

Value in the Commons Economy: *Developments in Open and Contributory Value Accounting*

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Executive Summary

One of the issues with the current economy is what Adam Arvidsson and Michel Bauwens have called the ‘value crisis’. This value crisis is characterized by an increased capacity to create common value through commons-based peer production and other practices of the collaborative economy. In these open and contributory systems, many contributors co-create value as a commons which can be used by all those that are connected to networks, but the income is generated by a fraction of the contributors connected to the marketplace, and usually in the context of proprietary platforms that do not re-invest sufficiently in the social reproduction of the commoners. One of the observed reactions and solutions is that some of these productive communities and the entrepreneurial coalitions allied with them are experimenting with generative business models, in which the entrepreneurial entities co-create the commons and create livelihoods for the contributors. Amongst the more significant experiments are those with models for contributory accounting and value accounting.

This report looks at the issue of potential rent extraction from contributory communities, and attempts to solve or mitigate it through open and contributory accounting practices. It focuses on the internal value practices within productive communities and their entrepreneurial coalitions.

The first section frames our research topic with reference to approaches about value shifts in earlier historical development drawing on the works of Kojin Karatani, David Ronfeldt, Alan Page Fiske, as well as the P2P-theoretical approaches of the P2P Foundation network.

The second section focuses on the open and contributory value practices of pioneering peer production communities, namely Enspiral, Sensorica and Backfeed, looking at their value practices, i.e. how to maintain autonomy, how to create value sovereignty beyond the pressures of the capitalist market, how to generate value flows from the old economy to the new, advances and changes in their accounting practices, etc.

The third section explores the potential policy implications of their pragmatic approaches, and how it can affect society as a whole, and the furtherance of commons-based peer production models through policy frameworks such as the Commons Transition Plan, and others.

1. Theoretical Framework

1.1 Background

Our common world is faced with significant questions regarding the evolution of value. We consider the following to be among the most important:

- What is value, generally in the context of the allocation of resources in human societies, but more specifically in our ‘digitalized’, ‘networked’ societies where emerging knowledge commons are playing an increasingly vital role?
- What ‘should’ value be in a world marked by ecological and resource constraints presently operating at a global scale? Can we imagine a value system that rewards generative instead of extractive activities and exchanges?
- In a world of social, cultural and institutional diversity, can a new ‘value system’ incorporate the multiple values that are not recognized by capitalism, such as the care economy and domestic work?

We cannot offer complete answers to these questions here in this study, but we can look at how the new commons-based approaches attempt to deal with them.

David Graeber’s book (2001), *Towards an Anthropological Theory of Value*, is a deep historical and anthropological survey of ways of dealing with value, reviewing anthropological research and approaches, and is itself a testament to the wide variety of value practices and explanations. Its main underlying thesis, if we understood it correctly, is that value is related to ‘making society’ and that we need value regimes which allow us to direct attention and energy to what we commonly value. Value comes into being through social practices. This stands in paradoxical contrast to the capitalist value regime, which seems to lead to avenues that no one in society, or perhaps only very few, really want.

There is, of course, no consensus about what value is nor from where it is derived, neither cross-historically nor amongst analysts and commentators of contemporary capitalism. What human individuals and societies are willing to put their attention and energy toward, and the ‘rules of the game’ through which resources are allocated, varies amongst cultures, regions, ideological and social groups within a society, and throughout historical times.

An intense debate persists on whether what determines value is located in the objective sphere (reflecting an amount of labor, energy, capital, resources etc.), such as is claimed by the labor value theory (LVT); some argue that value (and money) should now be tied to biomass or energy

expenditure. Another approach is questioning whether it is located in the subjective sphere (the marginalist school, Austrian economics and its influence on mainstream neoclassical economics), whether as a simple correlation of individual desires or as a conscious collective decision and social contract (many monetary reformers and for example Modern Monetary Theory would adhere to that view).

There is certainly a revival of interest in Marx and in the labor value theory, though the general literature of current Marxism is still very poor in examining how ICT and digitization would affect its understandings.

A recent exception is the work of Christian Fuchs. A common characteristic of these approaches is the claim that despite technological changes, capitalism itself is intact, and therefore, the analytical tools of Marx and the LVT are still essential. Fuchs also published a number of books looking at how digitalisation, the emergence of social media and of peer production and its derivatives, are changing capitalism. Within that tradition, Fuchs stresses that the 'audience labour' of social media users is 'productive labour', and that Facebook and other platforms are capitalist platforms are extracting surplus value from that labour power (Fuchs, 2015). This also means that for him, social media users are considered as part of the class struggle within capitalism.

There is a second stream located with the labour theory of value, represented by authors like Jakob Rigi (2015) or Olivier Fraysse (2015), who stress that the production of use value does not directly create surplus value, and that the platforms are rather extracting rent. Facebook is not selling what we produce on social media, which is about sharing 'use value' with our peers, but what they are selling is derived from our sharing, i.e. data about our likes and interests, essentially to advertisers. They are operating not in the production of value, but in the sphere of realization or circulation of value, i.e. helping sell what capitalism produces, and operating like media did before the internet, through audience work that insures the presence and generation of attention. This second approach is, in our opinion, more fruitful than the previous one.

The third stream, linked to Marxism as well, is the post-autonomist tradition derived from the autonomist social movements of Italy in the seventies, with authors like Michael Hardt and Antonio Negri (2011), and the analysts of the French-Italian school of cognitive capitalism, Yann-Moulier Boutang, Andrea Fumagalli, Christian Marazzo. Adam Arvidsson is broadly making the same argument.

These analysts argue that the labour theory of value is no longer the primary driver of cognitive capitalism, and that the productivity of cognitive labour cannot be compared in socially necessary labour time. Creating symbolic, creative, esthetic, cognitive value is highly contextualized and independent of the expenditure of time. They also argue that the production of value has spread to the whole of society, to what they call the 'social factory'. Labour has become 'biopolitical' because work and life have fused and become indistinguishable. Now that the production of value occurs in the 'social factory', value is extracted from the totality of life, in a kind of bio-cognitive capitalism. The value produced by society as a whole is what Hardt and Negri call 'the common', and the value of that common is extracted and 'translated' from 'outside' of the conventional production process - essentially through the financial sector in ways that create and reinforce the inequity of our economic system.

There are, of course, major differences between the fundamental approaches of these authors as well. The Negrian school is clearly an anti-capitalist one, and believes local and global rebellions and revolutions of the 'multitude' are needed to break the stranglehold of finance over the common. By contrast, Adam Arvidsson's concern in *The Ethical Economy* (Arvidsson & Peitersen, 2013) is to make the new types of value (which are independent of labour time) measurable and

recognizable in the current economy, so that this new value can have its legitimate piece of the distributional pie.

What all these authors agree on, however, is that there is a ‘crisis of value’, i.e. that the old value regime does not adequately recognize and reward the new value that is created.

The diagnosis is that we are transitioning to an economy with an ever increasing number of collaborative eco-systems, where the common value is produced through numerous contributions, most of which are neither measured nor recorded, but that value is then realized or captured through our financial systems. Value is increasingly created through the contributions of the many, but realized for the benefit of the few. However, the concern for this imbalance may entirely stay within the sphere of commodification. In this case, we would simply replace commodified labor with commodified contributions.

The authors of this report, however, take a different position. Rather than discussing what the new value means for capitalism, we ask instead: What does that new value represent for a shift towards post-capitalist practices? What if the common, or more precisely, the commons, actually represents a new economy that is being born within the old? This changes the perspective because it reorients discussion around commons-producing ‘peer producers’. If one adopts this perspective (we are anticipating later parts of this report), two main avenues would be open to us.

The first avenue would be to think about ‘reverse co-optation’ of value, from the ‘old’ system to the new. Can the emerging commons-centric economy, which creates value in and through the commons, use capital from the capitalist or state system, and subsume capital to the new logic? This premise proceeds from the realistic position that the new system does not have the power (yet) to change the overall logic of the present system, but it can carve out relatively protected niches within it.

The second avenue goes one step further within the confines of the already existing commons economy: Can broader streams of value be recognized, and become the basis of a new distribution of value that recognizes the commons and its distinct species of value-creation?

The third step will be the most difficult. If commons communities succeed in both reverse cooptation and new value distribution strategies within the confines of their communities, how does this become the basis of a wider system change that would affect the very domination of the capitalist market and its value regime?

The first option is represented by the ‘transvestment’ strategy of the Enspiral open cooperative, using external investments with capped returns and also insulating their purpose-driven activities from capitalist extraction (see Section 2.1). The second option is represented by Sensorica, which internally creates a value-sovereign distribution through its open value accounting system (see Section 2.2). The key to more fundamental change, however, will be the capacity to have this newly recognized value be recognized by the system as a whole.

Before we proceed in precisely documenting such practices, we need to deepen our understanding of the value crisis.

1.2. Analysing the value crisis

A spate of recent books has used derivations of the labour theory of value to highlight a ‘value crisis’. Arvidsson’s and Peitersen’s book *The Ethical Economy* (2013), as well as a thesis earlier outlined in a joint essay by Michel Bauwens (Arvidsson et al., 2008), are two of many treatises stressing that contemporary capitalist value-practices are no longer able to determine what value is. Value is, now more than ever, essentially co-created in the civic and social sphere, and it cannot be restricted to economic value as recognized by the system of capital. The material value of

products and services and the corporations that sell them represent only a fraction of the total value that is somehow generated by economic forces, as evidenced by the 'goodwill' value of stocks which vastly exceeds the value of the material resources. The stock market is no longer an adequate way to recognize and gauge that social value; new value-measures may need to be developed, and also a recognition that many human activities are beyond 'value' and cannot, or should not, be measured. Many of the new value-measures that are presently being developed and experimented with will be post-monetary 'current-sees' (seeing currents), as Arthur Brock of the MetaCurrency Project calls it - systems that enable communities to see flow, and react to it.

Michel Bauwens' commons-centric interpretation is that human societies, through commons-based peer production and related modalities of creating value, are now able to exponentially increase use-value production outside of corporations and markets. However, because abundant, digitally reproduced immaterial use-value is generated outside of the commodity form, it moves to the periphery of market production, and therefore ever greater amounts of use-value production are no longer recognized through monetization. This is creating a crisis of capital accumulation (as it becomes harder for capital to discover reliable sources of return), but also of precarious livelihoods.

