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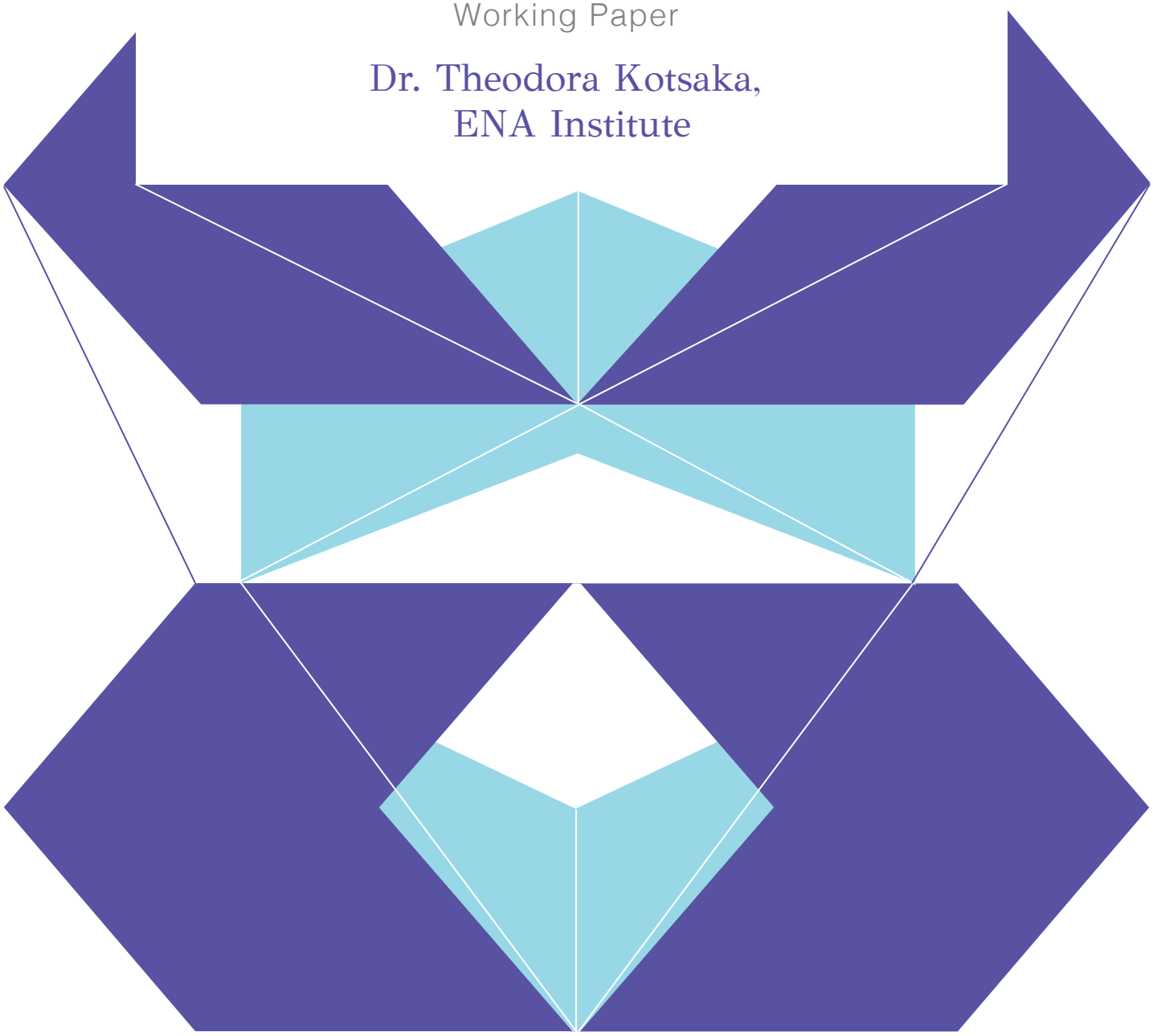
GOVERNING KNOWLEDGE COMMONS INTO THE FRAMEWORK OF 4th INDUSTRIAL REVOLUTION

