the experience of 11Free gave the member of the Hacklab the opportunity to realize that they needed a space to work together beyond the everyday communications they were having through electronic means.

On the beginning the members of the space started a search of references and previous experiences of hacklabs and hackspaces. It is important to notice that the Hacklab started there three years ago, a bit earlier than other initiatives in the hackerspace and makerspace scene in Buenos Aires. So, at that moment there was not any known local reference to follow. Nowadays, the makerspace scene in Argentina is a bit more complex and it is possible to find a wide arrange of different hackerspaces and makerspaces either in Buenos Aires or in other cities in the interior of the country like the Garage Lab and the Wasabi hackerspace in Buenos Aires and the MateLab Hackerspace in Mar del Plata and some makerspaces like NETI also in Buenos Aires among others.

Back in 2011, they ponder for a while which could be the best way to organize themselves and then decided it was best to take the form of a hacklab instead of a hackerspace. The difference between the two denominations has to do with the organizational form and aims of each space. Hackspaces were seen as more entrepreneurs-like spaces which depended in some form or another of formal organization. Whereas, hacklabs were related to hackactivism and self-organizing rules (see internal governance). So they refer themselves as a Hacklab, closely following the ethos of hackativism.

We always said we are a Hacklab. We already knew that hacklabs existed, and that they belonged to a more autonomous line of work, more anarchist and European. It was only later that we realized that there were also hackspaces and when we saw how they work, they were not very interested for us (Fauno interview)

During their three years of existence the Hacklab Barracas has become a reference for free software and hackactivims in the region. More than 200 people has participated in their workshops and open day activities. The Hacklab also participates regularly in free software events like Flisol (free software installation fest) and rallies in defense of free culture. They also have produced around 20 self-organized project of very different style, from an open brewery to an urban farm, and from a book-scanner to an open VPN network. Nowadays, around 20 people participate in their day-to-day activities.

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One of the first activities of the Hacklab has been the creation of a manifesto that acts as a guideline of the ethos (as the quote at the beginning shows) and rules of the space. About the space of the Hacklab, the manifesto says:

“It is a space to develop projects that involve technology and social commitment
It is a space to research and develop the potential of libertarian technologies
It is part of the movements of software, networks and free culture
It uses, disseminates and writes free software, understanding that it is impossible to “subvert” proprietary software
It is available to help and support the creation of similar spaces and friendship among them, without regarding those as branches
It is against the use of “products”, being those proprietary, restrictive or hegemonic
It is non-profit
It challenges technocracy and believes technology should be at the service of people and not reduce us as consumers
It rejects fascists, racism and sexism, trolls, boycotters and pro capitalist”

(Hacklab Barracas Manifesto)

The Manifesto had a founding character, but also had to be actualized according to the activities and challenges of running the space. Thus, for example the last line about racism and sexism was introduced by feminist members of the lab, in part due to complains about gender issues.

These changes were important, since apart from the Manifesto, there is not a formal organization or hierarchical structure that organizes the space. Rather, what domains the hacklab is a self-organizing activity where anyone willing to do a project can do it.

According to Fauno, one of the principles that guides the Hacklab is “magic anarchism”, meaning that the space is open for extraordinary things to happen: sometimes they do, and sometimes they do not happen at all. However, as it does not mean that there are not informal government mechanism in place (see internal governance). And, yet one of the most challenging task for the Hacklab has been to introduce this self-government style to other people who want to participate in the activities of the Hacklab.

More recently, some members of the Hacklab Barracas has decided to create a cooperative of software to provide software services. Although the idea of the software cooperative was part of the hacklab from the begining, it took more time and learnings to start organizing it. A kickstart moment for this change has been prompted in part due to the need to earn a living outside formal jobs. At the same time, this passage to a cooperative suggest certain maturing process of the Hacklab space that is in consonance with a flourishing scene of free software cooperatives in Argentina (Agustín Zanotti interview).

5.2 Aspects of ‘innovation’ and ‘change’ of the local initiative

Innovation in the commercial sense does not play a role in the activities of the hacklab. The entrepreneurial aspects of hackerspaces are clearly rejected:

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Hackerspaces seems to have a tendency to produce machines, they have a more entrepreneurial style. I am not sure I will feel comfortable in a space like that (Fauno, interview)

Moreover, the Hacklab manifest explicitly rejects proprietary products and technologies designed to turn people into consumers. Instead, tinkering with technology follows the aim of empowering the individual or the group and finding way to open up spaces for interchange. Thus several of the projects that the Hacklab organizes are based on ethos enabling the free interchange of information and knowledge among peers and avoiding vertical structures of control. There is a lot of effort in translating these values into technological initiatives that try to foster autonomy and self-reliance.