It is not difficult to see that answers to this conundrum could tilt towards either more intensive capitalist responses, or to the commons. One of the solutions, as advocated by Jaron Lanier, is to monetize and commodify the digital economy through micropayments. This is similar to the familiar efforts to value 'nature's services' through contrived markets, such as for pollution rights, and we can see similar efforts advocated in the care economy. In these visions, markets and capitalism are seen as the inescapable horizon of societies and their economies for which greater commodification is the natural, inescapable answer. Capitalist players assimilate the new value streams on the old, familiar terms. Of course, there are many other valuation proposals that do not proceed from a desire for marketization, but for the justified desire to create a flow of resources and income to the digital commons, the care economy, and people involved in managing and protecting natural resources. A key question here is, can efforts to valuation lead to any other reality than commodification?

Jeremy Rifkin (2015), in his book *The Zero-Marginal Cost Society*, argues that the trend of de-commodification seen in intangible realms (software, social networking) now extends to 'material' production. Distributed renewable energy creates, once the initial investment is made, an abundant flow of energy which destroys its monetary value. New manufacturing techniques such as 3D printing create a similar effect for many material goods. Once fiber is installed, communication capacities becomes abundant. Hence Rifkin predicts a future economy where demonetized collaborative commons are at the core of production, and market functions operate at the periphery.

Paul Mason (2015), in his book *Post-Capitalism*, uses the labor theory of value to make a similar argument. Software and design, he argues, when produced through open and collaborative commons that can be abundantly reproduced, should be considered as 'virtual machines'. This means that once labor is used to produce new software, very little new labor is needed to reproduce it, and therefore, the input of labor is minimized. This makes software companies that operate under the average, socially necessary labor hyper-competitive vis a vis their competitors, but because they are able to eliminate labor cost in production. At the same time, they are reducing the overall pool of profit for entire sectors of the economy, creating a crisis of capital accumulation through falling rates of profit.

Perhaps an even more influential book of the last decade has been *Race against the Machine*, by Erik Brynjolfsson and Andrew McAfee (2011), which points to the danger of increased automation. Automation has now moved to knowledge work, and threatens to destroy millions of jobs. As products become ever more abundant and cheaper, they argue, with less and less human

labor needed to produce them, there will be fewer and fewer humans as consumers, and capitalism as we know it will cease to operate. The book has led to a broad reassessment of value practices, and to calls for initiating a basic income, including from leaders of Silicon Valley, who are more keenly aware than others of the potential of this wave of automation to disrupt the stability of the capitalist economy.

So, at least amongst the authors reviewed here, there seems to exist an increasing consensus that we are going through a 'value crisis', and that a new value regime must be invented.

Feminist authors have been stressing the other side of this value crisis, which has been a constant characteristic of capitalism and even one of the conditions of its existence, as Silvia Federici (2004) argues in her magisterial *The Caliban and the Witch*. That argument is that capitalism cannot exist without externalizing costs and appropriating 'free' resources (such as the social reproduction that occurs through families and care work). Not recognizing and not valuing domestic care work, the labour of love that is so crucial to human survival, is one of the key processes that maintain this unjust system. The broader forms of care that capitalism's value system does recognize, and commodifies as labor for hire, are at the very bottom in terms of value recognition, most often considered to be the simplest form of exchangeable labor.

There is an obvious parallel here with work for the commons, or more specifically, with commoning considered as 'free' and unrecognized labour.

Indeed, it should be stressed that capitalism renders the commons economy invisible in much the same way that it ignores the value of domestic work. The digital value crisis has similar roots: the increase in free labour goes unrecognized. Here, capitalism doesn't just ignore negative environmental and social externalities, it profits from positive social externalities generated by care work, the commons and digital communities. This is the core achievement of the new netarchical capitalism: it has learned to profit directly from the positive social externalities of commons-based peer production and peer-based market exchange, just as it has always profited from unrecognized domestic work. An interesting idea is that some of the solutions invented by peer production communities could be of interest in the care economy as well, and quite likely, vice versa.

We would propose that the concepts of the care economy and that of a commons (-centric) economy are converging in the same general direction. As Peter Linebaugh has noted, the commons requires the activity of commoning, which is nothing other than caring for a joint resource or common social object. Caregivers are often giving energy and attention to unrecognized commons, such as the family commons. Authors from the care economy, such as Ina Praetorius, call for a return of 'economics' to its original function of providing for human needs and for recognizing all those who contribute to the general welfare. Moving towards a commons economy is moving to an economy centered around commoning, i.e. caring, where people can freely choose their object of care, be recognized for it, and be rewarded for it so that they can maintain fulfilling lives. Especially in the light of the re-emergence of the digital knowledge commons as being increasingly central to the organisation of our social lives, it would seem that where the new commons are essentially about our social and 'psychological' reproduction, the care economy rightly focuses on its *conditio sine qua non*, our even more basic need for physical and affective reproduction. Both need to go hand-in-hand, and a dialogue between the commons 'economists' and the care 'economists' seems long overdue. Both 'movements' may have a lot to learn from each other. For example, both are facing the fact that most resources are controlled by the state and market, and the transvestment strategies of commoners (see below) have also been invented separately by reproductive care workers. Both movements are interested in re-creating meaningful autonomous work, something that both child-care collectives and digital commoners have been successful at creating. As de Angelis (2012) and Barbagallo & Federici (2012) write in a special issue of the *Commoner* on 'Care Work

and the Commons', many new social movements and initiatives with the sphere of reproductive care work, are actively creating new social commons. The solutions that are found and developed within commons-creating peer to peer communities are therefore of the greatest possible interest in terms of how to support the care economy as well. Caring and commoning bring affectivity at the core of production. Perhaps as importantly, the capacity for the 'global scaling of small group dynamics', one of the key characteristics of commons-based peer production (CBPP) brings back the community dynamics of our original hunter-gathering anthropological condition, but adds the logic of affinity to the original logic of kinship. Bringing the commons back to the core of value creation and distribution, in the context of small group dynamics, brings care back at the center of production. While peer-based communities are starting to develop techniques that recognize all contributions within a peer network of common production, we need the same capacity at the level of much larger common territories for recognizing care work as value creation.

Let's move now to what is perhaps an even more important and central issue of the current value crisis: our 'survivability', or our connection to the natural world. We are embedded in this world and form a substantial, and not separate, part of it.

It seems clear that the current value regime rewards 'extractive' production and consumption activities. This increasingly endangers the 'sustainability' of the planet, or rather the capacity of the planet to sustain the current level of human activities. This points to the necessity of a shift in value regime, from 'extraction' to 'generation' (and regeneration).

Linking value to its expression in our monetary systems, ecologist John D. Liu suggests that:

If we say that money comes from ecological function instead from extraction, manufacturing buying and selling, then we have a system in which all human efforts go toward restoring, protecting and preserving ecological function. That is what we need to mitigate and adapt to climate change, to ensure food security, to ensure that human civilizations survive. Our monetary system must reflect reality. We could have growth, not from stuff, but growth from more functionality. If we do that and we value that higher than things, we will survive (Groome, 2016).

We can apply this principle to 'social extraction' as well, and relate it to the potential shift towards a commons and care economy. How do we move from an extractive to a generative economy as it relates to human communities and their commons? Indeed, the 'value crisis' as we described above means that more value is extracted from generic productive activities and less value is flowing back. The current format of 'netarchical capital' - in which capital no longer produces commodities for sale through commodified labor, but 'enables' peer to peer commons production and peer to peer 'exchanges' in order to extract rent from it - is similarly 'socially' unsustainable.

In conclusion, it would seem that the three issues we have discussed - i.e. the free labour of digital workers and social media users, the non-recognition of care work, and the ongoing ecological degradation of our planet and its resources - are all interlinked to the dominance of a system based on extractivism.

Therefore, the key underlying shift needed is one from extractive models, practices that enrich some at the expense of the others (communities, resources, nature), to generative value models, practices that enrich the communities, resources etc., to which they are applied. This is what we could call the Value Shift.

1.3. A historical approach to shifts in modes of exchange

According to Kojin Karatani (2014) in, *The Structure of World History: From Modes of Production to Modes of Exchange*, there are four fundamental modes of exchange. The first is

Mode A, which is based on the reciprocity of the gift and on the ‘community’. The second is Mode B, which is related to ruling and protection, and based on the ‘state’. The third is Mode C, which involves commodity exchange mediated by the ‘market’. Capitalism only emerges when the market becomes dominant and subordinates Mode A and B to its own needs.

The fourth is the hypothetical Mode D, which transcends all the other three. Each modality changes as it is constrained by the domination of other modalities. For example, the form of community is first the band (under nomadism), then the tribe, then the agricultural or territorial community under imperial systems, which eventually becomes the nation under the domination of capitalist systems.

The following table summarizes Karatani’s modes of exchange:

Types of mode exchange	Mode A: Community	Mode B: State	Mode C: Market	Mode D: Association
Description	The reciprocity of the gift (or ‘pooling’ through commons)	Ruling and protection (also called: ‘plunder and redistribute’)	Commodity exchange (capitalist market)	It transcends the other three (the return of mode A at a higher level of complexity)

Table 1. The four types of Kojin Karatani for the evolution of the means of exchange (Karatani, 2014).

Concerning mode A, Karatani stresses that Marx did not distinguish between the pooling of resources in nomadic bands and the reciprocity of the gift in tribal systems. He makes that distinction very clear, though he still uses the overall name and concept of mode A (the reciprocity of the gift) to refer to this joint period, which can sometimes cause confusion. But it becomes obvious that his description of mode D (the transcendental one) is congruent with the thesis that we may currently be at the threshold of a new type of civilization and economy based on a new mode of exchange (i.e. a new configuration under a new dominant mode). Very specific about the argument of Karatani is that mode D is not just a return to the reciprocity of Mode A, nor a pure nomadic band structure, but a new structure which transcends all three preceding structures. If mode A is dominated by gift exchange and on the pooling of resources, then the digitized commons enable all kinds of pooling of physical and infrastructural resources, but at a global scale. In other words, mode D is an attempt to recreate a society based on mode A, but at a higher level of complexity and integration.

