CHAPTER 3

P2P and New Socio-technological Frameworks

Technologies should not be seen as neutral, entirely deterministic nor as univocal in their effects. Instead, we should look at technology as 'value(s)-sensitive' responding to the material interests and social imaginaries of those that fund, develop and use them. Technology is thus a terrain of struggle, in which different interests and values strive for supremacy (Feenberg, 2002). The most fruitful approach is to look at the various potentials of new technologies, which can evolve in multiple ways, and how various social groups can take advantage of these potentials. Our vantage point is to consider to what degree the new networking technologies are useful in the context of a transition towards a commons-centric society.

The Internet itself, and its complexity offer an excellent example of various possible evolutionary paths possible since it was initially developed by the military-funded researchers of ARPA, to create a fully distributed structure that would share digital resources among geographically dispersed computers. The Internet was also adapted to their needs by scientific communities who saw it as a means to share knowledge. It was further influenced by commercial interests after the invention of the World Wide Web, and by governments' intent on controlling its mechanisms. However, the Internet was also taken up by the hacker movements and user communities adapting it to their uses. The Internet is therefore neither merely a tool of capital or the state nor merely a tool of liberation.

Internet technology uses are appropriated by social groups, but the critical issue here is that it creates new capacities (mild techno-determinism), and these new capacities may be more important for those that did not have them, than for those who already did. Large companies and governments already had private networks that interconnected them. However, these capacities have been

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democratized mainly through the Internet, especially after the advent of the World Wide Web, and this despite the subsequent control of the Internet by dominant players. As with the emergence of the printing press, the Internet democratized a capacity, which may then be contested. The result of these social struggles may not undo the unleashed capacity.

In the case of the Internet, at least three capacities have been created:

1. A capacity for many-to-many communication using all other forms of previous media as these are all integrated and included in a universal digital medium.
2. A capacity for self-organization that is the result of that permissionless communication.
3. A capacity to create and distribute value in new ways, i.e. self-organization can be put to use in the sphere of production.

In this manner, like the invention of the printing press before it, the Internet has created a historical opportunity for reconfiguring production, exchange, and the organization of society at large. The core emancipatory feature of the Internet lies in its capacity to massively scale up many-to-many communication, and therefore, in its capacity to lower the cost of self-organization and create and distribute value in radically new ways.

Despite the various adaptations of the social forces involved, and despite the partial subsumption of Internet infrastructures to the needs of global capital and a new type of capitalist investors (Malcomson, 2016), the fundamental underlying freedom for the capacities mentioned above has not been destroyed (yet). Capital and governments need the capacities of the Internet as much as civil society does.

To understand the subsequent politics of socio-technological design of various P2P applications, we have developed a framework that explains how the encapsulations of these designs lead to different outcomes.

3.1. Two Generic Models

We attempt to provide a birds-eye-view of the initiatives that utilize P2P social dynamics and technologies by introducing four quadrants. Each quadrant stands for a specific scenario in which a dominant force determines the design of the particular networks to facilitate specific outcomes. The forces at play want to protect their interests through the control of technological platforms, which encourage specific behaviours but discourage others. In other words, the owners or managers of platforms may design decisions and invisible protocols based on their interests, which in turn influence human behaviour in networks (Kostakis & Bauwens, 2014).

Here is our summary graphic:

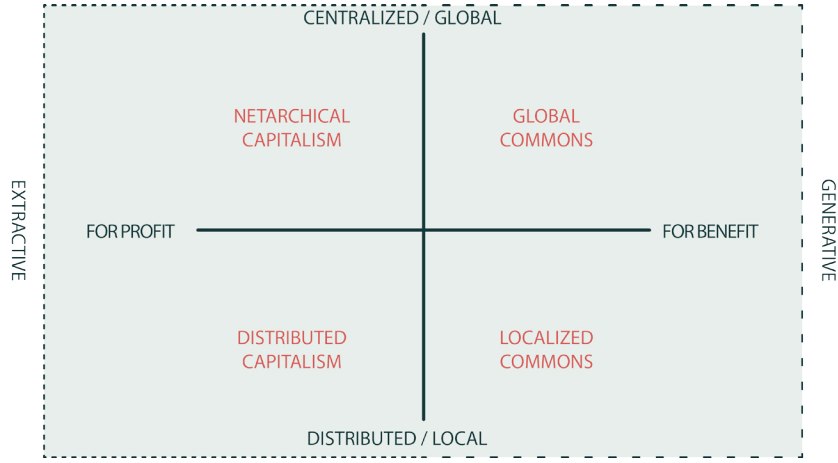


Fig. 1: Four Scenarios.

