

5

NEW ROLES FOR CITIZENS, MARKETS AND THE STATE TOWARDS AN OPEN-SOURCE AGRICULTURAL REVOLUTION

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Introduction

It has become widely acknowledged that the current on-going crisis represents a turning point in the global economy. However, it is neither the first nor, most probably, the last of these moments in history. In fact, it has been shown that such decisive moments tend to appear every five to six decades, following a recurrence of cyclical progressions, which Kondratieff (1935/1926) statistically presented in his “long waves”. Schumpeter (1982/1939), building on the analysis of the long waves, further discussed the cyclical behaviour of the capitalist economy, provoked by surges of technological innovation. Subsequently, departing from the Schumpeterian understanding of the economy, Perez (1983) postulates that those recursive patterns are not explicitly an economic phenomenon. They are rather explained as a result of a dynamic harmony and disharmony of the techno-economic sphere, on the one hand, and the socio-institutional, on the other.

The root cause of these patterns is conceived within the techno-economic domain, where technological revolutions cause discontinuities in the trajectory of technical change, leading to mismatches with the established institutional framework. This process eventually results in a shift of the ‘techno-economic paradigm’, i.e. the ‘common sense’ or the set of best practice principles that guide the engineering and economic behaviour of a certain time (Perez, 2002; 2004). Each techno-economic riddle has a socio-institutional solution, and once a match with the new paradigm is achieved, the potential for a period of prosperity and development is unleashed.

This process of ‘creative destruction’, as it is often delineated in the Schumpeterian tradition, exposes the powerful dynamic of technological innovation in re-shaping the world. Long periods of prosperity throughout the history of capitalism are characterised by and named after the core industries which had become the propellers of development of the time – from the Industrial Revolution to the Railway Era; and from the Age of Electricity to the Age of the Automobile (Perez, 2004). Likewise, the contemporary Information and Communications Technology (ICT) revolution has triggered an ever-growing discussion over the Information Age (Castells, 2010).

Nevertheless, it must be emphasised that technological revolutions, as in fact any type of revolution in the wider sense, do not necessarily lead to one inevitable social outcome. Much like social revolutions, they are organic and often destructive events that do not fall within the control of any particular social force. At the same time, the key role that technologies play in societal evolution has to be recognised. Technology is understood as a moving frontier which expands the sphere of the feasible, creating new possibilities for certain social groups that are able to deploy it.

Therefore, technology is itself a field of social struggle, as different social forces invest in the new opportunities to benefit from it (Feenberg, 2002). When social groups take control of a certain technology, then social, political and economic systems can effectively be transformed. In the neo-Schumpeterian tradition (Freeman, 1974, 1996; Perez, 2002), crises convey some of the basic functions of capitalism and are considered to be windows of opportunity for institutional change that rejuvenates the system. From a different perspective, Kostakis and Bauwens (2014) point out that crises, similar to the current crisis, can tentatively lead to something more than a socio-institutional regeneration of capitalism.

Foti (2017) adds an interesting characterisation of variations in economic cycles. He contrasts accumulation crises, i.e. crises in the supply of capital due to falling profit rates and capital-restrictive regulations, with regulation crises, where the issues are of demand due to an overaccumulation of capital, weak regulation and weak redistribution. The former typically lead to inflation crises and revolutionary waves of protest, as in the 1970s, whereas the latter are characterised by deflation and reformist processes, which is arguably the case today. This means that there is a conjuncture favourable for a broad reform of regulatory regimes and new forms of industrial and economic organisation.

The issue is further complicated with the deepening ecological crisis. There is a growing need for a shift from extractive production regimes, which exhaust natural resources and human capacities, to generative forms of production, which not only maintain their resource base but also enrich it. Today's 'jobsian' (Foti, 2017) mode of neo-liberal regulation overuses material resources and exhausts the soils, just as it exhausts the workers, creating ever-more precariousness. In contrast, a generative reform, for instance in the agri-food sector, would be oriented towards a just distribution of value among land-workers, along with practices that progressively regenerate the soil and the resources used, as in the cases of agroecology, permaculture and organic agriculture.

The role of a 'green' reformation is matched by the increasing importance of distributed ICT and manufacturing technologies and their capacity to mutualise productive resources. A potential synergy would combine mutualisation of knowledge, shared physical infrastructures, and (re) localisation of productive capacities. Commons-oriented communities can now emerge on global scale, based on mutualised technical and scientific knowledge in various fields of production or provisioning systems, while distributed manufacturing has the potential to radically shorten supply chains. Mutualisation of unused resources through a generative sharing economy has the potential to drastically diminish the thermodynamic load of the current production system.