What this means in our context is that Karatani marshals considerable evidence for the existence of each modality, sourced in both anthropological and historical literature. He thus recognizes different major transitions:

- A first transition occurs when the pooling of resources in nomadic bands is replaced as a dominant modality of exchange by the reciprocity-based gift economies of tribal systems. This allows a scaling from bands to clans, tribes and inter-tribal systems and, therefore, creates a world that consists of a collection of tribal mini-systems.
- A second transition occurs when the reciprocity-based systems of tribes are replaced by state systems, based on the logic of ‘plunder and redistribute’ or ‘rule and protect’. This allows scaling to inter-tribal and inter-community levels and, thus, creates a world of world-empires that compete with each other.

- A third transition occurs when these systems are replaced by the market form as the dominant form of exchange. This creates a global world-market system in which nation-states compete with each other, which Karatani characterizes as a world-economy.
- Finally, he posits, and we agree with him, a new transition towards mode D, a mode of exchange that integrates the preceding ones but is dominated by the pooling that was originally dominant in the early nomadic groups. Karatani calls this modality ‘associationism’.

It is important to stress the following point made by Karatani. To begin with, all systems are multimodal. The four modalities (or five according to our adaptation of Karatani’s scheme) exist in some form in all systems and it is only their mutual configuration which changes. This means that transitions depend on struggles for dominance among these modalities.

This opens up thinking about the value shift or value transition, not just as the replacement of one system by another, but as an ongoing inter-modal struggle. The question then becomes, how can we think about a commons transition as a way for the commons to engage the other modalities? Just as the logic of capitalist markets attempts to commodify, the logic of the commons is an effort to commonify. There is evidence of this type of value shift in the current practices of peer to peer based, commons-producing communities.

The underlying operating concept here is a quest for ‘value sovereignty’. Just as there is no consensus on what constitutes good food, so communities must decide for themselves how to regulate food provisioning, through ‘food sovereignty’. Similarly, communities that are already engaged in the value transition are opting for practices that advance their ‘value sovereignty’. As they must operate within a dominant capitalist market economy, they must protect their value sovereignty through membranes that safeguard them from capture by extractive forces, and create reciprocity mechanisms to likewise protect their networks. Finally, they must work at the eco-systemic level, i.e. create connections between value-sovereign meta networks. The last question becomes, how one can move from seed forms, however complex, that operate within a capitalist dominated economy to a new overall system that is itself commons-centric and has successfully incorporated market practices to serve the commons.

An example of such a meta-economic network vision is that produced by the Assembly of the Commons in Lille, a city in northern France, which seeks to place ‘common value’ production, i.e. the commons, in the context of other social institutions that produce value, such as the public sector and the private market sector.

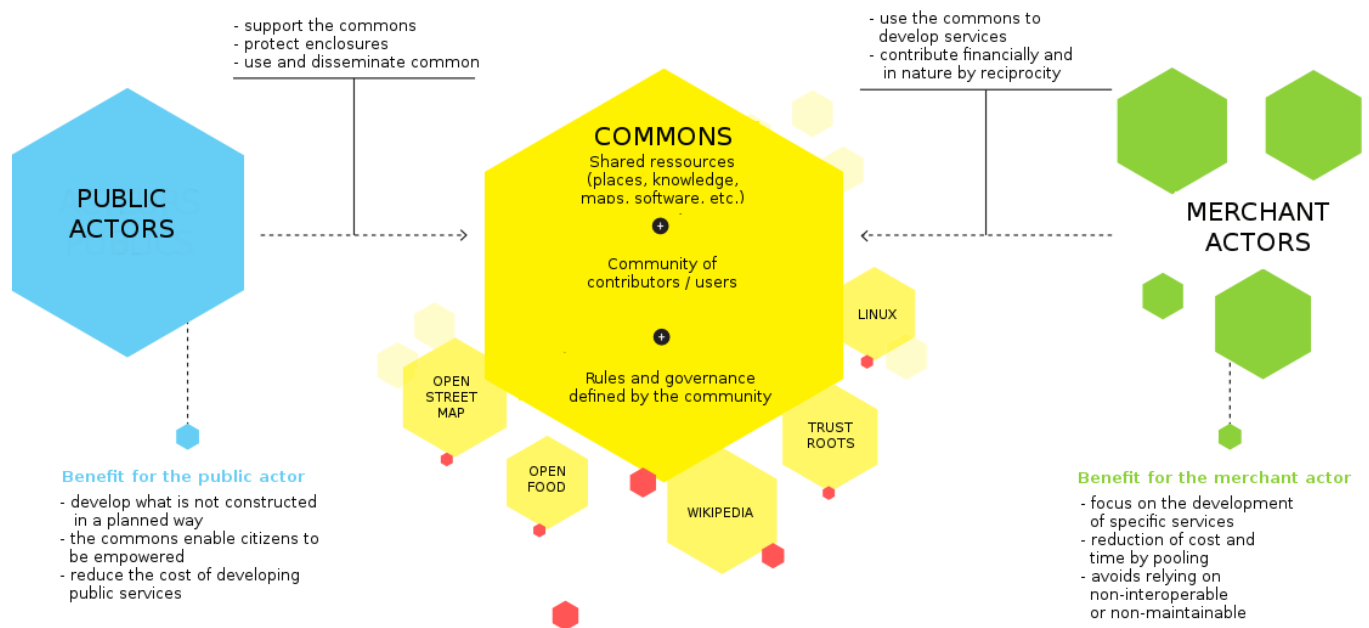


Figure 1: The inter-relationships between commons, state and market. Retrieved from: http://assemblee.encommuns.org/wiki/Fichier:Chambre_et_Assemblee_des_Commons.png

It typifies a way of thinking that we later describe in more detail. Specifically, Section 2 presents in more depth three organisations which attempt to create a form of value sovereignty, even as their members are obliged to engage with the market in order to create livelihoods.

2. Case Studies

The main method used in our report is that of the exploratory case study, using data from the various sources. The data gathered consist mainly of online available information, including internal working and communication documents (Google docs, wikis, etc.) developed by members of the examined organisations and shared via online repositories such as the P2P Foundation wiki. Furthermore, a significant body of information is provided at the websites of the organisations, and various online videos featuring interviews and conversations with the people involved. Moreover, a number of online media have over time covered various stories about our cases. Last, data has been gathered through personal communications of the authors with key persons from our cases.

2.1. The Enspiral Network

Enspiral is of particular interest because it is organized around the production of commons, such as Loomio and Co-Budget, with very strong internal community dynamics. It an entrepreneurial coalition of mostly mission-driven entities. Its infrastructure is managed by a cooperative Foundation, and it has a strong open source ethos in the documentation of its practices, along with a participatory design orientation to its structures which is regularly updated through 'refractor' processes. Enspiral specifically calls itself an 'open cooperative'

because of its commitment to both the production of commons, and an orientation towards the common good. It also has an integrative approach using strong subjective and intersubjective dynamics, which combine working around joint ethical charters, personal and community development. In terms of what we called ‘transvestment’ practices, Enspiral has successfully pioneered a funding process based on capped returns, in which capital is separated from decision-making, and the resulting resources can be donated to the commons after the agreed payments of the returns.

Here is a full description:

Enspiral is a network of professionals and companies aiming to empower and support social entrepreneurship. It was initiated in 2008 by Joshua Vial, a freelance computer programmer, who had some ideas that would help people do more ‘meaningful work’, in terms of fulfilling a social purpose. As a result, he formed a group along with other professionals, who shared the same interest, to experiment with some form of freelancer collective organisation. The idea was that if each one of them worked part time as a freelancer and contributed a part of their income to the group, the aggregated resources would allow them to commit the rest of their time on socially-oriented projects.

Soon, a larger and more diverse group of professionals, sharing the same vision, started to be interested. They formed independent teams, operating in collaboration with significant agility and low transaction costs (Enspiral, 2015a). They can function substantively autonomously, able to create and present their own brand to clients, but share a common legal structure (Enspiral, 2015b). The teams provide a wide range of services, including custom development of websites and applications, project management and creative services, all specialized for projects that aim to create social value. This initial company, later named Enspiral Services Ltd, is currently the largest company (in terms of turnover) in the network. It also served, for a long time, as a minimum viable structure for a tentative organization and business model, where self-organized individuals and companies distribute money, knowledge and control in a collaborative environment. Within a few years, the Enspiral Foundation has been established and new companies started to be launched along with Enspiral Services, gradually evolving to a collective of social enterprises, the Enspiral Ventures.

The Foundation operates as the ‘root node’ of the network (Vial, 2012), providing support and guaranteeing its vision and social mission, while it also serves as the legal entity of the network as a whole. Its formally a Limited Liability Company (Ltd) with a charitable constitution, mandating its non-profit purpose and the reinvestment of all income for its social mission. All Enspiral Ventures maintain a voluntary relationship with the Foundation, but operate as independent companies. They benefit from the connections, skills and expertise provided by the network in order to develop new solutions focusing on social challenges. In turn, they contribute with time and skills as shared resources to the network, as well as with monetary contributions to the Foundation, usually in the form of flexible revenue shares (Enspiral, 2015b). Those contributions constitute to the Foundation’s budget, which is collectively managed through collaborative funding processes, where the ventures can participate to direct what their contributions would support. At the time of the writing Enspiral comprises of more than 15 companies (Enspiral, 2016a), linked under various terms and united by a common vision of business for social purpose and empowerment.