For instance, some of the projects of the Hacklab try to foster free access to internet services via, for instance liberating Wi-Fi spots. A more ambitious project involves creating a peer-to-peer VPN network of communication that allows then to send e-mails and information without using central servers. This kind of networks have been attempted also in smaller cities in Argentinean Cordoba, but they are not so easy to coordinate and implement (Agustin Zanotti interview). The Hacklab Barracas has been building this network in Buenos Aires and already have approximately 20 nodes.

Another project has built a book scanner that allows to share and distribute knowledge and information previously locked.

All this projects have in common a conception of technological tinkering which aim is mainly to spread the use of technology, foster technological autonomy and improve the access to free culture. Thus, while the idea of sharing knowledge and liberating technology is central to this endeavour, the idea of creating something new or a new solution is rather secondary to that.

Activism activities also include the edition of the magazine *In defence of free software*, which is running its second number and the translation and edition of several books about the hacker ethos and the free software ideals.

Some members of the Hacklab also experiment with hardware, including robotics and electronics and more analog hardware like crouching and brewing. Hardware experimentation is part of the life of the hacklab, but in contrast to other makerspaces this is not central. The reason to this seems to be in relation to ethos of free software. In this respect, Fauno questioned to what extend open hardware was really open. For him there was a controversy in the fact that some open hardware relied in chips that nobody knew how to produce. Thus, the standard to regard something as open hardware was the possibility of reproduce every aspect of a technology. Even though in practice that did not mean that one should build everything.

In that sense, it seems clear that the ultimate goal of change for the Hacklab is the possibility to foster open culture and enabling other people to do similar things. Thus, change is measured as an ever growing community of people doing things in open culture.

Although the Hacklab has also relations with other social groups and movements, including environmental movements (for instance against Monsanto), the core of the activities sit comfortably within an idea of change related to free culture.

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5.3 Aspects of empowerment and disempowerment of the local initiative

5.3.1 Governance

5.3.1.1 Internal governance

The internal governance system at Hacklab Barracas is very informal and yet effective. It is built on the experience of years of militancy in free software campaigns and activism and recognizes the rule (Pareto?) that only 10 percent of the participants leads the projects. Based on that experience the first members of the Hacklab established a system based on very simple implicit rules that are designed to avoid friction and burdensome meetings. Some of the basics are these:

- Do's and do not's are based in the manifesto
- Anyone can propose or initiate a project and pursue it until becomes boring or gets other peoples interest
- Everyone is responsible of what is doing at the lab and needs to help with some task ad-hoc
- There is not vertical structure and everyone is a peer. Hierarchies, even those based on knowledge are rejected.
- Meetings and discussions are reduced to a minimum. Debates are held during the week at the mailing list. In rare cases there is a debate at the lab.
- A deal or accord is reached when they are close to consensus, but since absolute consensus is difficult, lack of opposition is enough to initiate a project

The system has been kindly denominated "Ad hocracia" (and also "magic realism in a more playful way - in reference to "magic realism" - the Latin American literature style). Ad hocracia means that participants are invited to do whatever they consider necessary for a project to work. In this sense, things are bound to happen at the lab, sometimes they do and sometimes do not.

Overall, the governance of the space rest on individual initiative and the capacity to work with other without external guidance. The simplicity of the system however it is difficult to transmit or to learn. According to Fauno, some people get it and some people do not understand it. Perhaps the main difficult is related to processes of social learning (see below) where a participant does not know in advance some programme or activities. However, the do it yourself ethos is also demanding for people that is not use to this kind of space, particularly those who are just visitors or are invited to give a workshop. When this occurs, there is a previous chat with the person and some basic rules are explained. In particular, they ask to avoid at any cost converting the space in a classroom or expect to gain attention from everyone. Since the space is open and free, there are expectations that everyone needs to collaborate and keep doing their projects even when workshops are running in parallel.

5.3.1.2 External governance

The hacklab barracas is connected with other spaces in a very loose way. There is not coordinating structure not an annual or regular meeting that congregates similar spaces at the local or regional

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level. Furthermore, members of the hacklab seem to be more interested in participating of free software events like Free Software installation days than in specific meetings of other hackerspaces. Their connection with other makerspaces of the local scene is thin or non-existent. However, they seem to be well connected with the more activist hacker scene at the international level.