Working Paper

Dr. Theodora Kotsaka,
ENA Institute



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FORCE Project[1]

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[1] https://enaforce.eu/

EXECUTIVE SUMMARY

Due to the 4th Industrial Revolution and the respective change of the production model (intense knowledge economy and digitalization), commons become relevant to wider sectors of the economy. Even though, commons practices remain fragmented and -with the exception of digital commons - operate almost exclusively in small scale. In order to escalate, the appropriate institutional and legislative framework is presupposed and that need cannot be answered without taking under consideration the role of EU and member states as regulators.

Transformations of extreme importance are occurring, not only to the production model, but consequently to the value production process. This 'value shift' is characterized by an increased capacity to create common value through commons-based peer production and other practices of collaborative economy. The process is described as a move from extractive models and practices that enrich some at the expense of the others, to generative value models and practices that enrich the communities and the resources. That is an evolution with serious implications for the current economic system and value creation.

Knowledge commons are re-emerging to the policy discussion since it reveals that they can contribute to answers that deal with technology, artificial intelligence (AI), data governance, biotechnology, climate change etc. Issues that are at the core of 4th Industrial Revolution. New forms of ownership, new forms of lending, new types of legal contracts: a new entrepreneurial subculture has been created, but we are still at the point of trying to describe it by terms such as 'commons' or 'P2P production'. For official economics the above mentioned hardly fit in the category of 'economic activity'. And that is a crucial point. Those practices exist because they manage to answer specific social problems in times of need. They are functional because they operate according to structures and values created into the framework of 4th Industrial Revolution that in commons and P2P economy are fundamental, such as openness, sustainability, networked activity or sharing of resources (stuff and services) etc. Of extreme importance is also the idea of shifting the focus from struggle for ownership -the corner stone of capitalism and the legislature culture on which it is based- to management. Commons movements put the emphasis on the right to use and the right to access to a resource, not to its ownership.

Which was more, under the situation created due to Covid-19 and the respective pressure for health systems, it became obvious that the current model of research & development, pricing and supply of medicine or vaccines cannot respond to the needs. The business plan applied to the provision of public health services has undermined the capacity of confronting cases of emergency. At the same time pandemic crisis created an upsurge in mutual aid, a full-scale mobilization of makers and peer production movements which were featured on media for first time in that scale. In global level, an intense activity took place concerning commons practices such as open research and science, utilisation of software and hardware under open licence, data sharing etc. The Covid-19 crisis made visible remarkable mutual aid initiatives but also the capacity of the maker movement to produce solutions where the state and market failed. It has, also, shown the lack of public-commons cooperation protocols when they were urgently needed.

P2P modes of production are best adjusted to the type of economy evolving under the 4th Industrial Revolution, they maximize the benefits of networks among peers, of modularity and enable openness and circulation at their maximum. At the current economic phase extreme enclosures

and privatization of every resource are a prejudicial practice in terms of value production, which means bad for the markets. However 'openness', P2P and commons cannot protect themselves alone from corporate greed, monopolies and extreme deregulation. Bottom up innovation is vitally linked to new institutions and new rights. In human history, communities had to defend again and again their rights on land, natural resources, crafts, language, culture etc. Today, we need an equivalent for science and information, a new principle against new enclosures. In the lack of the appropriate legal framework and institutional stewardship, the more open and accessible data are, the more it works in favour of the big players in the market. And here comes the importance of regulation.

The importance of the state as a regulator regarding productive transformation towards commons, is at the core of the whole process. The commons transition plan is mainly referring to the Partner State model and the construction of the respective Legal and Institutional Framework. In order to implement commons oriented policies there are certain tools that can be operated by a partner state drawn from emerging practices as: licenses protecting commons like GPL or Creative Commons, cooperative banks, P2P Accounting, Public Commons Partnerships (PCP) instead of the overused Public – Private Partnerships (PPP) that has been applied even for public goods like water or health, causing indefensible damage to societies. That kind of policies is possible to reduce the harm of the monopoly derived from intellectual property and patent systems. Commons and P2P policies can serve as a tool for EU and member states in order to challenge digital monopolies.