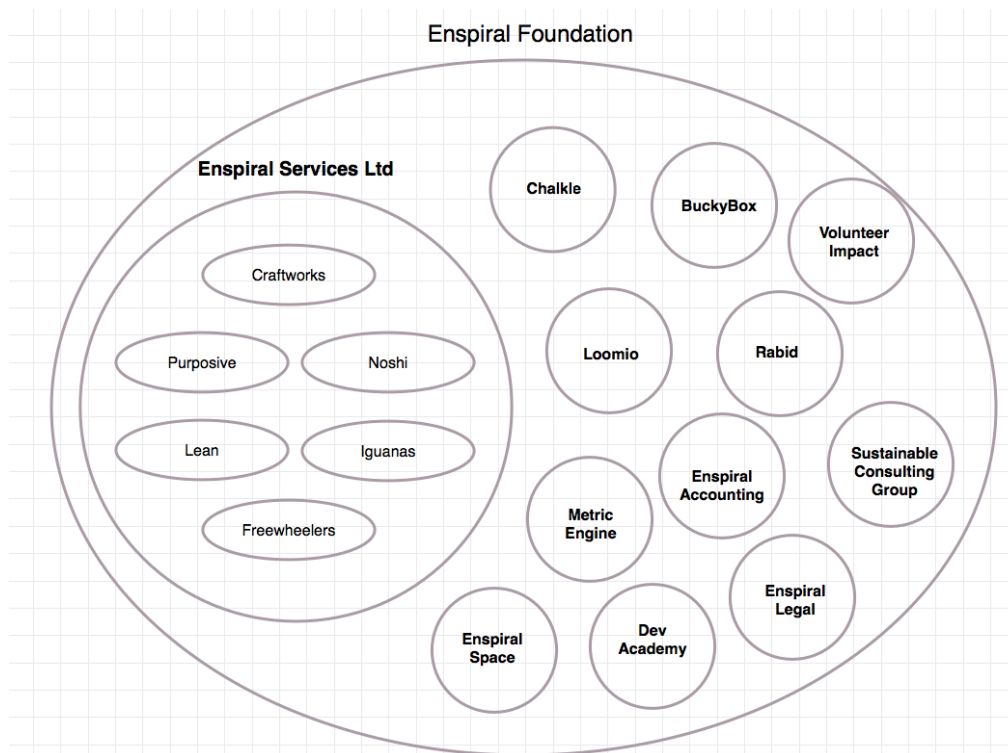


Figure 2: The Enspiral Network: The Enspiral Foundation encompasses the companies of the network, including Enspiral Services Ltd and multiple ventures. Retrieved from: <https://github.com/enspiral/services/wiki/What-is-Enspiral-Services>.

Membership. People engage in the Enspiral ecosystem in three ways: as *members* of the Foundation; as *contributors* and as *friends* (Vial, 2012). The Foundation members act as the caretakers and guardians of the Enspiral culture and social mission and collectively own the Foundation as shareholders. They have the ultimate power in the Enspiral ecosystem since they have control over the money and shares and decide which people and companies can join Enspiral. Any member can invite new persons to become *contributors*, who then also participate in decision making and communication channels through the shared platform of the collective and receive internal information about Enspiral. Contributors often work for various Enspiral Ventures and their contribution constitutes in time and skills in the Enspiral internal gift economy. Lastly, the *friends* of Enspiral are people who maintain an unofficial relationship with Enspiral, but also participate in the collective decision making and information channels. At the time of this writing, the Foundation has over 40 members and is supported by over 250 contributors and friends on a global level (Enspiral, 2016a).

Ownership and employment relations. The ownership relations in Enspiral vary and have selected on a case-by-case basis. The Foundation is practically a cooperative, even though formally registered as an Ltd. According to its constitution, every member owns one share, which cannot be transferred and no dividends are distributed, while all assets held by the Foundation are collectively managed by the members. As regards the Enspiral Ventures, a wide range of different legal structures are encountered, including worker-owned cooperatives (e.g. Loomio), Ltd companies (e.g. Enspiral Accounting, Rabid) and non-profits (e.g. ActionStation). Some ventures are collectively owned through distributed shareholdings, others are fully owned by the Foundation (i.e. the members), while in some companies all shares are owned by a few persons, in trust of the other workers (Enspiral, 2016b).

Similarly, the employment relations vary as well, from salaried employees to freelancers, according to each one's preference and needs. A large number of people is also not directly employed by Enspiral companies, but is involved in various projects and receives occasional payments. The relevant rates also vary, from lower-end junior levels up to very highly paid professionals, depending on the person and the type of the job. Additionally, some people that are co-owners or earning equity on several ventures receive payments based on the respective market rates.

Governance. Enspiral is a dynamic structure balancing between autonomy and cooperation. Regardless of the formal structures, all the people that contribute to Enspiral effectively participate in the governance and day-to-day coordination of the network through a series of coordination tools, including (Enspiral, 2016a):

- Loomio: an open source participatory decision making platform, where all the important discussions and decisions take place (evolved to an autonomous Enspiral Venture);
- Cobudget: an open source digital tool for participatory budgeting, where the people who have made financial contributions to the Foundation vote to allocate their surplus to new ideas;
- Chalkle: a virtual space where all the Enspiral events are listed, while everyone in the network can post ideas for events to be hosted (also an Enspiral Venture); and
- Numerous communication channels, including the Enspiral Newsletter, Slack, Facebook group, Hylo group and GitHub repository.

On every level, all the nodes of the network, either professionals or business entities, are operationally autonomous. Almost every venture features a different business model, according to the scope of work and particular needs (Enspiral, 2016b). Likewise, on individual level, people are doing their job as usual according to their occupation and expertise, either they are computer programmers, legal consultants or of any other expertise. Individuals and companies make financial (or other types of) contributions to the Foundation on a voluntary basis. Half of these contributions are used to fund the Foundation's fixed costs and an emergency fund, while the rest of the funds are allocated through co-budget.

In the context of our description of a value shift, Enspiral is clearly pioneering a new 'ethical' value regime but also finding innovative solutions for what we called 'transvestment', in this case, the transfer of 'value' (in the form of capital investment), from the external market forces, in ways that do not endanger the ethical orientation of Enspiral's activities, but contribute to support it.

The Enspiral culture is coalesced around creating value for the society rather than for shareholders. Production shifts away from the dominant form of 'shareholder-driven command and control', which bases its perpetual growth on the commercialization of the non-commercialized parts of society and is externalizing the costs of input (Vial and Robinson in Enspiral, 2014). On the contrary, Enspiral is orienting its creative forces to create and support value for the society, within and without the network. It is statutorily oriented towards the common good and is pro-actively developing the conditions to serve this purpose.

Nevertheless, this is not mandated by legal structures, carefully designed institutions and formal procedures alone. It is rather encoded in the Enspiral culture, which is held in high trust relations among the Enspiral community, while open source technological tools facilitate this process. We may point out to three particular elements of Enspiral that illustrate this approach on value: open source; collaborative funding and capped returns.

Open source: Sharing use values. In contrast to proprietary software, open source does not conform to the logic of artificial scarcity to generate added value in the market. It is rather sharing the created use value to a community of users. Enspiral is specifically creating open source

solutions, like Loomio and Cobudget, that assist people to address certain challenges related to power and coordination. At the same time, it is opening up its organisational model and spreading the relevant knowledge and experience, through its numerous communication channels and worldwide held events. Moreover, a number of Enspiral Ventures are dedicated to support this process, providing training and expert services (e.g. inter alia Dev Academy, Rabid, Volunteer Impact, Metric Engine). Enspiral is thus developing the common infrastructures, shared tools and knowledge that enable and support the creation of value for the social benefit.

Collaborative funding: Ethical re-investment of the surplus value. Enspiral gives people agency to re-invest the surplus value to support meaningful and socially oriented ideas through collaborative funding. Everyone at Enspiral, regardless of whether they have contributed funds or not, can propose a project that requires funding from the collective funds. For this they create a standardized proposal, called 'bucket', using a simplified online form available at the network's intranet (Krause, 2014). On a regular basis (e.g. monthly), those who have contributed funds decide collaboratively to which 'bucket' they would like to invest their contributions. Bucket funders are expected to use their funds responsibly, stepping beyond individual interest and decide based on the benefit of the network as a whole. This way, an open, transparent and participatory approach is taken to democratize finance, while a strategic vision is gradually created among the contributors. Furthermore, people actively commit money, as well as skills, knowledge and creative energy to the realisation of this vision.

Capped returns: Lining up social and financial value. A core value of the Enspiral culture is business for social purpose. Any type of social enterprise must be able to serve its impact mission, but at the same time they need to secure enough resources for their operation, especially early at their development. Throughout the history of Enspiral a great number of challenging governance issues have been overcome through the application of simple 'hacks' to existing conventional solutions. The charitable constitution of the Foundation is one example, which turned a registered for-profit Ltd company to a non-profit, member-owned foundation. Capped returns (Vial, 2016) is another such 'hack' that aims to line up the interests of investors with a greater social mission. The general idea is that the total returns that investors may receive on the equity of a business are capped. For this, the shares issued by a company would be coupled by a matching call option which would require the repurchase of the shares at an agreed upon price.

This way the people that participate in the actual production would gain full control of the company once this is starting to perform well. Simultaneously, investors would need the company to perform, in order to yield their returns. Basically, that would mean separating a company's productive value from its financial value and the lining up of the investors' interest to the company's purpose. Finally, once all shares have been repurchased by the company, it will be free to re-invest all future profits to its social mission.

There are several existing schemes that have inspired the idea of capped returns, which can also serve their purpose without significant legal modifications. Recently a scheme of redeemable preference shares had been used to fund Loomio (Schneider, 2016).

Enspiral's approach has been theorized by the Telekommunisten group in Berlin and by their main authors Dmytri Kleiner and Baruch Gottlieb (Kleiner, 2016). They propose an inter-modal approach of 'reverse cooptation' of value streams, called 'transvestment', i.e. the transfer of value from one modality of value creation to another. Therefore, 'capped returns' are one illustrative demonstration of this model since it creates a wall between the investors, whose returns are capped, and the autonomy of the purpose-driven social entrepreneurial ventures. Through this mechanism, external and potentially extractive capital is 'subsumed' and disciplined to become 'cooperative capital'. Significantly, once the capped return contract has been fulfilled, the resources are then ceremoniously given to the commons.

2.2. Sensorica

Sensorica is an 'open scientific hardware' peer production community specialized in sensors, based in Montreal. It has pioneered a complex form of 'contributory' or 'open value accounting', as well as non-dominium based forms of collective property (common property which belongs to the whole project and to no individual in particular), and ways to directly connect an open contributory system to potential income from market and other sources. In other words, it is experimenting with new ways of interaction between commons and market forms. In our interpretation of their value practices, they differ in one essential aspect from the Enspiral model. In Enspiral, there is no direct linkage between the open and free contributions to their common resource base, and the creation of a livelihood through membership in their the separate entrepreneurial entities., There is a 'wall' between the commons and the market. In the case of Sensorica however, though they have created independent entrepreneurial entities that have the sole right to commercialize their products and services. The income is directly linked to the priori commons contributions as measured through the open value accounting system.

Here is a detailed description of their experience:

Sensorica is an open collaborative network committed to the design and deployment of sensors and sensemaking systems, utilizing open source software and hardware solutions. It was officially launched in February 2011 in Montreal, Canada with the vision to empower 'communities to optimize interactions with our physical environment and realize our full human potential' (Sensorica, 2016a). Until 2015, Sensorica was focusing most of its energy into developing its own products and services, while developing the infrastructure to sustain its decentralized operations. At the end of 2015 Sensorica undertook the development of an open source sensor network for the heavy industry. Through this project, called Sensor Network, people at Sensorica realized that open networks can work in synergy with traditional institutions, in a way that benefits both parties, as well as the society as a whole (Brastaviceanu et al., 2016).