The vertical axis presents a polarity where the top (up) indicates the centralized control of digital production infrastructure and the bottom (down) for the distributed control of it. The horizontal axis relates on one side (left) to an orientation towards profit maximization versus on the other side (right) an orientation towards the commons. In addition, at the top are the infrastructures with global orientations, and at the bottom initiatives with more local or 'distributed' orientations.

So, the left side can be called 'extractive' because it impoverishes the natural and community resources it uses. The right side is the 'for-benefit' side that aims to create common good value either at the local level or the global level. This latter side we also call 'generative'[8] as it seeks to add value to communities and commons, both social and environmental. One of the key aims of many different contemporary transition movements is precisely this shift from predominantly extractive to generative models.

There is a strong linkage between the terms 'extractive' and 'exploitative': people who respect human beings will probably respect nature. It is a metaphysical attitude expressed both ways; against nature and people. It extends the view of human exploitation to that of a broader extraction from the totality of life. McKenzie Wark (2015) discusses Bogdanov's novel *Red Star* (1984) indicating a shift from class struggle to 'the struggle to organize the totality of human effort', where the exploitation between classes is only one of the fetishes to be overcome.

Also, what one may see in the history of the West is that as soon as we obtained social consciousness, we obtained environmental consciousness as well. Therefore, getting rid of the exploitation of humans and the exploitation of nature is, despite the different domains, a related process. As Jason Moore (2014)

highlights 'the "exploitation of nature" is placed on a more-or-less equal footing with the exploitation of labour power'. It is no coincidence that the same set of relations reveals itself in several works, including Foster (1999, 35), Clark and York (2005, 395), Clausen and Clark (2005, 423), Clark and Foster (2009), Clark and Foster (2010, 145), Clark and York (2013, 30), Foster et al. (2010). The suggested duality between extractive and generative models reflects this approach.

User-oriented technological systems generally can be looked at from two layers. The front-end is where user interaction takes place. It allows users to interface with each other and the system itself. The back-end is the technological underpinning that enables the whole process. The platform owners engineer both, but only the former is visible to the users. Hence, a P2P social logic is often enabled by a front-end, which is highly centrally regulated and appropriated on the back-end. An invisible techno-social system is thus formed, which profoundly influences the behaviour of those using the front-end. It sets limits on what is possible concerning human freedom and can 'nudge' behaviour (Thaler and Sunstein, 2009) in desired directions that correspond to the interests of the platform owners and managers.

A genuinely free P2P logic at the front-end is improbable if the back-end is under exclusive control and ownership. It does not mean, however, that users of these systems are powerless to use these capacities for their ends (especially if they are conscious of the limitations of such cognitive capitalist systems).

Following Figure 1, four future scenarios are introduced:

- netarchical capitalism;
- distributed capitalism;
- localized commons;
- global commons.

Each scenario sketches a different politico-economic approach that actuates different future road maps (Miles, 2004). The models of the left are inserted in the general model of contemporary capitalism that has been called 'cognitive capitalism'[9]. The models on the right could be inserted in a context that has been called 'post-capitalist', as the core of the activity is not geared towards profit-maximization.

3.2. The Extractive Model of Cognitive Capitalism

Cognitive capitalism concerns a systematic process of privatization and commodification of information, in the form of data, knowledge, design or culture, to maximize profits. In this new chapter in the evolution of capitalism, control over information and networks is the driving force of capital accumulation,

rather than material production and distribution. (see Boutang, 2012; Bell, 1974; Drucker, 1969; for a critical analysis, see Webster, 2006).[10]

By 'netarchical' we mean the hierarchies within the network that own and control participatory platforms. This version of capitalism is characterized by digital platforms that combine P2P elements, which allow people to interact with each other directly, but they are controlled and monitored by the platform owners. The full centralized control of the rest of the infrastructure is used to form these exchanges.