Hence, new modes of social production and new models of value creation and distribution can emerge from radical socio-technical transformations, which, in the long term, have the potential to transcend the system as a whole. These aspects can bring about deep political and social change: a 'phase transition' in the main modality by which humanity allocates its resources.

A phase transition is made apparent within two moments in history, where there are significant fundamental differences in the dominant productive relations and processes. From the slave-based system of the Roman Empire to feudal serfdom, and from feudalism to capitalism, we can identify such profound alterations in the most vital aspects of human societies, includ-

ing key raw materials and energy resources; technologies; types of territorial exploitation and financial systems. Above all, changes occur in global political dominance and the type of social contract and governance.

Bauwens and Niaros (2017), in the context of a Commons Transition Plan for the city of Ghent, Belgium, illustrate how such deep changes are already at work. There has been a tenfold increase in the number of commons-oriented civic initiatives since the crisis of 2008, roughly from 50 in 2006 to 500 in 2016, in a city of 300,000 inhabitants (Bauwens and Onzia, 2017). In Ghent, all provisioning systems are characterised by attempts that entail mutualised infrastructures. In Ghent, 93 of the 500 mapped initiatives are related to food, and there is no doubt that a sizeable generative food provisioning system already exists in the city and its bio-region. For instance, *Gent en Garde*¹ is a transition platform that endorses the demands of civil society for fair, organic and local food. It created, among other things, the Urban Agriculture workshop,² which is a working group of individuals and organisations whose mission is to create a more sustainable and healthy food ecosystem in Ghent. This development of the commons in the food sector is again partly connected to the public organisations in the city that are gradually building political support.

In the following sections, we attempt to explore a tentative path for such a transition, identifying the premises that would empower and legitimise a new political order. In the first section, the political economy of a prefigurative society emerging from a P2P phase transition is presented. The second section provides a theoretical approach of a new reconfiguration of the state, referred to as ‘the partner state’, which will support a potential transition by enabling and empowering social production. In the third section, we introduce a modest policy approach towards the partner state. A set of transformative policy proposals is presented, providing examples related to food and agriculture, which would potentially set up an open-source agricultural revolution. Finally, the last section attempts to synthesise the analysed aspects of the previous sections to formulate a proposition of an integrated model for a commons-based, sustainable agricultural system.

A P2P-driven phase transition³

On the verge of a phase transition, typically, a dominant system increasingly starts to show weaknesses in devising solutions to a series of systemic crises, while different classes of actors, including the ruling elites, as well as the subordinate productive communities, seek for solutions. Different patterns of response are being developed, which, at first, are used by the system and remain subsumed by the dominant paradigm, but at the same time form a new model, which will seek to gradually emerge and replace the old one. They form new social structures to enable and support the changes in the modalities of production and value creation. When these tensions are no longer absorbed by the dominant system, political and social turbulence eventually leads to revolution.

In the current phase, that is, the industrial society, the illusion of a natural abundance as the basis of the current socio-economic system and the ever-increasing negative market externalities create an unsustainable environment. On the other hand, artificial scarcity is imposed on naturally abundant resources, such as cognitive processes, including agriculture, and knowledge production. The commodification of the most vital means of human subsistence, including food and the basic means of production, has led to intimidating disparities and inequality. At the same time, the on-going economic crisis has amplified the existing inequalities, which further restrains the ability of the system to absorb the tensions.

In this picture, three types of patterned responses can be observed: (a) sustainable production, which introduces responsible approaches to account for the ecological limits and the cumula-

tive effect of the negative environmental externalities; (b) cooperative forms of organisation and the social and solidarity economy, which strive to create egalitarian practices for value production and distribution and emphasise social justice; and (c) peer-to-peer (P2P) collaboration and commons-oriented production, associated with the sharing of resources, emerging from a recognition of the natural abundance of immaterial commons, such as technical and scientific knowledge, software and design.

Our approach puts the latter in the epicentre, emphasising its potential to compound the fabric of a new economy and society. P2P is simultaneously a relational dynamic and mode of exchange that has emerged from the radical diffusion of ICT and the internet. The development of GNU/ Linux and myriad Free/Open-Source Software (FOSS) projects, as well as the free encyclopaedia Wikipedia, exemplified a unique capacity for individuals to relate to each other and communicate in a permissionless fashion. This entailed a new mode of production, which Benkler (2006) called 'commons-based peer production' (CBPP): a new modality of value creation and distribution, where individuals self-organise and contribute to the creation of universally accessible digital goods. P2P is closely related to the practice of commoning, in the sense that it enhances the capacity for the creation and maintenance of shared resources. Even though it is primarily associated with the digital commons of information, including knowledge, software and design, these resources are closely bound to the generative capacity of any type of production, digital or physical. After all, information is 'the fundamental source of power and productivity' in the Information Age (Castells, 2010: 21).

