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Molecular management: Protocols in the maker culture

ABSTRACT

Early industrialism was influenced by the organization of cottage industries, and in a similar vein, many of today's creative industries emerge largely from networked small-scale initiatives or cultural scenes. Collaborations and interactions are the backbone of the contemporary Do-It-Yourself (DIY) or 'maker culture', a distributed milieu of open software programmers and hardware hackers, but also crafters, backyard tinkerers, hobbyists and homesteaders. The scene is held together by micro-management tactics, or 'molecular' management, using protocols to guide collaborative innovation and shared craft practices, forming an emergent and innovative creative cottage industry. The maker culture is thus less of a DIY and more a do-it-together culture, merging collaborative play and interactions, often for the sake of shared curiosity. The mindset of the participants is that of the explorative craftsman; using a practical attitude of sharing ideas, methods and skills among practitioners, and the interactions are managed in a flat and meshworked manner through the use of protocols. The text specifically examines the protocols of the maker movement, finding an immediate connection between hardware protocols, like the 'makers bill of rights' guiding the principles of open source hardware, and the principles reflected in the social protocols of two hacker spaces. The maker culture is not only a loose network of dispersed tinkerers, it is also a close-knit molecular assemblage of materials, tools, skills and makers.

KEYWORDS

craft management
co-design
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MEET THE MAKERS

Looking through the news it seems we live in times where 'innovation' has replaced the concept of 'progress', and likewise, 'creativity' has become to postmodern capitalism what 'efficiency' was to the bureaucratic corporations of mass production (cf. Sennett 2006; Boltanski and Chiapello 2007). But still most of us researchers study how creativity is managed inside the 'creative industries' – rather than in the broader field of what was before the wider and perhaps more inclusive term 'the Arts'.

Today there is a 'creative imperative' (cf. von Osten 2002) where even hobby activities take on a character of professionalism and for almost every job the applicant is ordered to be creative. As famously argued by Richard Florida, creativity is an ability by which we can trace the emergence of a new industrial class (2002), and also the socio-geography of contemporary production (cf. 2005). Yet, at the same time, many jobs in the creative industries dissolve the distinction between the profit-maximizing firm and the civil society, or that of designers and users. Emerging fields of 'social entrepreneurship' and 'social innovation' further blur these once separate roles. This is done in a similar way to how 'participation', 'cooperative design', 'co-creation' and 'co-design' have been reconstituting the interfaces between designer and user over the last decades (cf. Bødker et al. 2000; Ulrich et al. 2003; Lee 2008; Sanders and Stappers 2008). Several studies have been made on this evolution, each highlighting another aspect of collaboration, be it that of the creative role of 'prosumers' (Toffler 1980), 'user-innovators' (von Hippel 2005) and 'pro-ams' (Leadbeater and Miller 2004) as different forms of design and knowledge workers. The focus on these earlier studies has often been on their quality as innovators, or how they enact or extract value from their ideas (cf. Hartley 2005), but this study will expose another integrated element in their practice of workmanship when we consider them collaborative crafters.

Today, 'craft is enjoying a bit of a Zeitgeist moment', Ed Vaizey has noted, British minister for culture, communications and creative industries (2010). Global brands are highlighting their specific craftsmanship, not least in the luxury industry, and several books have praised the work processes connecting the mind with the hand (cf. Wilson 1998; Sennett 2008; de Botton 2009; Crawford 2009, 2011). One specific group of practitioners today, often unseen but fully embracing the crafts, is the hacker or maker community.