This new form of capital directly exploits networked social cooperation that often consists of unpaid activities that can be captured and financialized by proprietary 'network' platforms. It sustains itself from the positive externalities created through human cooperation and the commons. If previous versions of capitalism were hostile to the commons and tried to destroy it, this new version has learned, at least provisionally, to 'tame' the commons. Nevertheless, this also means that it has become parasitic and rent-seeking. Netarchical capitalism is rent-seeking capital that has shifted its control mechanisms to control the whole network itself and functions one step away from real production.

For example, social media platforms like Facebook almost exclusively capture the value of their members' social exchange, by monetizing the data and selling the 'attention' of their users to advertisers. In addition, crowdsourcing models rely on distributed labour, and the 'shared' content contributes to firms' profit generation (for an overview on the critique of crowdsourcing models and precarious digital labour, see the collective book edited by Scholz, 2012). In netarchical models, such as that of Uber, Airbnb, Kickstarter and TaskRabbit there is no community nor the creation of commons; rather individual workers compete for their own livelihood.

In CBPP, productive communities consciously create commons, whereas in the so-called 'sharing economy' there are distributed market (P2P) exchanges taking place over private platforms, whose owners extract a toll from the exchanges. The process is controlled by the owners of the platforms, who extract value (rents or fees) from these processes. The 'sharing' concept here is no more than a marketing ploy.

Furthermore, the bottom-left quadrant, which includes examples like Bitcoin and some of the emerging initiatives based on Bitcoin's distributed ledger called 'blockchain', can be characterized as 'distributed capitalism'. These more distributed developments embrace the idea that 'everyone can become an independent capitalist or trader', and they purport to offer individual autonomy from both big business and the state. In this model, the aspects of autonomy and large-scale participation are celebrated and supported by P2P infrastructures, though individual profit-maximization is still the primary motive. The design of Bitcoin is quite exemplary in that context, as its deflationary design means that early buyers or producers of the virtual coin, can sell them to latecomers

at a premium, without the necessity of productive work. Bitcoin is similarly extractive towards nature because of its enormous appetite for energy.

More generally, each system that is geared towards competition for scarce resources, will favour winners over losers and, over time, lead to the same oligarchy as netarchical capitalism. Distributed capitalism is ideologically different and is based on a different techno-social paradigm, but the unequal distribution of influence within networks lead to the same place as where netarchical capital started from. This is already true for both the ownership of Bitcoin mining capacity and the ownership of the coins themselves. Generally speaking, such projects are driven by an underlying vision that society is just a sum of autonomous individuals, who create contracts with each other. There is no real society and no collectivity in these visions. Lastly, the projects related to this vision of distributed capitalism (also called 'anarcho-capitalism') lack any counter-measures that can prevent the creation of inequality and oligarchy (Boehm, 2001).

Moreover, many forms of the left quadrants are hybrid and should not be considered 'wholly negative', since they still rationalize P2P sociality, thus conditioning autonomous forms of production and exchange for an increasing number of users. Paradoxically, capitalism itself strengthens non-capitalist and post-capitalist forms of self-organization and value creation. Examples are how the popular forces of resistance and even revolution self-organized during the Arab Spring, but also various CBPP communities have made inventive use of netarchical platforms and distributed systems to organize themselves and their projects. For example, a community-supported fishery in Ostend, Belgium uses Facebook to connect fishers and their clients. Hence, netarchical platforms invest in P2P infrastructures and effectuate the material conditions, where the struggle for more autonomous and inclusive forms of network society may take place.