P2P and the commons can thus prescribe the premises and a common vision for the necessary convergence of the three patterns described previously. For example, open forms of cooperativism and social and solidarity economic entities can operate in synergy with the commons to create livelihoods for the contributing communities. In convergence with the sustainability principles, new economic models such as an open-source circular economy can promote the regeneration of resources and the support of environmental stability for the current as well as the coming generations. The commons can function as the foundation for a pluralistic commonwealth, where multiple forms of value creation and distribution co-exist: a core institutional arrangement which will guide all other social forms towards achieving the maximal common good and individual freedom.

Such a convergence is necessary so that the contributing communities can be emancipated from the old decaying productive relations and reconstruct the necessary social and political institutions. In the present form of social and economic order, cooperation is subsumed under competition. Collaborative processes occur internally within hierarchically structured corporate entities, which compete with each other in markets. A P2P-driven phase transition would compel the reversal of this relation. In the P2P ecosystem, value is created in collaborative processes, while new types of ethical entrepreneurial coalitions co-create commons along with the productive communities. At the same time, a safety net of for-benefit associations supports the common infrastructure and protects and enriches these commons. Competition thus takes place within the sphere of collaboration. Value is created and distributed through the commons, while a new type of economy generates livelihoods for the contributors around this commons.

Cooperative, reciprocal organisation and economic democracy offer a prototype for a new political order, which moves beyond authority and hierarchy, promotes inclusion and participation and focuses on the service of the community above profit (Restakis, 2010, 2015): a political economy for a 'generative democracy' (Restakis et al., 2015), i.e. a type of democracy that is constantly re-created through distributed social production. A combination of CBPP for abundant resources and a reciprocity-based cooperative organisation for scarce material resources would further empower social reproduction and provide livelihoods for the contrib-

utors (Bauwens and Kostakis, 2014). This type of synergy, referred to as ‘open cooperativism’ (Conaty and Bollier, 2015), could assist CBPP to move from a proto-mode of production to an autonomous and integrated mode of production, able to sustain itself and its contributors.

Nevertheless, as recent experience from radical political movements has shown, such a reconstruction of the productive relations cannot succeed within the old political order, where power is concentrated in a professional political elite operating in a market state form that is dominated by private financial interests. It is therefore necessary that the state itself and the dominant political structures are challenged and transformed as well. New hybrid forms of deliberative and participatory democratic governance have to be adopted in order to assign the political initiative to the civil society for setting the political agenda and executing the public services.

The P2P dynamics are already planting the seeds for the institutions of a new societal model. In this prefigurative society, citizens, markets and the state obtain new roles and importance, which can be summarised as follows:

- a The citizens participate in common value creation and the civil society becomes productive. The commons gradually shift from the periphery to the very core of social and economic organisation and form the fundamental institutions.
- b The market becomes ‘ethical’ and adopts generative as opposed to extractive economic practices. Cooperative and solidarity-based economic models determine the allocation of financial and physical resources.
- c The state becomes the ‘partner state’, facilitating and enabling social production through participatory democratic governance. The political objectives shift away from the service of the political and economic elites and are directed towards the maximisation of personal and social autonomy.

What would be necessary for a successful transition to this model is the reconstruction of these prefigurative value-creating production systems. At the same time, the social and political power that relates to these social configurations would start to gain influence. The already-existing CBPP practices would need to be properly transformed so as to be able to assure their own self-reproduction. The new type of ‘ethical economy’ (Arvidsson and Peitersen, 2013) provides the context and vital space to encircle the commons and enable forms of non-commodified production and exchange (Bauwens and Kostakis, 2015). With the term ‘ethical’, we refer to an economic paradigm in which value creation serves the community before business, a model where the business logic has to accommodate to the social logic.

The initial steps have been made by the contributing communities of the FOSS and Wikipedia, as well as various open design initiatives around the globe. Ethical entrepreneurial coalitions have started to emerge, organising the productive communities in egalitarian and democratic economic entities and creating added value on top and along the commons. Cases like Enspiral (Pazaitis et al., 2017), the open enterprise Sensorica and Wikihouse (Bauwens et al., 2018) and numerous platform co-ops (Scholz and Schneider, 2017) have recently gained eminence, exemplifying hybrid modes of operation balancing between the commons and the capitalist marketplace. Specifically in the agricultural sector, projects like Farm Hack and the L’Atelier Paysan cooperative illustrate the potential of these models in food production (Giotitsas and Ramos, 2017). Support is provided by institutions like the Free Software Foundation, the P2P Foundation, Creative Commons and Wikimedia Foundation, which function as a safety net. They serve to protect and enrich the commons created by the communities through a variety of legal, technical and institutional tools and a global, interconnected community of knowledge and practice.