Over the last decade hundreds of hack-labs and maker-spaces have emerged over the globe; from the fabrication laboratory, 'fab-lab' at MIT, and open prototyping workshops in Europe and Asia, to maker fairs in Africa (cf. Troxler 2010). Together with a wide range of Internet sites and blogs, these are visible traits of a more and more global and influential 'maker culture'. What characterizes this emerging culture is another type of innovation philosophy than in the labs of companies or entrepreneurial innovators. The maker movement is defined by Thomas Kalil, deputy director of the White House's Office of Science and Technology Policy, as a group of makers 'who find making, tinkering, inventing, problem-solving, discovering and sharing intrinsically rewarding' (Kalil cited in NYSCI 2010: 1). He continues,

> This broad-based community encompasses scientists, engineers, students, welders, software developers, hackers, circuit benders, musicians and crafters of all stripes: individuals and communities of people drawn

> together by a common delight in the magic of tinkering, hacking, creating and reusing materials and technology.
>
> (NYSCI 2010: 1)

A point of assembly for the maker community has been the magazine *Make* from O'Reilley publishers in California, first published in 2005 and with a circulation with over 125,000 issues monthly but with a much wider distributed Internet site. The magazine often features projects from creative enterprises using open prototyping and production platforms that also often are used by within the creative industries, such as Arduino and Makerbot.

The makers are a craft community active in the civil society, based on workmanship and ingenuity (Pye 1968), and networked with the rise of the Internet logic that has turned organization 'from collective to connective' (Broeckmann 1999). The maker culture coordinates events, research, development and innovation in distributed and self-organized manner, driven by 'scientific pursuit, personal organization, community values and intrinsic enjoyment of creating DIY objects' (Kuznetsov and Paulos 2010). A wide interconnected resource is formed by a wide variety of popular blogs and sites, such as makezine.com, boingboing.net and instructables.com.

According to sociologist Richard Sennett (2006) we live in a time of a new capitalism, a system feeding on speed, flexibility and mobility. Potential is celebrated rather than past performance and this makes us constantly haunted by the 'spectre of uselessness'; the scope that our job is the next to be outsourced. We work long hours but have short commitments and long service earns us no respect. The work in the information industry looks free on the surface but is Taylorized in a way that we have no possibility to earn a good sense of craftsmanship in our job.

> The emerging social order militates against the ideal of craftsmanship, that is, learning to do just one thing really well; such commitment can often prove economically destructive. In place of craftsmanship, modern culture advances an idea of meritocracy which celebrates potential ability rather than past achievement.
>
> (Sennett 2006: 4)

To challenge this culture, consumers will have to train to get the eyes of craftsmen; 'the modern consumer needs to think like a craftsman without being able to do what a craftsman does' (Sennett 2006: 143). But the makers take Sennett's call by the word and set out to develop new forms of hands-on engagements and a yearning for craftsmanship. Even though mostly being driven by an amateur curiosity, the Do-It-Yourself (DIY) culture among the makers share an approach of self-enhancement that resonates well with the almost subversive quality of craft today. 'The emotional rewards craftsmanship holds out for attaining skill are twofold: people are anchored in tangible reality, and they can take pride in their work' (Sennett 2008: 21).

The makers spread the ideas and inspiration of making, and facilitate the skill dissemination that can turn the hobbyists into a pro-ams, or 'networked amateurs working to professional standards' (Leadbeater and Miller 2004: 9). Here it is important to stress that amateur is not a derogative term, but a 'practice that is not limited or confined by the demands of the marketplace' (Beegan and Atkinson 2008: 310). To raise their amateur approach to professional skill level, the makers are getting organized to manage the flow of

information, the dissemination of works and also the management of larger coordinated systems, like the famous examples of the free operating system Linux, or the free Wikipedia encyclopaedia. However, they use different protocols for collaboration than what has before been common in the world of craft. They use what we could call 'molecular' management models.

MOLAR VS MOLECULAR MANAGEMENT OF MAKING

At the core of the traditional concept of organization is the management of parts into a whole; an optimized machine where all parts interact smoothly and friction is reduced to a minimum by various means of control (Morgan 1986). Modelled after Fredrik the Great's beloved automata, the military hierarchies of the Prussian clockwork armies turned into the key diagrams of organization and management of the social body as Michel Foucault (1991) and Manuel DeLanda (1991) have described. With the division of labour and mass production this became the main mode of production.