5.3.2 Social learning

Social learning at the Hacklab is a complex process of individual learning and sharing knowledge that it is embedded in the political ethos of hack-activism and autonomy.

To understand how it works is important to notice that the hacklab space does not work as the main learning space neither as a classroom for hackers. The process of learning code or other technologies is divided between self-process of learning and at home and through mailing list or chat rooms. These practices are based on the previous trajectory of software hackers and free software activism.

Sometimes there are people that does not have any idea and says "I can't stand Windows anymore" or "I would like to install Linux", and we said to them: "we are not a technical service, I can get you the installation cd-rom and if you need help I can give you a hand, but you need to do it yourself". There is people that likes this dynamic and people who does not, but generally it is more the people who like it (Fauno interview)

In second place, the members of the hacklab do not act as official tutors. The idea of having a formal teacher is totally rejected because it implies a vertical structure or asymmetry of knowledge.

It comes to a point when you realize the weakness and strengthens that everybody have. So, if somebody new comes and wants to do something you can say, this person can give you a hand or give you some advice where to start. But we do not have a facilitator, like the famous comrade in charge that Engels mentioned about anarchism. We do not have a comrade in charge of teaching, or a professor. Sometimes some person comes and start saying professor to one of us, and that was bothering: he said, please do not call me professor, I am John. Thus because, this is not the kind of relation we want to have with people who wants to join the group (Fauno interview)

This does not mean that knowledge expertise is not respected. On the contrary. But there is a fine balance between this respect and the redrawing of the open space of the lab could implied building a teacher-alumni relationship. This is why workshops proposed as open spaces that share the space with other activities (see above).

It is inevitable to ask to what extend this social learning style is really inclusive and what happens with those who struggle with learning specific things, like code. Fauno suggested that they tried to be more kind and tolerant than other spaces with those who are just beginning to learn.

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Overall, the slip nature of the learning process between learning by your own at home and this knowledge probably means that the space of the hacklab works more as space for trying new things and trying new collaborations.

5.3.3 Resources

The activities of the Hacklab are self sustainable and non-profit. The Hacklab Barracas borrows the space from the Biblioteca Barracas and does not pay any rent. They contribute however with the payment of utilities. Every person brings their own computer or materials to the lab and in some cases they raise money internally to meet ends. In exceptional cases they produce parties at the lab in order to raise further cash.

Over time, the self sustaining ethos of the lab has also impregnated other aspects of daily life of the hacklab. For instance, they sometimes do collective buying at the central market in order to get better prices for food and avoid intermediaries, or try to produce their own beer (hackbeer). Although these projects are still isolate to be part of a more systematic plan, they point out to experimentation with alternatives forms of resources and income (see also Hackcoop initiative above)

5.3.4 Monitoring and evaluation

There is no formal evaluation or monitoring activities at the Hacklab Barracas. Underlying this conception is a key issues for the Hacklab: formal measurements create burdensome bureaucracy. Therefore, they do not count participants or results in any formal way. The only activity related to monitoring is the construction of a wiki line for every project they build in order to document their activities. However, the underlying goal of the wiki page is not monitoring but allowing replicability and learning.

Thus, (almost) every project gets a post where different aspects of the process of construction and coordination of the process are documented. In some cases, the documentation is a painful task and takes more time that the project itself. In other case, it is done just as a small "cut and paste" of the idea of the project and the results.

According to Fauno, there are two main aspects that measure a good project. One, and foremost is the open aspects of making things. and the second is replicability:

What counts as a good project is a project that works well and that is easy to be reproduced. On the one hand, it has to be open software and on the other hand, that other people becomes able to use it (Fauno Interview).

In some way, within the semi-informal "magic anarchism" of the lab, the only indicator of success that is bound to work is the feeling that a projects works and has been re-used or replicated by other people. That is because the ultimate aim of the lab is to foster open culture and liberating technology. Therefore, if the projects get replicated that is an informal indicator of success.

5.4 Other issues about the local initiative

One of the interesting issues about the local initiative is related to the identity aspects of what it means to be a hacker, including for instance the use of nicknames and how this has been changing over time in social terms and also in terms of material culture. In some respects, the definition of hacking has changed from just software tinkering to tinker with material technologies, but this has also an impact in what does it mean to fabricate your own technology. What does it mean to make a thing when you do not own or know how to make an important part of it, like its core chip? These questions remain interesting also for the Latin American context.