These emergent forms of social production have thus sparked an on-going transformation. However, a qualitative phase transition would require the reconstitution of powerful political and social movements. In order to transcend capitalism, a sustainable ecosystem would need to be created, to function as a counter-economy to the current model. At the same time, this ecosystem will function as the prototype for the transformation of the state. Elsewhere (see Kostakis and Bauwens, 2014; Bauwens and Kostakis, 2014, 2015; Bauwens et al., 2018) we have provided an extensive discussion of a tentative trajectory for this transitional process. In this chapter, our focus is on the role of the state and targeted policies aiming to create a sustainable alternative to the dominant model. In the following section, we will further discuss the role of the partner state as enabler and facilitator of the political economy emerging from P2P relations.

The partner state: a theoretical approach

The partner state, first theorised by Italian political scientist Cosma Orsi (2005, 2009) and further developed by Kostakis and Bauwens (2014), is a state form that empowers the social creation of value by its citizens and enables autonomous social production. It protects the infrastructure of cooperation for the whole of society (Bauwens, 2012; Bauwens and Kostakis, 2015).

As a state form it is deduced from the micro-economic arrangements of CBPP and the social and solidarity economy with the new type of for-benefit associations that support them. CBPP relies on two premises for its reproduction: a commons of collectively managed resources and an infrastructure facilitating cooperation. These require adequate support and protection from enclosures, while the maintenance of the technological infrastructure comes with significant costs as well. Thus, the open-source communities have created for-benefit associations, a new form of social institution in service of the communities and everyone that contributes to the commons. In comparison with traditional non-profits and non-governmental organisations, for-benefit associations introduce an important social innovation. Stemming from the world of FOSS, and due to the non-rival – in fact anti-rival – nature of the digital commons, these institutions operate from a standpoint of abundance in relation to the commons. In this sense, their role does not focus on regulating scarce resources for a commanded community but rather consists of pro-actively enabling and empowering open cooperation based on shared resources.

Nevertheless, this type of sharing is not a ‘free for all’ situation. While the digital resources are abundant, the physical infrastructures involve both financial and ecological costs. Moreover, the ‘for-benefit’ character already suggests that the orientation of these associations is to provide for the common good of all the related participants, which in this case are the contributors to a certain open-source project. If we transpose this characteristic on a territorial scale, an institution that provides for the common good of a certain group of people associated with a specific type of social relationship is one of the main functions of the state. This has been the basis of the concept of the partner state: a set of institutions that protect the common good and enable citizens to create value. As such, the conceptualisation of the partner state can function on any territorial level: local, regional, national, transnational and global.

From a Marxist point of view (Miliband, 1965), the state is also an instrument of class rule and reflects the balance of forces in a particular social order. However, a transformation towards the partner state should not be viewed as a struggle of the commoners to oust the privileged classes and seize state power, only to get locked in to their own materialistic class interests (Troncoso in Bollier, 2016).⁴ The partner state cannot be the instrument of a privileged rule alone; it needs to manage the common good. Just as the ‘invisible hand’ of the market is a myth, so too an invisible hand of the commons. Stemming from the immaterial world, P2P communities at most lack mechanisms for distribution of power, like authority, prices or democracy. Their governance

is truly poly-archic and power is distributed according to meritocracy and on an ad-hoc basis.⁵ Similarly, commoners tend to care about their commons and lack a general vision of the society as a whole. That specific provision for the whole requires its own specific set of institutions.

In this direction, Silke Helfrich (in Bollier, 2016)⁶ attempted to redefine the way we think about the commons. The commons must be understood as ‘an important form of transpersonal rationality and coordination – a new category that describes the individual-in-relation-with-others’ (Bollier, 2016: 24). Helfrich proceeds to suggest that, even though there may be no commons without commoning, commoning is not necessarily the only kind of contribution to the commons. And here we find the role of the state in ensuring the rights of all citizens and supporting constructive relations on top of and along with the commons. In the Hegelian (1820) notion, the state is viewed in a broader sense, encapsulating the community as a whole, including its institutions. From this point of view, the state constitutes the sphere of full, actual and genuine freedom and is considered as the individual’s utmost end. The partner state encapsulates this perception by enabling the individual to pursue ends larger than his/her own personal good.