However, the maker community exhibits a very different mode of management and coordination than the hierarchical models of the traditional firm. These modes of organization has been popularly studied the last years as *Complex Adaptive System* (Holland 1999; Axelrod 1997; Axelrod and Cohen 1999; McMillan 2004) and put down in more popular jargon as 'wikinomics' (Tapscott and Williams 2006). But when taking on the protocols of the maker culture it might help to first start in the abstract and use some Deleuzoguattarrian terminology to make situate the difference between maker protocols and classic engineering of closed systems.

Gilles Deleuze and Felix Guattari distinguish two models of organization: the 'molar' and the 'molecular' (1988). The molar is a hierarchical or sedentary mode of organization, static and accumulative as it tends towards increasingly the equilibrated and homogeneous (Deleuze and Guattari 1988: 334f). The molecular, on the other hand, is nomadic and transversal, dynamic and in motion, striving away from equilibrium. However, tempting as it is, one should not treat these modes as opposites, as they are not mutually exclusive; they are distinctions to recognize processes of becoming, of how new things come to be or how coordination evolves between interacting parts. The molar is reactive or defined by negation, it holds back the process of becoming and the centre is static. It is a tendency towards centralization and hierarchy. The molecular on the other hand is active and affirmative, in constant motion and plots new lines of becoming. It is a tendency for escape and dynamic behaviour.

Philosopher DeLanda (1997) recognizes how the molecular tends to assemble self-organizing 'meshwork' structures or what Deleuze and Guattari called 'the rhizome' where structures emerge not on central command but are 'synchronised without a central agency' (1988: 17). DeLanda, as well as complexity theorists such as Stuart Kauffman (1995), examines how these meshworks ignite autocatalytical processes; catalysis is related to the 'general notion of aiding growth "from within" or "from in between"' (DeLanda 1997: 291).

Ant hills and slime moulds and several other examples from nature exhibits the same traits of self-organization as that of the Internet (Johnson 2001) as they form a network, which is 'characterized by equity between nodes, bi-directional links, a high degree of redundancy and general lack of internal hierarchy' (Galloway 2006: 317).

In this 'hive' of actors, organization happens through local-level interaction and hierarchization is avoided by 'protocols' or 'systems of material

organization' (Galloway 2006: 319). Protocols are local codes of interaction, social etiquette and communication as well as material and catalytical formats of interaction that are operating to facilitate the interoperations of the networked parts at a molecular level:

> Protocol functions largely without relying on hierarchical, pyramidal or centralized mechanisms; it is flat and smooth; it is universal, flexible and robust.
>
> (Galloway 2006: 317)

Nevertheless, it is also at this level, in the shift from molar control to molecular protocol, that the network code exhibits any paradox as Alexander Galloway notices:

> The contradiction at the heart of protocol is that it has to standardize in order to liberate. It has to be fascistic and unilateral in order to be utopian.
>
> (2004: 95)

It is at the level of protocols that the maker community organizes itself, and just like noted in the Deleuzoguattarrian distinction, between the molar and molecular, Galloway notices that 'Protocol is synonymous with possibility' (2004: 167); it is on the level of becoming, not being, that the maker community thrives as an autocatalytic and self-organizing system.

Indeed, this molecular approach is a mantra ringing through the hacker community and we will see it further in their protocols: 'Mistrust Authority – Promote Decentralization' (Levy 1994: 29). It is an ideal of no present boundaries between hacker and information (or matter) in the continuous quest for knowledge, improvement and spending own time with technology. Reduce rules to a minimum, promote transparency and self-organization; from free information autocatalysis will emerge. It is in this setting that Charles Leadbeater (2007) proposes that the emerging culture of collaboration exhibited on the Internet replaces the Cartesian 'I think' with a distributed 'we think'. This molecular promotion of decentralization can be also traced to the maker protocols.