A general Partner State approach and strategy and appropriate legal forms of common ownership and stewardship are new emancipatory tools that EU can have in its tool-kit. It is a case for a targeted, proactive, entrepreneurial state, able to take risks, creating a highly networked system of actors harnessing the best of the private sector for the national good over a medium- to long-term horizon.

1. INTRODUCTION: TRANSITION TO COMMONS ECONOMY AND THE IMPORTANCE OF A REINFORCING INSTITUTIONAL FRAME-WORK

Due to the 4th Industrial Revolution and the respective change of the production model (intense knowledge economy and digitalization), commons become relevant to wider sectors of the economy. Even though, commons practices remain fragmented and -with the exception of digital commons - operate almost exclusively in small scale. In order to escalate, the appropriate institutional and law framework is presupposed and that need cannot be answered without taking under consideration the role of EU and member states as regulators.

Commons
Commons are a shared resource which is co-governed by its user community, according to the rules and norms of that community (the protocol of resource stewardship). The category includes gifts of nature (water, land etc) but also shared assets or creative work (language, information, culture artefacts etc)
Knowledge Commons
The term knowledge commons refers to information, data, and content that is collectively owned and managed by a community of users, particularly over the Internet. What distinguishes a knowledge commons from a commons of shared physical resources is that digital resources are non-subtractible; that is, multiple users can access the same digital resources with no effect on their quantity or quality
Digital Commons
Digital commons are a form of commons involving the distribution and communal ownership of informational resources and technology. Resources are typically designed to be used by the community by which they are created. Examples of the digital commons include wikis, open-source software, and open-source licensing. The distinction between digital commons and other digital resources is that the community of people building them can intervene in the governing of their interaction processes and of their shared resources. Typically, information created in the digital commons is designed to stay in the digital commons by using various forms of licensing, including the GNU General Public License and various Creative Commons licenses.

Structural technological changes have as a result that today economic value is mainly produced through intangible goods such as research, knowledge, data and information etc. In order to flourish those types of goods presuppose features such as openness, free data, networks and P2P modes of production[2]. That is an evolution with serious implications for the current economic system and value creation. Commons are re-emerging to the policy discussion since it reveals that they can contribute to answers that deal with technology, artificial intelligence (AI), data governance, biotechnology, climate change etc. Issues that are at the core of 4th Industrial Revolution.

[2] P2P -peer to peer, people to people, person to person- a relational dynamic through which peers freely collaborate to create value in the form of shared resources, circulated in the form of commons. P2P expresses an observable pattern of relations between humans. Definition from The P2P Foundation, *Commons Transition and P2P: A primer*, 2017, op.c.

2. WHERE ARE WE IN TERMS OF COMMONS TRANSITION AND COMMONS-BASE PEER PRODUCTION (CBPP)?

The commons transition3 process rapidly moved from digital commons, to redistributive urban commons and is beginning to move into the direction of cosmo-local ecosystems. At policy level there are public-commons protocols in Bologna and 150 other Italian cities and Commons Transition Plans have been produced from Ghent to Sydney. Similar intentions there are in Amsterdam. Cities and peripheries like Ghent, Bologna, Amsterdam, Barcelona, Naples, Montreal, Lille, Madrid and Bristol amongst several others, are creating spaces, institutions and structures for citizens to manage matters that most directly concern them[4]. They are increasing transparency, enabling participatory budgeting, facilitating the creation of social care co-ops, turning empty lots into community gardens, co-creating skill and tool sharing programs etc. The above has been known under the term 'New Municipalism' a movement of citizen-led municipal coalitions[5].