In other words, state power may be a matter of social struggle. However, any post-capitalist aspiration of a state would ideally deem material struggle obsolete. In fact, Marx himself would probably be the first to celebrate this transformation. Therefore, the state should be reimagined as a Greek *polis*; a ‘structured human living-together’ (Drechsler, 2001: 6). In the *polis*, the citizen and the state are mutually dependent to achieve genuine happiness for both. It is therefore one of the main functions of the state to allocate power to those social structures that would better serve its paramount purpose of existence; as Aristotle has stated it: ‘the good life’ (*Politika*, I 1252b). The extent to which this is achieved, in turn, legitimises state power for the larger part of the society.

The neo-liberal state legitimises its dominance over its citizens and a general prioritisation of business over welfare, based on the assumptions of the quasi-democratic functions of free markets. A divine-like set of functions and ‘laws’ that are assumed to be in operation in markets are expected to appraise efficiency for commodity exchange, creating a positive-sum game for the majority of society. Furthermore, following Milton Friedman’s (1953) ‘positive’ epistemology in economics, these assumptions have to a very large extent been left unchallenged until today, even though it is becoming ever more obvious that they are false and wildly unrealistic.

So, how can a P2P transition establish a sustainable political economy while avoiding similar fallacies? How can the partner state gain legitimacy in advancing its purpose to ensure a ‘good life’ for the whole society? CBPP may have the potential to redefine citizen involvement and democratic participation. Simultaneously, such processes create demand for effective state reforms that build upon the essence and the importance of abundance, distribution and intrinsic positive motivation (Kostakis, 2011). In the following section, we briefly present a cluster of certain policies that would aim to empower a critical mass of people to participate in CBPP and earn sustainable livelihoods. Furthermore, some examples are illustrated with relevance to agriculture and food in order to provide connection to the most important means of human subsistence that insure human well-being. As more people would be able to support themselves and improve their living conditions through this process, this type of political approach will gain in legitimacy and eventually be able to overthrow and replace the old political order.

Setting up an open-source agricultural revolution

In our understanding, the ideal pursuit of a revolutionary struggle for political power within the confines of the current dominant system would envision the partner state as its political outcome. A first step in this direction would be a cluster of policies with the foremost mission

of empowering direct social value creation, protecting the commons and promoting democratic participation. Such a policy mix, which represents a fine balance between government regulation, private-market freedom and autonomous civil society projects, has been meticulously discussed elsewhere under the concept of ‘the Partner State Approach’ (Kostakis and Bauwens, 2014).

In the following subsections, we highlight some general directions, which aim to operate on different levels of the economy and society. Where applicable, references are provided from existing initiatives related to food and agriculture in order to illustrate some empirical cases that build up this alternative political economy. A potential transformation towards a resilient and sustainable food system would require transformations at multiple levels and diverse approaches of governance (Vivero-Pol, 2017). These experiments attempt to nest in the current system, simultaneously exploiting and challenging it and, eventually, transcending it.

It should be noted that the proposals derive from a composition of the analysis of the Partner State Approach (Kostakis and Bauwens, 2014; Bauwens and Kostakis, 2015), along with various policy-related approaches for the commons and the partner state (Restakis, 2015; Restakis et al., 2015; Pro-Comuns, 2016).

Ethical marketplace and cooperative organisation

A stream of policies would be directed to support and enhance the ethical economy and cooperative organisation. Coalitions of ethical economic agents should be created around the commons, engaging a diverse set of stakeholders in CBPP. Support should be provided to shared/reciprocal forms of ownership and open/commons-oriented business models. The creation of support structures for open commercialisation would maintain and enrich the commons and provide interconnection with global commons-oriented communities, such as open design communities. At the same time, institutional and legislative reform would be necessary in order to shape an appropriate framework for the operation of the ethical economy. Education and training institutes should disseminate the theory and practice of cooperativism and the values of reciprocity and service to the community, and support the development of the cooperative culture.

The mainstream commercial sector should be reformed to minimise the negative social and environmental externalities, and convergence with the social and solidarity economy should be incentivised. Hybrid economic forms, like fair trade and social entrepreneurship, should be empowered through targeted policy measures and financial support. Support infrastructures (e.g. technologies, facilities, etc.) should be developed and maintained, designed to promote the commons as well as openness and sustainability. Alternative financial instruments should be developed, including crowdfunding and seed funding schemes, as well as debt-free public financing and complementary currencies.

In the agricultural sector, a shift to sustainable, resilient and responsible production practices should be promoted, along with the establishment of complementary fair systems of distribution and consumption. Alternative approaches to this direction are movements like Community Supported Agriculture, including various networks and projects, such as FairShare, Urgenci and Growstuff, which support communities to adopt sustainable, localised farming and consumption practices. Ethical marketplaces like Fairmondo, the Food Assembly, Farmdrop and the Open Food Network have been developed to create integrated networks of local producers and consumers, promoting fair trade practices and responsible consumption patterns. Cooperative coalitions like the Land Workers’ Alliance, Alemany Farm and the Dune Costiere community provide support for local producers, advocate for proper policies and provide education and

awareness on sustainable farming practices and food security. Finally, community kitchens and urban pop-up restaurants promote a different approach to food in general based on communal relations and provide viable solutions to current societal crises, like the refugee crisis in Europe.