MAKER PROTOCOLS AND 'MAKER'S BILL OF RIGHTS'

The maker culture is experimental and open and has an explicit heritage from the hackers and as media theorist McKenzie Wark notices, hacking is 'at once an aesthetic and an ethic' that requires cooperation as much as individual skill and inventiveness (2006: 320). This makes hacking flourish in a molecular state. This has also made it popular to see hacking as a countercultural or anti-consumerist form of hands-on innovation-activism, or quasi-anarchism with the aim of hacking reality itself, in sites such as lifehacker.com, which covers technology as well as social improvements of makers. From such perspective, one could argue that hacking is a tactic for 'cultural counterintelligence' (Becker 2002), animated and anti-authoritarian, seizing back imagination subjugated by technocrats or the narrow mindedness of specific molar cementations of what is considered correct or orthodox.

Among the makers, protocols exist both as material properties purposefully designed into artefacts, and also as patterns of practices and codes of

conduct. This intertwining of protocols guides the processes of becoming on a material as well as interaction level. In the *Make* magazine, already in the fourth issue an 'Owner's manifesto' appeared, authored by a Mister Jalopy, with the catchy slogan 'If you can't open it, you don't own it' (2005). This declaration, or the 'Maker's bill of rights' also appeared as a central feature to understand the basic of the maker's workshop and tools to feature several central protocols of making, such as 'screws better than glues', 'batteries shall be replaceable', 'if it snaps shut, it shall snap open', 'circuit boards shall be commented' and 'schematics shall be included' (Jalopy 2011). These features, which for most sound perfectly acceptable, have over the last decade become rare in consumer goods and especially electronics, for example the popular Apple products like iPad and iPhone. Yet, as protocols, the 'rights' exemplify an open format for collaboration and expose 'molecular' traits, as they can be disassembled, repaired, hacked, updated and reassembled in many different ways – not only according to the designer's initial intentions. With the support of open protocols and rights, products are not programmed in a molar way, but on a material level encourage a culture of hands-on curiosity, appropriation, sharing and exchange.

In this way the maker culture, in its transversal and multi-disciplinary manifestation, takes the heritage of the open source software culture to produce an open material code. Here 'code' not only signifies a computer program, but a larger material 'operating system'. As noted by media theorist Eugene Thacker,

> Code is a set of procedures, actions, and practices, designed in a particular way to achieve particular ends in particular contexts. Code=praxis.
>
> (Thacker in Galloway 2004: xxi)

This means the open source code of the hacker community is translated into other forms of material code, and as we will see, also into social code or protocols. On top of this, it is possible to trace a 'material ethic' in the maker protocols: just like the slogan of 'information wants to be free', the maker protocols call for a 'matter wants to be free'.

The 'hacker ethic' is an underlying ethos of the maker movement, and also recognizable in the protocols of Jalopy. As Steven Levy puts it in his book *Hackers*;

> Access to computers – and anything that might teach you something about the way the world works – should be unlimited and total. Always yield to the Hands-On Imperative! […]. Hackers believe that essential lessons can be learned about the systems-about the world-from taking things apart, seeing how that work, and using this knowledge to create new and even more interesting things. They resent any person, physical barrier, or law that tries to keep them from doing this.
>
> (1994: 28)

According to media theorist Pekka Himanen, the hacker ethic is a new work ethic that sets a new approach to work, very different from Weber's classical text *The Protestant Ethic and the Spirit of Capitalism* (Himanen 2001). For Himanen, the hacker ethic emphasizes the passionate, joyful and playful resonances in the work of the hackers, where curiosity and exploration are more important than making money. Likewise, Himanen sees freedom of

expression as a key component, explicitly enshrined in the hacker ethic, as it triggers expressions of sharing and cooperation. The playful approach of the hackers comes in sharp contrast to the pious protestant ethic, in dissonance with its moral and dutiful relationship to work, as hackers put play and leisure as driving forces behind their work. Yet, Himanen sees no celebration of inactivity in the hacker ethic, rather he sees it as the answer to the overall Taylorization of the everyday. Hackers self-organize their free and creative time, resist supervision and share their work with others to let their software code be 'beautiful' and explorative, just like their relation to work.