Another example from the software domain, is the case of coalitions between IBM and various commons-based projects. Being a profit-driven corporation, IBM exploits the use-value produced through CBPP. But, simultaneously, the IBM involvement has enhanced the sustainability of many CBPP projects, by stimulating opportunities for paid work and the creation of more and better outputs. Likewise, Bitcoin may be pushing towards distributed capitalism, but has signalled an essential milestone for some post-capitalist aspirations. It is the first global currency based on 'social sovereignty', which signifies alternative paths for 'post-Westphalian' monetary systems that are able to scale and coexist. Blockchain technology, associated with Bitcoin as a distributed database, eliminates the need for a trusted third party. The transparent and distributed nature of the blockchain theoretically could help small and large communities to reach consensus and implement novel forms of self-governance. These potentialities introduce various opportunities and challenges worth enough to investigate and experiment, despite their enduring weaknesses of blockchain-based applications, such as their high energy usage and thus environmental cost.

3.3. The Generative Model of Commons-based Peer Production

Let us now move to the right quadrants which include several promising social movements, and CBPP projects. If the left side showed predominantly extractive, rent-seeking behaviour vis a vis P2P exchanges, then the right side shows a positive engagement with the commons and communities, that is, a generative relationship.

In both the bottom and top right quadrants, the 'civic' element predominates, either in the form of a local community or in the form of a global open design community that mutualizes its knowledge. Both use digital platforms, but the difference lies in how they instrumentalize the digital commons that they use.

In the localized commons model, the global digital commons are used to strengthen and organize the local. In the global commons model, networks are used to directly organize at the global level, to deploy activities directly at the global level, and to project power at that level. For example, the priority of the Transition Town movement (localized commons quadrant) is towards local transitioning, and their use of global digital commons is at the service of their local goals. Conversely, the goal of Wikipedia (global commons quadrant) is to create a global and universal knowledge resource, just as GNU/Linux aims to create a global alternative to proprietary operating systems.

The vein of our critique of localized commons initiatives is twofold (Kostakis et al., 2015). First, many localization communities (e.g. several ecovillages) produce a digital commons (e.g. novel permaculture techniques) while working to meet their needs. However, because of their local focus, they have loose connections with each other; they do not produce a global commons, and thus they fail to contribute to the formation of a global counter-power. Many global issues cannot be solved at the local level, and hostile global power dynamics can thwart many local solutions. For example, industrial fishing fleets operating outside of the national nautical zones can easily thwart a local fisheries commons.

Localization is part of the answer, and it is necessary, but not sufficient. Such initiatives could deploy their efforts at translocalization and transnationalization. For example, they could federate both at the local and transnational level around their domain of activity, such as provisioning systems (e.g. food or shelter). Some cities could function as 'partner cities' enabling the deployment of these local systems while they create transnational coalitions themselves, and support global open design communities that mutualize the development of shared infrastructure.

Our approach is in no way hostile to localized commons initiatives. We have to co-construct the new generative mode of production and allocation at all levels. Localized projects can interconnect at all levels, including the local territorial level, and local structures can create transnational infrastructures (such as a global coalition of cities). Our argument is instead that these local initiatives vitally and structurally need global complements to be effective. However,

we have also a broader argument, in which the local is considered a vital dimension of a commons-centric society.

In line with degrowth and localization narratives, we are living the endgame of neoliberal material globalization based on cheap energy, labour, and transport, which necessitates the relocalization of production. The value-creation communities of the global commons approach are based locally and simultaneously connected globally. New and substantially more community-oriented forms of socio-economic organization emerge. There is arguably no contradiction between open design collaboration on a global level, and production/ manufacturing on a local level. Even more, a potential convergence may strengthen localized reterritorialization through global networks of enterprises. These will be based on global digital commons, of software, knowledge, and design, but operate according to relocalized implementations

To distinguish this approach from both localized communities and global neoliberal material networks, we could call it 'cosmolocalism' (Ramos et al., 2017; Kostakis and Ramos, 2017). This idea comes partly from the discourse on cosmopolitanism which asserts that all human beings belong to a single community, based on a shared morality and a shared future. Cosmolocalism captures the potentials of the global digital commons in conjunction with the capacity for more localized manufacturing. The shared morality comes through the commons, meaning, through co-creating and co-managing shared resources.

The dominant economic system treats physical resources as if they were infinite and then locks up intellectual resources as if they were finite. However, the reality is quite the contrary. We live in a world where physical resources are limited, while non-material resources are digitally reproducible and therefore can be shared at a low cost. Moving electrons around the world has a smaller ecological footprint than moving coal, iron, plastic and other materials.