Technology and distributed production

Policies should promote open technologies and distributed localised production through the provision and support of the knowledge commons. The creation of open manufacturing spaces should be promoted, such as makerspaces, FabLabs and micro-factories. Through the convergence of local manufacturing technologies with sharing practices and community-based forms of governance, and supported by institutions dedicated to the expansion and diffusion of productive knowledge, such spaces may serve as vehicles for citizen-driven transformations (Niaros et al., 2017). Investments in science and technology should be aligned with the commons and the co-creation of productive knowledge, while all publicly funded research should be released under commons-based licenses.

Numerous significant projects and initiatives which emerged from the open-source movement have enabled significant aggregation of knowledge and practical tools related to agriculture. Projects like Farm Hack, L'Atelier Paysan cooperative, the Open Source Ecology, Open Source Beehives, Aker, MyFood, the P2P Food Lab and Open Land Labs offer a variety of social innovations and technological solutions for agriculture and farming, from open-source software applications and digital platforms to open hardware tools and technologies. The promotion of the open-source mind-set and the sharing of knowledge, practices and designs create an ecosystem that coalesces around a global digital commons for sustainable agriculture.

Democratic governance and the public sphere

Finally, a stream of policies should operate on a meta-level for the state itself, which should learn from the social economy and organically transform itself. The state should redefine its role through the empowerment and support of the civil society and the production of social value. Openness and transparency should be maximised and democratic governance should be promoted, through systematised participation, deliberation and real-time consultation with citizens, including online and offline facilitation, liquid voting and participatory budgeting. De-bureaucratisation should be forwarded through the commonification of public services and public-commons partnerships, while community-driven infrastructures and networks should be supported and enhanced. The public realm should be re-claimed by the commons through joint management and regeneration of workspaces and public spaces and the development of collaborative commons-oriented projects.

With the objectives to ensure food security and safety on a local/regional level, public authorities have put forward integrated agendas for the development of sustainable food systems. Prominent cases, like the Vancouver Food Strategy and the Canberra City Farm project, design strategies that include, inter alia, the promotion of fair and sustainable food production practices; the empowerment of grassroots community food initiatives; the promotion of learning; and the development of skills and social competences for socially, economically and environmentally responsible practices.

Vancouver and Canberra are only two of the 128 cities around the globe that have signed the Milan Urban Food Policy Pact,⁷ developing an international framework of reference for the promotion of sustainable and just urban food systems. At the same time, on a grassroots level, numerous projects, like Prinzesinnengarten and the Urban Farming Guys, aim to revitalise

unattractive and counter-productive urban space while providing safe, locally produced and fairly distributed quality foodstuffs.

These have been only a few indicative examples from the countless initiatives that are striving to create a new approach to agricultural and food production and consumption. Even though significant awareness has been gradually raised throughout the past decade, these practices remain to a large extent fragmented and unable to generate a strong counter-current to the dominant productive model. In the final section, we provide a proposition for the creation of the necessary conditions for such a convergence.

COFARMIN: a blueprint for a commons-based agricultural system

Our rough proposition towards a commons-oriented productive model in the agricultural sector aims to devise the techno-economic blueprints for innovation and sustainability. The main idea is based upon a potential conjunction of CBPP with the emerging capabilities of distributed manufacturing technologies. These include any type of technologies that enable customised local manufacturing of physical items, from desktop manufacturing equipment such as three-dimensional printers and computerised numerical control machines to more traditional benchtop tools like drills, cutters and screwdrivers.

This model, codified as ‘design global, manufacture local’ (DGML) (Kostakis et al., 2015) has sprouted from successful commons-oriented projects which focus on P2P technologies and open hardware, such as Farm Hack and L’Atelier Paysan cooperative. These cases demonstrate how a technological project can leverage a knowledge commons to engage a global community in its development (Dafermos, 2015). They furnish concrete examples of how commons-based technologies and practices along with distributed, localised manufacturing can enhance the autonomy of people and transform all sectors of production in the direction of economic and environmental sustainability. Just as networked computers have democratised the means of information production, the emergence of local distributed manufacturing is democratising the means of making.