This mindset of playful curiosity and exploration also shifts the focus on what kind of 'problems' the makers approach and how their roles are within the community. The makers are less purpose- or problem-driven than the designers who studied in classical design method research (cf. Simon 1973; Rittel and Webber 1973; Simon 1981; Schön 1990; Cross 1999) and more like Sennett's craftsman discussed earlier; a practical attitude spanning musicians, programmers and practitioners of manual workmanship sharing a will to excel in beauty in the widest sense of the word (Sennett 2008).

Several researchers have approached this shared innovation environment as a management phenomenon, examining lead users (von Hippel 1986) and using approaches like 'open-innovation' within communities of active hobbies (Shah 2005). Especially open source software programmers and the Linux/GNU project have raised attention (cf. Raymond 1999; Moody 2001). Recently the open source logic of code has facilitated 'Personal Fabrication', where 3D printers can print almost anything, and perhaps most importantly, new machines of the same sort – thus multiplying the means of production to appear as distributed in personal homes (Gershenfeld 2005). Here, the personal computer becomes a site of personal production that facilitates how the execution of code has moved from 'bits to atoms' (Anderson 2010).

As earlier noted by Wark, this distribution and fragmentation of the modes of production also create other forms of class conflict, in Wark's case between a 'hacker' class, producing the code of reality, and a class of 'vectorialists', owning the means of actualizing or executing the code (2004). In a similar vein, media theorist Jussi Parikka examines the networked politics of the Internet and the synchronous manipulation of memes and viruses (Parikka 2007; Parikka and Sampson 2009).

Much of the material artefacts among the makers approach a 'granular' system of making and learning as part of their constitution. A system like Lego is granular in its modularity, but it also allows adding more technical parts to make simple automata, and lately even digital parts to make small robots, as the Lego Mindstorms, a popular toy among the maker culture. The digital Lego toy was hacked by users shortly after its release, but LEGO was quick to give the fans a 'license to hack' their robotic kits (Hatch and Schultz, 2008: 193). The Mindstorms kits have since been further co-developed by four American brand enthusiasts and it is now the most popular robotic tool kit in the world (Hatch and Schultz 2008: 198). On a broad scale, Lego has embraced their fans as co-designers, opening the code for participation and has since engaged even more with their 'Adult Fans of Lego' and now even have fan-designed models, with the fans' names appearing on the packaging along with the inscription: 'Designed by LEGO Fans' (Hatch and Schultz 2008: 198). It is thus no surprise that the maker culture is full of Lego innovations as its modularity resonates so well with the culture of the makers.

Many popular platforms among the makers are granular in their composition; they fit into each other from the simple to the complex, following simple protocols of translation. The granular facilitates for open contributions, which in turn trigger further levels of engagement. For example, making a simple circuit invites to go further and write code for Arduino, an open source microprocessor, and later adding functions for a simple robot, which in turn leads to the invention of a simple protocol for unlocking a door by an SMS message. Knowledges hook into each other and create bigger functional pieces, where every little step is a practical application supported by a lot of free instructions, manuals and a vast online community of forums. The thresholds are reduced to avoid the tacit leaps, which are often required in the arts or cultural production.

It is this granular mode of building as well as the gravitation towards sharing ideas with a community that has formed the hacker culture (Levy 1994). Thus the makers coming to the maker fairs and forming hacker spaces often look for places to meet, share and learn from each other. Yet, as in most social settings, rules help to facilitate the interactions, and thus we can see how the hacker ethics and the maker protocols resonate in the rules of the hacker spaces.

SOCIAL PROTOCOLS OF MAKING

We can closely examine some of the 'house rules' of two spaces to better see the correlation between material and social protocols in the maker culture. The examples are from the Chaos Computer Club Cologne (C4) in Germany, and Noisebridge, a hack-space in San Francisco. As we will see the two maker-spaces and communities manage the craft innovation culture. The communities, in Cologne and San Francisco, attract different groups of makers, but share certain values, approaches and cultural traits. The spaces are guided by rules, often explicit, of what the cultural protocols of the space is; how behaviour, maintenance and cleaning should be performed but also how tools, code and ideas are shared.