Sensorica is partially a commons-based community and partially a market-oriented entity. On one hand, individuals and organizations are mutualize resources to initiate projects, driven primarily by intrinsic motivations, as opposed to financial rewards. On the other hand, the innovative solutions developed in Sensorica can be exchanged in the market to generate income. It is basically an informal structure, legally represented as a non-registered association, with which all the affiliates (i.e. affiliated individuals and organizations) are linked (OVN Space, 2016a; Siddiqui & Brastaviceanu, 2013). A non-profit organization acts as a custodian, holding all assets and liabilities of the network as commons, based on a 'non-dominium' agreement (Brastaviceanu et al., 2013). 'Non-dominium' reflects the fact that no country or combination of countries has the power of dominant control over the relevant territory and resources.

As regards the market-oriented operations, Sensorica uses independent exchange firms to interface between the informal network and the market (OVN Space, 2016b; Sensorica, 2016b). The exchange firms are neutral entities, which serve to exchange the products co-developed by the network in the market. For this purpose the exchange firms take over all the relevant operations, such as marketing, sales and logistics, while they hold legal liability for the products. Their operation is fully transparent to the community and in trust that they serve the benefit of the network as a whole. The exchange firms are the exclusive carriers of the Sensorica brand in the market and are responsible for assuring the quality and ethical standards of the products (Brastaviceanu et al., 2015). At the time of the writing Sensorica operates with two exchange firms

(Sensorica, 2016b), one related with prototyping and digital fabrication services and one with blockchain services.

As an organization, Sensorica is inspired by open source design and commons-based peer production. It is fully decentralized, featuring distributed decision-making processes and bottom-up resource allocation. Its structure is multilayered and polycentric, designed to facilitate co-creation and exchange of value. It is a dynamic structure, highly adaptive to its ever-changing internal and external environment. Participation in Sensorica is open, with very low barriers of entry. It empowers permissionless individual action through open knowledge and transparent processes.

Sensorica identifies itself as a new type of organization tuned for P2P organization; an expanding type of open enterprise or, as it is referred, an Open Value Network (OVN) (Sensorica, 2016a). An OVN is a generic organizational and business model, apt to enhance and support commons-based peer production. It can take various forms and can be adapted according to each context (Siddiqui & Brastaviceanu, 2013). OVNs allow individuals and organizations to create common value in an open environment, while keeping account of the different contributions in a common ledger system. All assets are commonly held by the network and the co-created value is distributed equitably within and beyond the network.

Its economic dynamics are based on flat and large scale coordination, cooperation and collaboration. It builds on mass-customization of shared resources, in contrast to mass-production. It thus relies on economies of scope instead of economies of scale to increase returns, which are distributed amongst the contributors in proportion to their contributions.

The aspiration of the OVN model has been to create an ethical structure that could harness the flexibility of open collaboration and sharing, while addressing the challenges of open source projects, related to governance and sustainability. The OVN model provides solutions for open source software and hardware projects, so that they can effectively capture, manage and distribute financial rewards to the contributors; deal with issues related to trust; retain and protect a formal legal structure and brand; and formulate and execute a business strategy.

An OVN comprises of separate business entities (open-enterprises), with relevant flexibility with their legal and ownership arrangements, that can perform all the traditional business functions, including R&D, coordination, production, distribution, marketing, sales, distribution of profits, legal liability, etc. Simultaneously, an OVN utilizes the productive dynamics of peer production and mass-collaboration, observed in numerous open source projects, where a significant proportion of the produced value comes from multiple small contributions. This way a unique innovation potential is created through openness and variety, while the linked business entities deploy this potential to become viable and competitive in the market.

The OVN is characterized by three fundamental principles, which guide the various relations within and without the network, namely, open membership; transparency and variety of contributions. These are briefly presented below (Siddiqui & Brastaviceanu, 2013):

Open membership. In an OVN all members can at any time join or leave the network and form, join or acquire an open-enterprise. An OVN can consist of individuals or organizations, including nonprofits, government entities, open-enterprises or even other open-value networks.

Transparency and open-access. Transparency enables the open source communities to gain access the information, knowledge and the processes in an OVN. Nevertheless, certain restrictions may apply according to the nature of the resources and the respective expertise of the contributors (e.g. dangerous chemicals may be restricted to chemists, etc.).

Variety of contributions. As a contribution is understood any tangible and intangible input, including a product or a service; an idea or a prototype; time spent on tasks or projects; physical

space offered for activities; data or information; but also financial investments; social connections; manufacturing and distribution channels; as well as any type of provision or entitlement, such as liability acquisition, insurance, certification or evaluation. In other words, any effort that is a part of the use value is a contribution. This broad spectrum of contributions, which spans across all levels of the production, finance and governance of the OVN are evaluated and rewarded under the same terms.

The Sensorica OVN rests on a techno-social infrastructure in order to reinforce decentralized self-organization and render the network creative and productive. This infrastructure comprises three main interlocking systems (Sensorica, 2016c):

- a Value Accounting System (VAS), which records and evaluates every member's input and calculates revenues in proportion to each contribution;
- a reputation system, which determines the behavior within the community and attributes merit in accordance with the collective interest; and
- a role system, which allocates the arrangement and interrelation of the different activities among the agents, based on their skills and interests.

These systems enable the OVN to track and evaluate the contributions and redistribute revenue. The Sensorica VAS constitutes a contribution-based reward mechanism, which fairly redistributes revenues in proportion to each contribution to the related projects. The aggregated data generated by the VAS are fed into the other two systems, which in turn support the VAS. In the following paragraphs we provide a more detailed presentation of the Sensorica VAS.

Sensorica provides a platform for people to share resources and create common value. In turn, revenue is generated through either market-oriented entities, which build on the common value to exchange products and services, or through project-related grants. As a result a broad spectrum of different contributions are employed in this process, including material contributions (e.g. resources, tools, consumables, etc.), immaterial (e.g. time, effort, etc.) or capital (e.g. space, equipment, infrastructure, etc.). In order to ensure a fair redistribution of revenue in accordance with the contributed value a VAS is necessary to record the various contributions for every different project (Brastaviceanu, 2014).

The VAS is a contribution-based reward system, which incentivizes interaction and collaboration, by keeping a permanent quantitative and qualitative record of all contributions. The recorded contributions are evaluated, based on a metrics system, as well as participatory evaluations of the members (OVN Space, 2011). The VAS integrates the function of the other two systems mentioned previously, i.e. the reputation and role systems: it keeps a permanent record of who is doing what (role); how well (reputation) and how much (value) in a particular project.

The different dimensions of value are made commensurate using a value equation system, which attributes a percentage of the total revenue to every participant, in the form of 'fluid equity' (OVN Space, 2016c). The fluid equity of every contributor in a certain project is visually represented in the form of a pie-chart, illustrating its share of the potential revenue related to the project. That is, if exchange value is created in the market, the VAS guides the redistribution of the revenue to the contributors.

Furthermore, as the OVN is a dynamic structure, certain types of contributions are simultaneously associated with the creation of new resources (Brastaviceanu, 2014). For example, a design or a prototype which had been contributed to one project, represents a resource that can be used in a different context. Therefore, in order to facilitate this interoperability of the resources in different contexts (e.g. different projects), the VAS is complemented by a Network Resource Planning (NRP) system, which matches resources with a certain value stream. Similar to the function of an Enterprise Resource Planning (ERP) software, the NRP collects, stores and interprets data from

all the different types of activities in the network and attaches them to specific resources, to keep track of the contributed value on resource level.

The NRP integrates the function of the VAS in Sensorica, by allowing the re-use of resources in different contexts, enabling exponential network effects. Especially in the the case of digital commons, like open source software, open knowledge and open designs, further utilization of the associated resources results to further increase in the aggregated use-value for the network. At the same time, the NRP-VAS supports the expansion of the OVN, by attributing equity to resources generated by external sources and integrating them to the network (Brastaviceanu, 2014). For example, a piece of open source software code, which has been developed by someone who is not a member of Sensorica, can be used within a Sensorica project to compile a final product that is then exchanged in the market. Through the NRP-VAS system, the external developer will be given a percentage of fluid equity in the project and, as a result, revenue will be distributed to him/her. This way, the OVN can create bridges with other creative communities in mutually beneficial terms.

The main objective of the NRP-VAS is to separate the various forms of income generation, either through the market or through grants, from the actual distribution of revenue. It thus effectively succeeds in avoiding rent seeking behaviour, not just by external forces, but also by privileged internal agents, which attempt to exploit the common value for their personal gain. The system allows the identification and evaluation of the different qualities of contributions, through a combination of self-logging and peer review. The social contract is that all external revenue shall flow back to all contributors, not just those directly connected to the market or government partners.

The NRP-VAS infrastructure supports the distribution of rewards according to the recorded economic activity. The OVN model sits on top of the NRP-VAS infrastructure, which keeps track of economic activity within and without the network in real time and in a transparent manner (Brastaviceanu, 2015a). Furthermore, qualitative characteristics of economic contributions and behavior are also taken into consideration, based on different dimensions of reputation of the contributor, as perceived by the community. All this is integrated into an techno-social infrastructure, which, on one hand, redistributes benefits to the contributors and, on the other hand, reinforces a certain state of affairs that represents a common sense of fairness among them. Building on this, additional layers can be attached on the top, with relevance to various perceptions of ethics, sustainability or any other subjective systems of value (Brastaviceanu, 2015b).

Nevertheless, as the distribution of rewards is based on past economic activity, the accumulated data comprise a public socioeconomic profile related to a particular person or organization. There is a significant amount of power that this type of information can potentially provide if it gets appropriated and centrally controlled. For this reason, Sensorica is exploring the deployment of the NRP-VAS infrastructure on the blockchain, to maximize transparency and security (OVN Space, 2016d).