In brief, DGML denotes a productive process where design is developed, shared and improved as a global digital commons, whereas the physical manufacturing occurs on-demand at the local level using shared infrastructures (Kostakis et al., 2016, 2017). The dynamics of this model lie on the distributed access to information, including knowledge and design, as well as on the physical means of making. Contrary to the mass-production industrial paradigm, which relies on economies of scale, DGML rests on commons-based economies of scope. While the advantages of scale rest on high-capital entry and cheap global transportation, the commons-based economies of scope share infrastructure costs in terms of intangible and tangible productive resources. Furthermore, distributed manufacturing technologies have been claimed to hold the potential to eventually revolutionise the manufacturing industry, by generating the premises to convey peer production, as it emerged from open-source software and the digital commons, into the physical realm.⁸ Kostakis et al. (2015, 2016, 2017) have recently demonstrated the prospects of this model, emphasising its unique dynamics in terms of design-embedded sustainability, resilience, scale and strong collaboration impetus.

COFARMIN, standing for COoperative FARMing Infrastructures, is structured on three interlocking levels (Figure 5.1): (a) a digital techno-social platform of global knowledge commons, including code and designs; (b) a network of local makerspaces equipped with distributed manufacturing technologies; and (c) the local society and economy of productive communities. These digital and physical infrastructures connect the global commons-oriented communities of open design with the makerspaces and the local societies. The techno-social

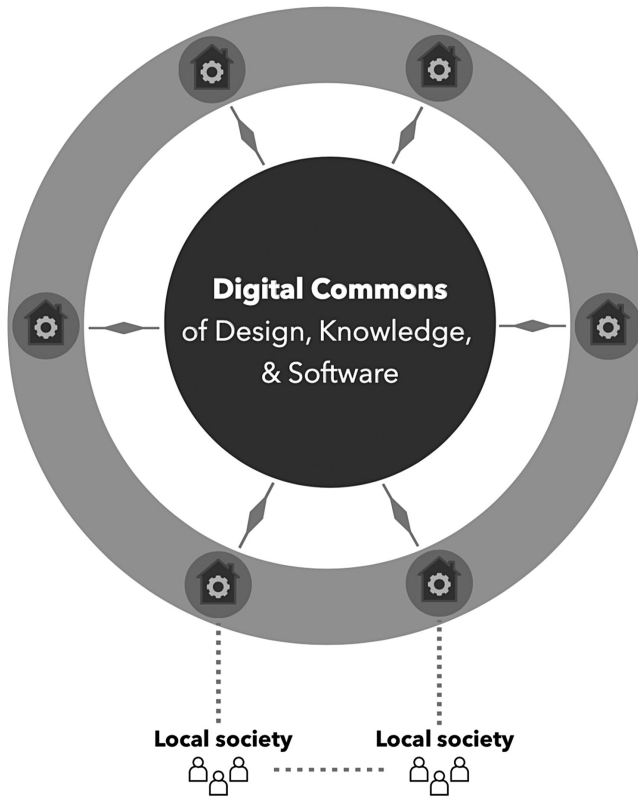


Figure 5.1 The three interlocking layers of the COFARMIN ecosystem.

Source: Nikos Exarchopoulos and Vasilis Kostakis.

platform provides a repository and readable library of already developed open-source and open hardware solutions related to agricultural production. Local farmers, producers and growers, as well as hackers, designers, engineers and activists, engage in creative interaction to exploit the global knowledge in order to develop tailor-made, innovative solutions to address local challenges. Local makerspaces will facilitate this interaction by providing technical means and expertise to customise and materialise the selected solutions in a cost-effective and sustainable manner. In this process, a circulation of open-source software and open hardware technologies is initiated within a collaborative networked environment, thus further contributing to the knowledge commons repository. The resulting collective intelligence empowers people, through participation and interaction, to adopt more sustainable productive patterns, as well as collaboratively develop innovative solutions to local societal challenges.

DGML envisions a bottom-up participatory paradigm which introduces new, decentralised and distributed systems of production and provisioning; inclusive governance; and commons-based value and open innovation. It may be argued that some of the least developed parts of the world need some of the most advanced technologies. ICT and distributed manufacturing may be the globally imagined tools that act locally in response to certain problems and needs. A diverse set of stakeholders, from small-scale producers, commons-oriented grassroots communities and individuals to micro-enterprises, as well as public institutions, would benefit from this (g)local process.

The emerging economic model enables a productive modality that is small-scale, on-demand, decentralised, resilient and locally controlled, yet simultaneously developed and designed on a global basis. The on-site local contributors are brought together in a networked environment and benefit from the socially produced use value, while enriching and expanding the commons sphere.

Moreover, a multi-stakeholder approach is developed, including open design communities and local producers as well as entrepreneurs, which is expected to result in generative synergies. Ethical entrepreneurial coalitions emerge to create added value on the commons, while open forms of cooperative organisation ensure the maintenance of the common infrastructures and provide livelihoods for the contributors. An ever-spreading virtuous spiral of collaborative creation and social innovation mobilises all the relevant stakeholders to move towards an integrated, sustainable commons-based system of agriculture.