At a local level, the challenge is to develop economic systems that can draw from local supply chains: what is light (non-rivalrous; e.g. knowledge) becomes global and what is heavy (rival; e.g. manufacturing equipment) remains local. We can thus design global and manufacture local (Kostakis et al., 2016; 2017). Decentralized open resources for designs can be used for a wide variety of things, medicines, furniture, prosthetic devices, farm tools, machinery and so on. For example, the WikiHouse project produces designs for houses; the LibreSpace community that built the first open-source satellite in orbit; the Farm Hack and L'Atelier Paysan communities that produces designs for small-scale agricultural machines; the OpenBionics project that produces designs for prosthetics; the AbilityMate that produces ankle-foot orthoses; the RepRap community creates designs for 3D printers.

Such projects do not necessarily need a physical basis as community members are dispersed all over the world. Global design communities and local production communities could thus create commons-oriented entrepreneurial coalitions: participatory business ecosystems that work for a community and

its commons. The participating entities constitute sovereign means for the commoners to create livelihoods, whilst maintaining global commons. This approach may move beyond the threats of social regression, through a vision of a more frugal abundance for the whole of humanity. It maintains a maximum amount of wellbeing services and infrastructures but with a lower load on natural resources and the environment.

A limitation of this new model is that the problems of its two main pillars, information and communication as well as local manufacturing technologies, are not yet directly addressed. These issues may pertain to resource extraction, exploitative labour, energy use, material flows or the digital divide (see the work of Christian Fuchs for an integrative approach on the issue from a social sciences perspective: Fuchs, 2008; Fuchs and Horak, 2008; Fuchs, 2017). Our claims for the sustainability potential of commons-based products and practices rest on thin empirical foundations. However, some favourable dynamics cannot be neglected (Kostakis, Roos and Bauwens, 2016; Kostakis et al. 2017; Piques et al. 2017).

CBPP communities are not motivated to follow a planned obsolescence approach to design and engineering. Also, local manufacturing technologies (from 3D printers and laser cutters to drills, low-tech and crafts) offer possibilities for on-demand manufacturing resulting in less transportation of the raw materials. While the potential of such models is still debatable regarding scale, when customization and scope are needed they can be instrumental. Moreover, CBPP communities tend to mutualize their productive resources (for example, shared manufacturing infrastructure in makers-spaces) and thus benefit in tandem.

WikiHouse, Open Source Ecology, Farm Hack, L'Atelier Paysan, RepRap, OpenBionics, AbilityMate are only some empirical cases where the digital commons converge with local manufacturing technologies creating sophisticated products (from houses, tractors and other agricultural machines to prosthetic robotic hands and 3D printers). These communities develop, share and improve the design as a global digital commons, while the actual manufacturing takes place locally through shared infrastructures, often with local conditions in mind.

To escape the predicaments of the current political economy and to move towards ecologically sustainable alternatives (Bollier, 2014b), we envision a transition effectuated by new distributed systems of provisioning and democratic governance. The global commons scenario suggests that we should work on building both global and local political and social infrastructures.

Of course, CBPP cannot instantly substitute all production processes or that centralized infrastructures (such as water supply) are useless. CBPP is a proto-mode of production and, thus, currently unable to perpetuate itself on its own outside capitalism, to a full mode of production. Central to this discussion is, on the one hand, the concept of the 'ethical market' that would include commons-oriented enterprises; and on the other hand, the 'partner state' that

would enable and empower direct social-value creation by providing support for the necessary infrastructures, and focus on the protection of the commons sphere (Orsi, 2009; Bauwens and Kostakis, 2015; Kostakis, 2011).

It is necessary to tackle the flow of value, which is now 'extracted' by netarchical capital, to create a fully-functioning commons-centric economy. Contributors of global and local communities must create their commons-oriented entities so that the surplus can be used for creating livelihoods, ensuring social reproduction of commoners, and reinvesting in P2P-based production networks. Capital accumulation must be replaced by 'cooperative accumulation'[11], which is reinvested in the growth of the commons-based productive communities and their entrepreneurial coalitions. This strategy was used successfully to grow cooperative networks such as Mondragon, Spain, but also to create the vibrant cooperative economy of Emilia-Romagna, Italy.