The driving forces behind hacker spaces differ slightly between the two countries, even if the tinkering and technology is at centre stage. In Germany, and continental Europe in general, the hacker community emerges in resonance with the autonomous left, and open source, or 'copyleft', software has political and often anti-capitalist tendencies. In the United States, on the other hand, the idea of sharing is the bearing ideology and hacker spaces emerge as a 'reaction against American individualism – the idea that we all need to be in our separate single-family homes with a garage' (Tweney 2009).

MAKING AT C4

One of the few formal guides in how to set up a hacker space is drawn from the experiences of the German Chaos Computer Club, a hacker organization active since 1997. At the C4 people meet, for example, to work on open wireless communication (Freifunk), building antennas and networks and they also have OpenChaos evenings where building, programming and politics are discussed, lately the issues concerning WikiLeaks and Crypto-anarchy (C4 2011).

In a widely spread reference on the 'design patterns' of hacker spaces hackers Jens Ohlig and Lars Weiler (2007) make up a few suggestions for aspiring hacker space-builders. One important aspect is that most spaces are infrastructure driven. The spaces are built for people to come and access the

infrastructure, and the space builds community from the facilities. The makers gravitate towards the tools. There are no programmed activities, no 'team-building' made to amalgamate with the participants, but instead they meet around their specific interests and execution of ideas (Ohlig and Weiler 2007). Infrastructure does not only consist of electronics and tools, but elements for socializing, such as a well-equipped kitchen, sofas, games, and, for keeping the peace: a dishwasher.

Based on their experiences from C4, Jens Ohlig and Lars Weiler suggest some protocols:

- Find a space with uninterested landlord and cool neighbours
- Don't let anyone live in the space ('The Roommate Anti-Pattern')
- Collect fees regularly. ('Elect a totalitarian treasurer'.)
- Have regular meetings, once a week. ('Tuesdays!')
- Make consensus decisions. ('Use the weekly plenum for discussion. Don't take votes – discuss until everyone agrees'.)
- Order to get things done – but always participate in the action.
- Don't appoint a leader. ('Do not have ranks. Use leadership temporarily, like for projects and when you really need it. Don't have a single root'.)
- Leave room for a lot of junk. Let people know many times in advance before cleaning out stuff.
- Make sure access is easy. Make many keys, but make sure people pay a deposit for them. No copies!

(2007)

These rules, which in many ways resonate with organizational ideas of squatters and anarchists, do not still echo too much of the hacker spaces being a highly political space or a 'Temporary Autonomous Zone' (Bey 1991) but are rather formed to facilitate a non-hierarchical work environment that is still a healthy place to be. Nevertheless, like in many other open source projects, the space is run in an open mode, yet not totally free. Authority is earned through work and merits: 'Look for people who *have* authority (and get respect), not for people who *use* authority (and get laughed at)' (Ohlig and Weiler 2007).

MAKING AT NOISEBRIDGE, SAN FRANCISCO

Noisebridge was founded 2007 and is a vibrant hacker space in the Mission district in San Francisco with a vital mix of punks, hobbyists and Stanford graduates regularly attending the community events. At Noisebridge there is a busy schedule of activities every day in the week and the space has several subgroups organizing events concerning everything from craft and lock-picking classes to database programming and soldering. Groups like BioBridge use kombucha fermentation, sourdough culturing, algae production to, as they say,

> demonstrate how scientific tools and rigour can be used not only to improve upon our culturing techniques, but also to provide valuable

> insight into the underlying biological processes, we want to make serious (micro)biological/biochemical science available to a wide public.
>
> (BioBridge 2011)

Another group assembles under the theme of Hack Politics to 'discuss, think, hack, and launch projects related to politics' in addition to 'getting our community organized in issues involving digital civil liberties in the US and throughout the world' (HackPolitics 2011). Their work includes everything from cloud lobbying and legal issues to more hands-on writing of software. The discussions concerning crypto communication and the political implications of surveillance and proprietary social media have been widespread through the hacker community (Kullenberg 2010) and especially during 'the Arab Spring' 2011 many hacker forums were discussing how to support the democracy struggles.