Proposals for a partner state-enabled transition in food provisioning

The general logic of our proposals draws upon lessons from urban commons transitions in cities, such as the cases of Ghent, Barcelona and Bologna. These are considered convincing prefigurative forms of partner states, presenting important institutional innovations and processes that streamline cooperation between the city and commoners. Furthermore, such configurations may have surfaced on city level, but they provide an alternative transnational governance structure that complements and transcends the current state institutions. With the current global order and the inadequacy of nation-states in addressing contemporary challenges, the cases of urban commons reconfigurations provide useful lessons for a transition from today's market-centric form of state institutions to commons-centric ones.

Specifically with regards to food, the focus is on the promotion and support of sustainable alternative systems of provisioning, which may as well be applied in every field of human provisioning, including housing, mobility, energy and social care. A first step would require the emergence of a critical mass of commons-based seed forms of provisioning practices (as those presented in this volume in the chapters by Rosset and Val, Fonte and Cucco or Balazs). They first appear as viable solutions to urgent systemic problems the dominant system is unable to solve. As such, they possess a capacity to mobilise citizens, while they become stronger through interconnection with each other and integration with other related domains. For instance, local organic producers may connect with community-based kitchens to cover vital needs for disadvantaged members of society in direct confrontation with traditional food supply chains. Simultaneously, alliances can be built with initiatives from complementary systems, such as energy cooperatives or local makerspaces. Civic mobilisation around such alternatives can create crucial pressures for increasing social and, eventually, political power.

In response, a partner state would develop necessary regulatory and institutional frameworks to support these alternatives, to gradually transit them from the margin to the centre of the system. Different forms of direct and indirect support can be provided concerning regulations in food-related supply chains but also complementary systems, which may even create greater impact. For instance, policies such as feed-in tariffs that incentivise certain forms of energy production over others may deem alternative systems more appealing, along with their associated initiatives. Similarly, regulatory measures targeting profit-oriented renting platforms, like AirBnB or Uber, can support local commons-based alternatives.

Lastly, provided proper institutional support, generative ethical market forms can be developed around the commons-based alternatives. With adequate resources flowing from the dominant system to the commons-based one, those seed forms of provisioning could expand and become

‘normalised’, thus shaping the new logic in their respective systems and territories. Evidently, these processes are tightly interwoven and should take place concurrently. Nevertheless, it is crucial that a significant number of initiatives are operating before political action can be mobilised or appropriate institutions can be designed. More importantly, this approach is highly context-specific and dependent on the structural characteristics of the respective political economy but also on many cultural and subjective aspects, which vary in every context.

Acknowledgements

Alex Pazaitis acknowledges financial support from the Estonian Ministry of Education and Research [grant numbers: B52, IUT (19-13)].

Notes

- 1 https://wiki.commonsgent/wiki/Gent_en_Garde
- 2 <https://stadslanbouwgent.wordpress.com/charter>
- 3 This section is based on ‘P2P Revolution and Commons Phase Transition’, by Michel Bauwens, available at: <http://commonsstrategies.org/p2p-revolution-and-commons-phase-transition>. (Originally published in Spanda Journal VI, 1/2015: “Systemic Change”, edited by Helene Finidori, The Hague: Spanda Foundation, available at: http://www.spanda.org/SpandaJournal_VI,1.pdf).
- 4 From the discussions in the context of the Deep Dive Workshop convened by the Commons Strategies Group in cooperation with the Heinrich Böll Foundation, held from 28 February to 1 March in Berlin, Germany. Full report by David Bollier, available at: <http://cdn8.commonstrategies.org/wp-content/uploads/2016/07/State-Power-and-Commoning.pdf> (last accessed: 14 September 2017).
- 5 For a more extensive discussion on the post-democratic governance of P2P communities, see Bauwens, M. (2012) ‘Blueprint for P2P Society: The Partner State & Ethical Economy’. In: Shareable, available at: <http://www.shareable.net/blog/blueprint-for-p2p-society-the-partner-state-ethical-economy> (last accessed: 14 Sep 2017).
- 6 See endnote 2.
- 7 The Milan Urban Food Policy Pact has been subscribed by Mayors on the occasion of a major event during Expo 2015, on 15 Oct 2015 in Milan. For more information see: <http://www.milanurbanfood-policy.org>.
- 8 Here of course we have to acknowledge the limitations related to the materials and energy resources necessary for the equipment. Also, even though the digital commons may be of anti-rival nature, there are costs related to the regeneration of human effort and the physical infrastructures.

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