2.3. Backfeed

Unlike our two previous examples, Backfeed is not a really operating peer production community, but we believe its innovative and integrated design features warrants a special discussion. Backfeed is a system based on the use of the blockchain ledger, which imagines itself as a full infrastructure for decentralized production, which comes with sophisticated capabilities to develop incentives and express them through cryptocurrencies. By doing this, they address the capacity to more easily create 'value sovereign' communities, and make technical tools available for their management of value. If Enspirial has a full wall between the market and the

commons, which Sensorica aims to bridge through its open value accounting system, then Backfeed is even more directed towards the market polarity, by an intensive use of 'incentives' for the commons-based production. Whether that is a desirable option is a fundamental question, as commons-based production is said to be based on 'intrinsic' production, and there is a potential danger that market-based incentives may 'crowd out' commons-based motivations. But with these reservations in mind, Backfeed remains an innovative way to think through the future of commons-based production with much more emphasis on extrinsic incentives and crypto-currency based monetization. Politically, the polarity represented by Enspiral represents a strong commons-based, common good oriented, and community centric approach, while Backfeed's vision is based much more on the aggregation of individuals, who contractually align with each other, and with more stress on the exchange mechanisms. In this context, Backfeed exhibits much more of the libertarian (anarcho-capitalist) ethos. At this stage of non-implementation, the Backfeed protocol and design should be read as a possible future scenario for value exchange.

Here is our more detailed description:

Backfeed is a social operating system for decentralized organisations. It builds upon blockchain technology to develop a distributed governance model for decentralized value creation and distribution (Davidson et al., 2016). Before presenting the Backfeed model, it would be necessary provide a brief introduction of the main concepts and features of blockchain technology and the practices associated with it.

A blockchain is a distributed ledger or database of transactions recorded in a distributed manner, by a decentralized network of computers (Wright & De Filippi, 2015:6). As the name implies, it is organized in a linear sequence of smaller encrypted datasets called 'blocks', which contain timestamped batches of transactions. Each block contains a reference to its precedent block and an answer to a complex mathematical puzzle, which serves to validate the transactions it contains. As a general purpose technology (Davidson et al., 2016), the blockchain, in its most basic form, serves as a means to record, in a secure and verifiable manner, a particular state of affairs which has been agreed upon by the network (Wright & De Filippi, 2015). As such, the blockchain can be used in any system that comprises valuable information, including money, titles, deeds, intellectual property rights and even votes or identity register data (Davidson et al., 2016; Tapscott & Tapscott, 2016).

Blockchain was first introduced as the underlying technology of the crypto-currency Bitcoin to solve the problem of double-spending for a peer-to-peer electronic cash system (Nakamoto, 2008). Following Bitcoin's innovation, there has been an increasing interest to explore the potential of blockchain technology in other fields of human activity, including digital currencies, self-executing smart contracts platforms, along with many financial and non-financial services (Wright & De Filippi, 2015).

Bitcoin thus marked the beginning of a nascent industry of distributed applications with the issuance of tokens on a blockchain (Van Valkenburgh, 2016). These tokens represent a generic and measurable unit of value, imbued with the rules of the network that issued them. Most of these applications implement a specific protocol for the issuance of these tokens, providing incentives for users to commit resources to the network, in order to secure transactions without the need of a trusted intermediary. As long as people trust the underlying technological infrastructure, it is possible for them to engage in direct peer-to-peer transactions. But, how can people use blockchain technology to engage in complex social relationships that do actually require some kind of trusted interactions?

Backfeed develops a trust layer, enabling people to engage in secure and decentralized trusted interactions on top of the trustless blockchain technology. The blockchain is regarded as a technological infrastructure that could allow for the establishment of a new organisational structure, called 'Decentralized Cooperation' (DC). In this context, autonomous agents collaborate to achieve a common goal, making spontaneous contributions to a network, with no central coordinating or ruling authority.

Backfeed builds on blockchain technology to replicate the same model in the context of spontaneously emerging networks of peers. This is achieved through a social operating system for decentralized organisations, representing a generic protocol layer that sits in-between the blockchain infrastructure and the actual applications that are deployed on the blockchain. This protocol layer operates on top of the blockchain to determine how value is created and distributed in a DC. It thus makes it possible for people to effectively manage, coordinate and reward contributions, while they collectively develop and deploy applications on the blockchain.

In order to establish the value contributed to a DC, Backfeed elaborated a new consensus protocol named 'Proof-of-Value' (PoV), which consists of: (a) a peer-to-peer evaluation system used to determine the perceived value of the various contributions; (b) a reputation system for allocating influence according to the contributed value and the alignment with the overall perception of value within the organisation and (c) a token-based economic model, where the token market value is determined by the perceived value of the goods and/ or services that the organisation provides (Davidson et al, 2016). Without getting into too many technical details, in the following paragraphs we provide a more detailed description of how these three components of the Backfeed protocol are put into practice in a potential DC.

Agents in a distributed network can contribute freely and in a spontaneous manner to an organisation's goal. An agent can be an individual or one facet of an individual (as an individual can be split into multiple agents), as well as a group of individuals, or any other entity that can act as an independent unit (e.g. a DC can be an agent in another DC). Each agent in a DC has a unique account that tracks the record of actions (i.e. a historical log of contributions and evaluations) and record of equity (i.e. her balance of tokens and her reputation score over time). Their contributions can consist of any action with potential value, tangible or intangible, for the DC, for instance (non-exhaustive) a new piece of information, a code snippet or design, an idea or a service. The value of each contribution is determined through a participatory evaluation process, where agents evaluate contributions (including their own) based on a reputation score, which indicates their influence within the organisation.

Whenever a contribution is evaluated positively within the DC community, a reward is distributed to the contributor. The reward consists of a specified amount of economic tokens and reputation. A certain tradeoff is in place between the issuance and distribution of tokens and the reputation flow in the DC. While token distribution serves to incentivize agents to make contributions to the DC, the reputation score is used to indicate their alignment with the value system of a community. The overall evaluation of a specific contribution is calculated by the system utilising the reputation score. The amount of tokens distributed to the contributor depends on the median value of all weighted evaluations, accounting for the total reputation of the DC and not just that of the evaluators. In other words, tokens are issued after a minimum of 50% of the DC community's reputation took part in the evaluation of a certain contribution.

Tokens in a DC serve as transferable value-carrying units that can be used as instrument of reward, medium of exchange, means of payment and measure of wealth. They simply indicate that the creation of value took place, so they do not represent a link to the individual that they were issued initially. Therefore they may be transferred and exchanged like most currencies and commodities. Conversely, within a DC, reputation indicates the level of alignment an individual

has to the DC's value system. As such, reputation may not be transferred as it is linked to the agent who has earned it.

A public reputation system is used to determine the rules according to which new reputation is both issued and distributed. The system relies on 'objectively subjective information', that is information that can be regarded as subjective to a network, but objective within that network. This enables the evaluation of any given agent through the value systems of specific networks. Thus, the Backfeed protocol distinguishes itself from most personal reputation systems which only reflect the subjective perception of a particular agent within the network.

The reputation score can increase in two ways: (a) through a contribution that is perceived as valuable by (all or a part of) the community; and (b) through a useful evaluation of others' contributions, meaning an evaluation that is retrospectively aligned with the evaluations of the rest of the community. Thus, the objects of evaluation are not only the contributions to the organisation, but also the alignment of these evaluations with respect to the overall value system of the organisation. Reputation is issued to contributors, on an ongoing basis, whenever the median value of their respective contributions reaches a positive value, i.e. when more than 50% of the DC reputation considers that a contribution is valuable. Hence, new reputation cannot be issued without a consensus within the network. The precise amount of reputation to be issued for each evaluation is specifically defined, on a case-by-case basis, for each individual DC, based on the chosen evaluation set (i.e. the set of possible values with which a person can evaluate a contribution, e.g. on a scale from 1 to 5).

In order to make an evaluation, agents need to put some of their reputation at stake, meaning that a certain fraction of the evaluator's reputation is deducted from its overall reputation upon making an evaluation. Therefore, the protocol encourages people to evaluate contributions at an early stage. This is achieved through a reallocation of reputation, whereby the reputation stake of each evaluation is distributed to all the previously aligned evaluators. Thus, the earlier an evaluation is made, the greater are the potential rewards to be earned. Eventually, as others evaluate the same contribution with a similar evaluation, those who are the most in line with the overall community's evaluation will be able to retrieve the reputation they lost, and often gain more reputation than they initially had.

Finally, Backfeed introduces an economic model that would potentially enable spontaneous and self-organized communities of contributors to bootstrap, manage, coordinate and sustain a DC. Central in this model is the issuance and distribution of economic tokens, as transferable and exchangeable units of value. Hence, a tentative lifecycle is identified for a DC, which consists of three sequential and overlapping phases in relation to the evolution of the function and value of the digital tokens:

Digital tokens as equity: An initial group of risk-taking individuals invest work and resources to the DC, in order to accumulate tokens. Tokens at this stage represent equity share in the DC. The issuing of new tokens is a means to secure an initial burst of contributions, as new tokens are issued whenever new value is created or added. At this point, the value of the tokens is purely speculative and depends on the expected value of the products or services that the DC will provide.

Digital tokens as commodity: As the DC starts offering a certain product or service, the tokens acquire actual market value, as the only way to benefit from those products or services is by spending these tokens. The market value of the tokens ultimately depends on the perceived (i.e. subjective) value of the services that the DC provides. People can either contribute directly to the DC operations to collect tokens, or purchase them from the current token holders in a decentralized marketplace.

Digital tokens as currency: In the case that the DC reaches a specific level of maturity with a stable user-base, the token value can be crystallized into a more objective value. This follows a

decision by the DC to establish a price cap (or upper margin) at which it will start selling tokens, in order to prevent the market price from exceed this margin. As time passes, DC tokens eventually become redeemable against a specific amount of fiat currency or other digital tokens, therefore completing the DC lifecycle. The price cap mechanism serves to eliminate the volatility against market pressures, as well as to create a reserve of funds in the DC, which would enable people to redeem their tokens directly to the DC (regardless of market price) at a 100% reserve price.

The three phases described above interrelate to synthesize the DC lifecycle. Even though they are distinctive, they actually coexist and frame the interaction of the agents in a broader ecosystem. In this context, DC tokens can be obtained in three different ways: (a) as a reward for those who contribute to a DC, according to the value they add; (b) through purchase on the market from contributors, for those who did not contribute; and (c) through purchase directly from the DC, in case the DC is offering tokens at a price.

In turn, the value of DC tokens can be related to three different factors, namely: (a) their actual use value that depends on the perceived value of the services the DC provides; (b) their market price that fluctuates according to current and expected use value of the token; and (c) the price at which they can be redeemed against the DC for fiat currency or digital tokens. Figure 3 graphically presents the interaction of contributors and non-contributors in the context of a DC.