Many of the guidelines at Noisebridge come from the German patterns, but they also emphasize other, much more socially engaged, aspects of the maker culture:

- That the space is a social hacker space, not the tinkerer's own garage, making the social meeting and skill share a key asset. ('Talk to people and make friends'.)
- But that it is not only about talking, but making. ('be sensitive to people's desire to stop talking and start hacking'.)
- Encouragement is welcome ('Motivation is a rare commodity among us and a compliment here and there can work wonders in terms of creating more of it'.).

(Noisebridge 2013)

In these protocols one can spot a difference already noted by Dylan Tweney, that the US maker scene puts more emphasis on innovation and experimentation by tinkering in a *social manner* than the German scene. The German hackers almost take the social for granted, and are more uncomfortable with the idea that they are spaces for 'innovation' (a capitalist term) and have to form rules for sustaining longer social community and in a more political way. Whereas the German hackers put energy on conflict management, the US makers always have their own garage to return to.

As exposed in the examples and cases above, the protocols of the maker culture materialized at the hacker spaces embody some of the molecular features of the 'maker bill of rights', a protocol for material innovation but applied to the social plasma, and these social protocols amalgamate the two. The maker culture keep control decentralized, on a social and material level, while at the same time open and keep channels free for sharing, collaboration and granular tinkering.

CONCLUDING DISCUSSION

What we can see in the social as well as material protocols of the hacker spaces is a certain form of 'molecular' craft management; distributed, semi-autonomous and connected. Here tools, modular gadgets and social collaboration form the scene. In this assemblage *both mind and matter obey the same protocol*, which shape a Complex Adaptive System. More detailed studies

of such molecular systems could contribute to the understanding of design collaborations both in the field of design management and organizational studies and deeply affect the way collaboration is organized within the creative industries, at least on a grass-root scale, and also how co-design studios are run at design schools.

However, one should not get blinded by the promises of 'participation' and the other forms of collaboration, co-creation or co-design popular these days, as not all aspects of the maker culture is totally open and democratic, but can in itself be a tyranny, hiding conflicts and fragmenting possible opposition or resistance (cf. Cooke and Kothari 2001; Miessen and Basar 2006; Miessen 2008). As noted earlier by Galloway, protocols are fascistic and unilateral in order to be utopian – and also participation has its drawbacks with informal power relations and forced consensus. True participation also needs to distribute authority and self-realization. Likewise, especially concerning code, merit dominates over amateurism, which may also stifle some of the collaborative curiosity it is meant to foster. Yet, as many protocols exhibit; the atmosphere may be earnest but good hearted, guided but socially allowing, playful but professional. The implications of these power games have deep impact on the development of open source and open design (cf. van Abel et al. 2011), and could be studied in order to support the development of the fields and methods of open participation.

The implications of a molecular approach to the understanding of organization in the maker culture and its craft management can help render visible the decentralized models of innovation in civil society and their adaptive protocols of collaboration. Such molecular perspective can put better light on DIY culture and makers, and their role in social innovation and micro-entrepreneurship. As many creative industries also tap into crowd sourcing and other forms of user engagement, a molecular perspective may facilitate the design of collaborative protocols and make sure the cooperation runs smoothly.

In his study about the culture of collaboration among the writers and editors of Wikipedia, Joseph Reagle also finds that there are several social protocols, or 'wikiquette', which echo the hacker ethics and maker protocols (Reagle 2010). These simple rules of engagement, such as 'Assume Good Faith' or 'Please don't bite the newcomers', are also inherent in the hacker spaces. It might be added up in the way Wikipedia editor Phoenix 15 puts it; 'All rules and guidelines add up to this: Respect!' (Reagle 2010: 45). Or, as observed by Tweney during his visit at Noisebridge, the makers puts it more graphically:

> The community governs itself according to the guiding principle expressed on a large poster of Keanu Reeves hanging from the loft: 'Be excellent to each other, dudes'.
>
> (2009)

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