6 Synthesis of hackerspaces case study

In reading this synthesis of the hackerspace case study for TRANSIT, it is important to bear in mind how the methodology developed for the research project generally 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.

6.1 Condensed time-line

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, but over time hackerspaces have extended into fabrication also. 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.

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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.

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

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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

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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 cooperativeselling 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 hackerspace 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 the 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-

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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 hackspace 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?

6.2 Aspects of 'innovation' and 'change'

Pinned to the wall of Makespace 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 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 seen as 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 hactivism and seeking cooperative approaches to developing economic activity around the hacklab.

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The real innovation therefore rests in hackerspaces and their networks being an innovative way to promote 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, 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

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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. 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 hoc* rancia 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 placed 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 for overcoming the incumbent social structures that embed conventional approaches to learning, knowledge, and innovation in society. Some of our interviewees observed hacking being incorporated into entrepreneurial and mainstream activities, but with a marginalisation of the original political ethos. It 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.

6.3 Aspects of empowerment and disempowerment

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.

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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 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 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

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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.

6.4 Other issues

Our approach to hackerspaces has been driven by the general interest of the TRANSIT project in transformative social innovation. A myriad of fascinating issues have arisen more inductively through the course of the research. Those we think would be important to follow up in the future include: issues of identity and identification with hackerspaces and hacking, and how this is changing and developing; the material culture developing in hackerspace and spilling out of them; the fascination in humanised tools/technology as a device for social change; the complex relations between autonomy and social development.

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Annex 2: List of interviews

| Interviewee | Purpose of interview | Date | Duration of interview | Interviewer |
|--------------------------------------|------------------------------|-------------|------------------------------|---------------------------------|
| Makerspace founder | Transnational networking, US | 06/12/13 | | Adrian Smith |
| Makerspace founder | Transnational network | 23/01/14 | 1 Hour | Adrian Smith & Sabine Hielscher |
| Local initiative founder | Transnational network | 20/08/12 | 1.5 Hours | Sabine Hielscher |
| Academic researcher A | Transnational network | 08/08/14 | 1 Hour | Sabine Hielscher |
| Academic researcher and practitioner | Transnational network | 29/09/14 | 1.5 Hours | Sabine Hielscher |
| Paul Bohm | Transnational network | 04/08/14 | 2 Hours | Sabine Hielscher |
| Paul Bristow | Transnational network | 08/09/14 | 2 Hours | Sabine Hielscher |
| Jarkko Moilanen | Transnational network | 05/09/14 | 1.5 Hours | Sabine Hielscher |
| Transnational networker | Transnational network | 03/10/14 | 4 Hours | Sabine Hielscher |
| Academic researcher B | Transnational network | 29/09/14 | 1 Hour | Sabine Hielscher |
| Mike Pountney | Local initiative | 06/12/14 | 1.5 hours | Adrian Smith |
| Emma O'Sullivan | Local initiative | 06/12/14 | 1.5 hours | Adrian Smith |
| Nicolas Reynolds (Fauno) | Local initiative | 27/09/14 | 1.5 hours | Mariano Fressoli |
| Agustín Zanotti | Local networks | 24/09/14 | 1 hour | Mariano Fressoli |
| David Alcoba | Vailets HackLab | 13/11/14 | 2 hours | Adrian Smith |
| Sara Alvarellos | Madrid Makerspace | 4/12/14 | 1 hour | Adrian Smith |

transformative social innovation theory

Annex 3: List of meetings and events attended

| Meeting and events attended as part of data collection, dialogues, etc. | Purpose of attending | Date and duration | Attending from the research group |
|--|-----------------------------|--------------------------|--|
| Electromagnetic Wave, UK | Transnational network | 05/05/13 | Adrian Smith |
| Brighton Makerfaire | Transnational network | 06/09/14 | Adrian Smith & Sabine Hielscher |
| Hacking toys workshop | Local initiative | 08/09/13 | Adrian Smith |
| Brighton Makerfaire | Transnational network | 07/09/13 | Adrian Smith & Sabine Hielscher |
| Makers & fixers event | Local initiatives | 03/06/14 | Adrian Smith |
| Build Brighton Open Evening | Local initiative | 18/12/14 | Adrian Smith |
| HackLabBarracas Open Saturday | Local initiative | 27/9/14 | Mariano Fressoli |