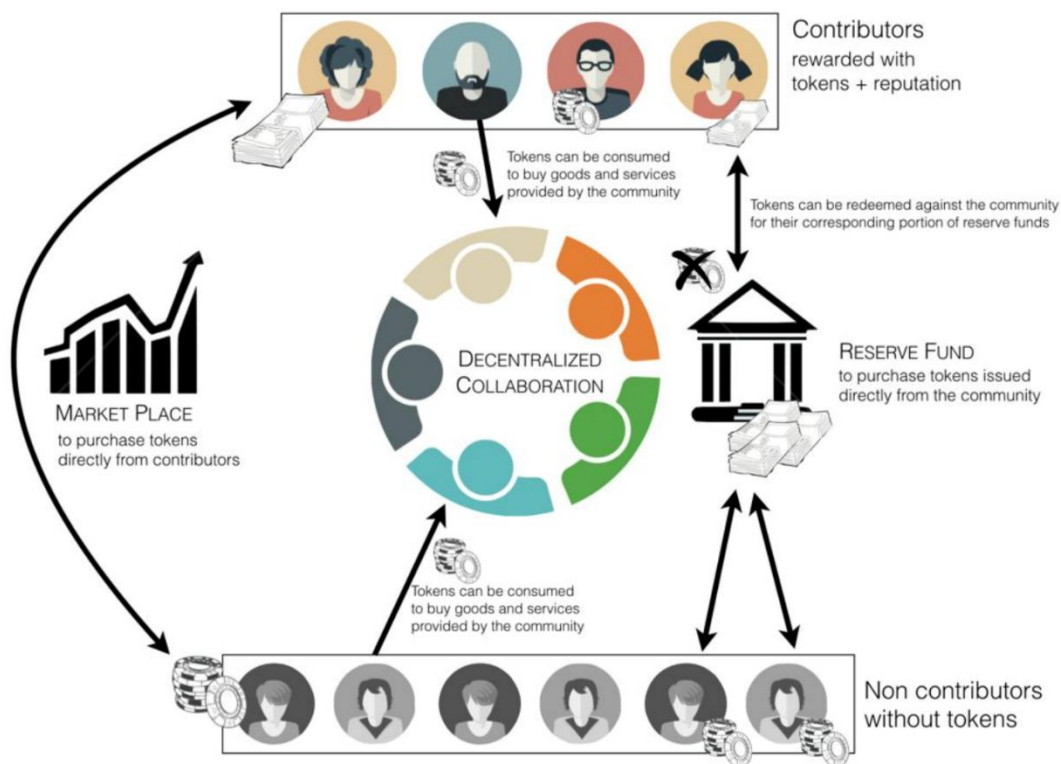


Figure 3: Contributors & non-contributors interacting with a DC. Retrieved from: <http://backfeed.cc/technical-resources>.

The innovation of Bitcoin disrupted the global financial system, featuring a decentralized digital currency and payment system that is not governed by any State or government. However, the

value system encoded in the Bitcoin protocol is indeed not much different from the conventional market system. The main difference of the PoV protocol is that instead of relying on pre-defined objective measures of value, it aims to encapsulate a multiplicity of objectively subjective measures of value. This way, the Backfeed model generalizes the process of mining to include a much wider variety of contributions: anything that is perceived by others as bringing value to the community or organisation. The PoV protocol shifts the focus from algorithms to human judgement, since individuals get rewarded for their active participation and contribution to the community values, as perceived by the community.

The economic model introduced by Backfeed suggests that every DC can set up their own tokens to represent the value system that organically emerges through its evolution. Each DC may feature a unique value system, placing emphasis on the elements that its purpose or vision values the most. In this sense, every set of DC tokens is an expression of at least two forms of value: (a) the specific conception(s) of value that characterizes the DC, which will determine the issuance and distribution of tokens within the DC; and (b) the value provided by the DC within the broader ecosystem, which will determine the exchange rate between the DC token and fiat currency or other digital tokens.

Hence, in a broader perspective, a multiplicity of value systems emerge out of different DCs. Mutually interacting DCs compose a whole ecosystem and support each other according to the extent to which they need each other's services. As the ecosystem evolves, it might even be the case that certain DCs, rather than maintaining their reserve funds in regular fiat currency, may couple to other, possibly more established DCs, whose services are highly demanded or perhaps simply complementary to those of the other DCs. A dynamic exchange rate is therefore established amongst different types of tokens, depending on the relative value of their corresponding DC in the overall ecosystem. This could lead, over time, to the formation of a multilateral market for DC tokens, which might eventually evolve into a self-contained universe of economic transactions, ultimately making it possible for people to bypass fiat currency altogether.

The economic model exemplified by Backfeed thus operates on the production as well as on the actualisation layer of value. It deploys one of the arguably most promising functions of the blockchain, as a system of tracking and managing value with the ability to encapsulate a variety of qualitative different contributions. In turn, tokens are issued as quanta of value, in order to fulfil a number of functions: First, they support an 'objectively subjective' perception of value, attached to a collaborative goal. Second, they provide a qualitative measure for the produced use value, thus emancipating the various contributions from commodification and enclosure and allowing more egalitarian distribution of rewards and meritocratic governance. Finally, they are issued in command of the contributors themselves, rather than external parties (e.g. shareholders), allowing them to retain control of their produced value. Hence, tokens issued through decentralized consensus are more suitable measures of value from monetary units, issued through market price mechanisms of supply and demand and speculative sentimental relations. They thus succeed in providing nominal representation of value, while being intrinsic to the production process and attached to the underlying relations, better than any external quasi-objective medium that abstracts the productive process.

In conclusion of the three case studies, we can see how they present three options for negotiating the interaction and boundary between the commons and the market, as illustrated below (Figure 4). In Enspirial, the commons and the market are clearly delineated and there is no direct interaction. In the case of Sensorica, the open value accounting system represents the social contract that any subsequent value realization in the market will be rewarded fairly. In the Backfeed case, through the creation of tradeable crypto-currencies, it is possible to directly 'marketize' the contributions. This could be problematic as the market incentives could 'crowd

out' the commons-based contributory logic, so experimentations with Backfeed are of great interest.

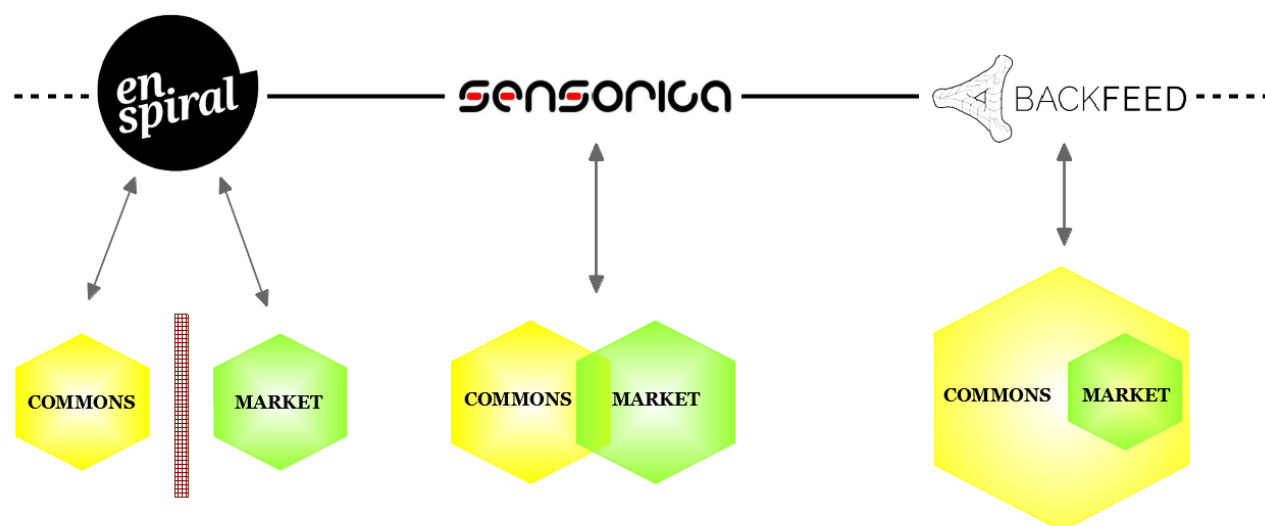


Figure 4: The polarity between our three case studies.

3. Policy Implications

The three case studies show the emergent 'institutional' forms that are taken by a large number of these attempts to transform the value creation and distribution:

- The projects are based on, and open to, free contributions to a common pool of mutual knowledge, i.e. the productive community, which relies on a common technical infrastructure that enables cooperation.
- The projects allow for the generation of income and livelihoods through participation in the external value system, but systems are in place to recognize the new value regime 'internally'. This is the domain of the generative or 'ethical' entrepreneurial coalition which attempts to create an economy 'around the commons'.
- In many cases, here clearly seen both in Enspirial with its Foundation and with Sensorica with its 'non-dominium' institution, there is a for-benefit institution that 'enables and empowers' the conditions for ongoing cooperation within the network.

Here we summarize a set of proposals that deal respectively with an 'economic' and 'political' infrastructure for the new commons-based value regime.

3.1. Economic Infrastructure

The first aspect of suggested practice and policy is to protect the 'internal value regime' that is distinct from the external one. This is what we call the practices that insure 'value sovereignty', which include measures for internal fairness.

The second aspect is the measures against external extractive and rent-seeking activities of profit-maximizing entities towards the commons and its allied economic entities, but also to increase the positive capacity of reverse cooptation of the means available in the dominant external system. Commoners should thus use transvestment strategies that would transfer value from the capitalist market modality to the commons modality.