Nevertheless, the aim here is to use cooperativism for strengthening the emergence, expansion and dominance of CBPP. Moreover, it is an illusion that such a development of the commons forces can be done with a hostile state. A successful commons transition strategy requires tackling the issue of political organization and on influencing the form of the state head on. Before proposing a more coherent strategy for a commons transition (Chapter 5), we need to place P2P within the wider context of the structure of world history (Chapter 4).

TWO MODELS OF VALUE CREATION AND THEIR TECHNOLOGICAL INFRASTRUCTURES

TECHNOLOGY IS AMBIVALENT

THE INTERNET HAS CREATED A CAPACITY

- for many-to-many communication
- for self-organization
- to create and distribute value

EXTRACTIVE

GENERATIVE

NETARCHICAL CAPITALISM

Based on the development and control of participatory platforms.

GLOBAL COMMONS

Focused on the global level by building global counter-power.

DISTRIBUTED CAPITALISM

Based on the distribution of productive forces with a for-profit orientation.

LOCALIZED COMMONS

Focused on the local level and using global commons to deploy activities locally.

It impoverishes the natural and community resources it uses.

The unequal distribution of influence within extractive initiatives leads to the same place.

It adds value to communities and commons.

Both orientations are necessary

COSMOLOCALISM
Design global, manufacture local

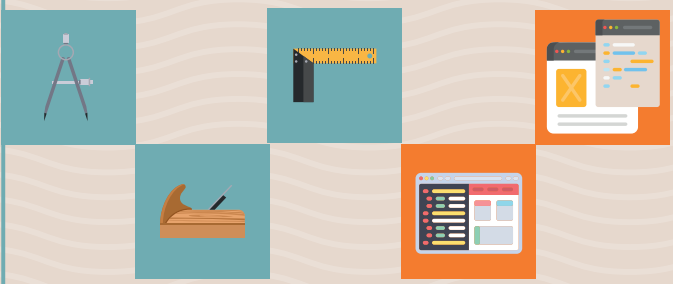
These are the traits of a new mode of production

Our dominant system exploits natural resources as if they were infinitely abundant. Negative consequences become 'externalities', evading responsible use.

Meanwhile, knowledge — socially productive, naturally abundant, easily reproduced — is locked behind Intellectual Property and paywalls.

But we can turn this around!

...by combining digital commons with community-based manufacturing.



ITS KEY:
What's 'light' (knowledge) is global, and what's 'heavy' (physical manufacturing) is local.

Three advantages over capitalist forms of industrial production:

1. NON-PROFIT

Communities design the objects they will use. This way, planned obsolescence is halted while resilience is promoted.

2. LOCAL

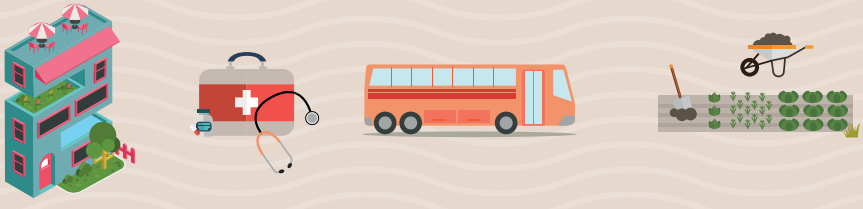
Customized physical manufacturing happens in community workshops. High transportation costs are reduced while maintenance and spare parts are handled locally.

3. SHARED

Digital resources like blueprints, collaboration methods and software are shared globally. Material resources like community spaces, tools and machinery are managed locally. Precarious work decreases and power is distributed to create a true 'Sharing Economy' more worthy of the name.

The 'design global, manufacture local' approach can work for

- Housing
- Medicine
- Transportation
- Agriculture
- ...and more!



DEMOCRATIZE PRODUCTION, EMPOWER COMMUNITIES AND PRIORITIZE THEIR NEEDS AND TALENTS.