We therefore propose:

- ***Mutualization and pooling***: Commoners should mutualize digital (e.g. commons of knowledge, software and design) and even physical resources (e.g. shared manufacturing machines). CBPP communities, and their contribution-based technical systems of production, can generally be characterized as open contributory systems. This means that people can freely contribute to one or more commons of their choice. This capacity to pool and mutualize productive knowledge is now one of the most important characteristics to obtain both ‘competitive’ and ‘cooperative’ advantage (depending on the orientation of the productive entity towards profit-maximization or not-for-profit generative goals). Mutualization and pooling - or in other words ‘the commons’ - should be at the heart of the productive and societal system.
- ***Development of open contributory accounting systems***: One of the keys to the success of establishing new value regimes and the value sovereignty for these regimes is the capacity to recognize ‘new’ and ‘other’ forms of value, and to create better and fairer systems of distribution which recognize these new forms. In conditions of domination by a extractive value regime, this can be done by creating a ‘protective membrane’ around the new value regime and internally through the development of open and contributory value accounting. No new value regime is possible without new ways of accounting.
- ***Development of Open Cooperatives to create livelihoods***: Classic cooperative models still function as ‘private property’ in relation to external commoners and can at best create ‘closed commons’. It is therefore vital to develop new cooperative forms in which the creation of open commons is constitutive of their goals and activities, both regarding immaterial knowledge commons, and the mutualization of their physical infrastructures. This is why we propose the model of an ‘open cooperative’, i.e. an entity that would be legally and statutorily bound to creating commons and shared resources. Open cooperatives would internalize negative externalities; adopt multi-stakeholder governance models; contribute to the creation of immaterial and material commons; and be socially and politically organized around global concerns, even if they produce locally (Bauwens & Kostakis, 2016). In short, open cooperatives argue for a synergy between the CBPP movement and elements of the cooperative and solidarity economy movements. The convergence between the older cooperative entities and the commons models will also be vital to create transvestment, i.e. a stream of funding and investments from the well-established cooperative ventures to the new open cooperative formats.
- ***Reciprocity-based licensing***: Open cooperatives should use commons-based reciprocity licensing to protect against value capture by capitalist enterprises but also to create solidarity between the allied and generative coalitions. We argue for commons-based reciprocity licensing, which has been called ‘copyfair’. Copyfair allows commons-contributing entities to use the immaterial common material for free, or the material commons under fair rules of usage, but non-contributory for-profit market entities have to pay for a license for the right to commercialize the certain commons. In this approach, the free sharing of knowledge is preserved, i.e. the universal availability of immaterial commons, but commercialization is made conditional on reciprocity. So, reciprocity is created between the sphere of the (capitalist or non-capitalist) market and the sphere of

the commons. This simultaneously allows for the entities participating into the ecosystems of commons-oriented entrepreneurial coalitions to pool and mutualize their immaterial (and even material in the long run) resources and benefit in tandem.

- ***Towards cooperative and participatory eco-systems for the Generative Entrepreneurial coalitions:*** Phyles, developed as a concept by the 'las Indias' peer production community, are global, transnational eco-systems that generate livelihoods for the commons and their contributory communities. Through the creations of such global open cooperative form, even if the production itself is maximally relocalized out of ecological reasons, the material cooperation remains global. Global open design communities that mutualize productive knowledge are matched with equally global cooperative coalitions of local producers, which can match the power of the extractive multi-national system. They are a vital tool for building counter-hegemonic power at the global level, at the service of the value transition and the new value regime.
- ***Open supply chains and common network resource planning for 'Open Source Circular Economies':*** These coalitions will also be able to use open supply chains in order to realize an open source 'circular economy' and achieve dramatic reductions in the ecological footprints through cosmo-localization, i.e. systematically applying the principle of what the P2P Lab has called 'Design Global, Manufacture Local' (Kostakis et al., 2015). We cannot achieve circular economies without intensive open collaboration at the knowledge level.

3.2. The Political Infrastructure

This leads us to the second step, that is to build a counter-power at the urban, regional and global level. We thus advocate for:

- The creation of *local* institutions that give voice to the commons-oriented enterprises that build commons and create livelihoods for commoners: We need *Chambers of the Commons*.
- The creation of *local* or affinity-based associations of citizens and commoners, bringing together all those who contribute, maintain or are interested in common goods, material or immaterial: We need *Assemblies of the Commons*.
- The creation of a *global* association that connects the already existing commons-oriented enterprises, so that they can learn from each other and develop a collective voice: We need a *Commons-oriented Entrepreneurial Associations* or 'Phyles'.
- The creation of *global* and *local* coalitions between political parties (e.g. Pirate Parties, Greens, New Left) in which the commons is the binding element: We need a *Common(s) Discussion Agenda to build local, regional, and global 'Coalitions for the Commons'*. It is vital for progressive political forces to move away from the private/public binary, and to integrate the commons as a third pole for proposals. Politically aware commoners can organize themselves on the model of the already-existing 'Commons Transition Coalition' for Australia and New Zealand. Assemblies of the Commons, such as those active in the northern french city of Lille, have already developed sophisticated political models for open cooperation between urban administrations and the commons community. Recently, a first European Commons Assembly gathered in Brussels for a dialogue with the Commons InterGroup of the EU.

The complementary nature of our integrated set of proposals is illustrated in our last graph. The three circles express the requirements for a new mode of exchange and production that integrates the requirement of shared knowledge and mutualization of physical infrastructures, fair distribution of value, and compatibility with the ecosystems on which we depend. The new producers organize themselves in a double movement of the creation of both civil-political and economic representation, at all levels, from the local to the global. The underlying 'Agency' represents the public supportive framework through which autonomous social production can thrive and develop, i.e what we call the 'partner state' institutions which accompany both the recognition of productive civic activity through the commons and the generative entrepreneurship that it generates.

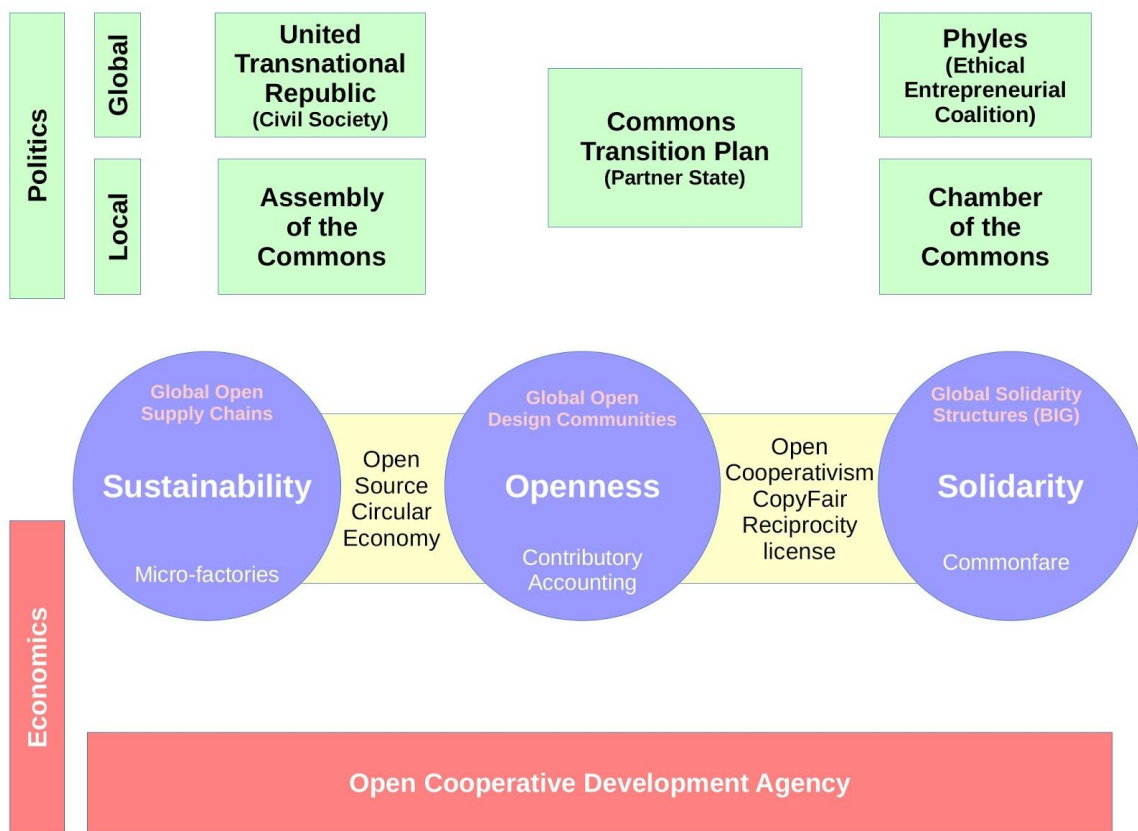


Figure 5: Integrated Commons Institutions. Retrieved from: https://wiki.p2pfoundation.net/File:P2pCommons_slide_corrected2.jpg

4. Conclusions

We have attempted to develop a new way to envisage a broad societal transition, by proposing an integrative strategy that arguably differs from the classic left narratives of 19th and 20th centuries. Why would this proposed strategy be effective?

First, it is consistent with the historical record that shows that political revolutions did not precede deep reconfigurations of social power, but completed them. The development of a new bourgeois class and its practices precedes the concluding social revolutions that made their power and modalities dominant. There is a convergence of data that supports the prefigurative existence of a growing number of commoners, who could form the basis of a historical subject at the forefront of this transition.

Moreover, very important in our minds are the changing cultural expectations of millennial and post-millennial generations, and their requirements for meaningful engagements and work, which are hardly met by the current regime. The precarization of work under neoliberalism drives the search for alternatives, and the cultural force of P2P self-organizing and corresponding mentalities fuels the growth of commons-oriented networks and communities.

Also, CBPP is a model that could create a context of truly sustainable production. It is almost impossible to imagine a shift to sustainable circular economy practices under the current proprietary regime. The thermodynamic efficiencies that are needed for sustainable production could be found in the systematic applications of principles inherent in the commons-centric economy.

Finally, the crisis of the left itself, which is now relegated to the management of the crisis of neoliberalism itself and the limitations of the (post-)Keynesian models, points to the vital need of renewing the strategic thinking of the forces that aim for human emancipation and a sustainable life-world. In particular, the development for proposals to relocalize production, and massive investments in regenerative economic activities, would re-create substantial employment potential to re-engage blue-collar sections of the population, who would be a natural fit for a regenerative maker economy centered around sustainable production models.

We believe that a strategy for a multi-modal commons-centric transition offers a positive way out of the current crisis, and a way to respond to the new cultural and political demands of the commons-influenced generations. The commoners are already here and so are the commons, and the prefigurative forms of a new value regime. The time has come for an integrated strategy that both strengthens their economic networks, and the emergence of a new value regime; but vitally accompanied by political institutions and mobilizations which create broad coalitions between peer producers, labor and service and agricultural production workers.

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