At the same time, during last decade, a spontaneous augmentation of cooperative economy and P2P production is taking place. Especially in southern Europe a dynamic grass rooted activity came as a reaction from societies in austerity. Almost unnoticed from capitalist economy's logistics, several fragments of economic life starting moving under a different structure creating a net: parallel currencies, time banks, carpools, local exchange systems, food cooperatives, cooperatives and self-organised spaces with a variety of uses as self-organised kindergartens, are multiplied every day without being noticed by economists, accounting, policy makers or EU institutions. In some cases they are the result of the collapse of the previous structure that economic or health crisis cause. Very often people are practising commoning, solidarity economy or P2P without even knowing it.

For official economics the above mentioned hardly fit in the category of 'economic activity'. And that is a crucial point. Those practices exist because they manage to answer specific social problems in times of need. They are functional because they operate according to structures and values created into the framework of 4th Industrial Revolution that in commons and P2P economy are fundamental, such as openness, free time, sustainability, networked activity or sharing of resources (stuff and services) etc. Of extreme importance is also the idea of shifting the focus from

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3 The 1st Commons Transition Plan on big scale was a non-region specific adaptation developed by Michel Bauwens for The FLOK Society Project. The Ecuadorian plan was itself built on the original FLOK Proposal "Sumak Yachay. Devenir Sociedad del Conocimiento Común y Abierto. Designing the FLOK Society. v.1.5.2. By Xabier E. Barandiarán & Daniel Vázquez, 2013." More at www.wiki.p2pfoundation.net/Commons_Transition. Generally, the term refers to projects that are specifically or more loosely related to a commons-oriented transition in terms of political economy, society and civilizational model. More at www.primer.commonstransition.org/1-short-articles/1-1-what-is-a-commons-transition

4 L. Calafati & N. Mcinroy, Local government and the commons: The time has come, Progressive Economic for People and Place (PELS), November 2017. www.cles.org.uk/blog/local-government-the-commons-the-time-has-come/

5 V. Rubio-Pueyo, *Municipalism in Spain: From Barcelona to Madrid, and Beyon*d, Rosa Luxemburg Stiftung: New York Office, December 2017.

struggle for ownership -the corner stone of capitalism and the legislature culture on which it is based- to management. Commons movements put the emphasis on the right to use and the right to access to a resource, not to its ownership.

An important CBPP feature is 'cosmolocalism'. The current economic model is based on global specialization which comes at huge environmental cost, no longer bearable due to climate change, pandemics etc. Transporting goods is three times more expensive than manufacturing them. Alternatives proposed take various forms of more protectionist regionalization. The big danger of that approach is a contraction of international cooperation and potential competitive warfare between states, even into the EU framework. The cosmo-local approach is part of P2P economy and is proposed as a third way alternative. It follows the adage: 'what is light is global and shared, what is heavy is localized'.

That does not mean that everything needs to be localized. It refers to a sensible or smart localization, about the subsidiarity of material production. The aim is to locate production as close as possible to the local needs, but in ways that make sense and without closing down globalized culture. The relocalization could use the model of distributed microfactories. It should ideally also take the form of distributed property and governance for the production entities, while being connected to global open design communities based on open source technical collaboration worldwide. An example of that kind is a network of multi factories in Europe. There are 120 collectives of materials-producing craft workers, which collaborate through their Invisible Factory and get organized by open source and cooperative models6. Cosmo-local also means cooperative models such as those of the Social and Solidarity Economy, but with added collaboration around open source technical and scientific commons.

6 A Multifactory is a collaborative working environment, which helps its members to grow as entrepreneurs and to innovate as there is a constant exchange between members, and they share experiences and knowledge. A Multifactory is a self-regulated system, where few norms rule relationships between entrepreneurs and innovation comes from everyday interaction between members, which are independent under any aspect, but on occasion can act as if they were parts of a single huge company. Multifactories proved to be places that help a new generation of entrepreneurs to grow, as they count on immaterial assets and shared resources to develop their companies. G. Focardi & L.Salati, Multifactory: An Emerging Environment for a New Entrepreneurship, Osun WES, 2016. www.multifactory.eu/projects / www.bob.co.it / Documentary :www.youtube.com/watch?v=n6ZnhC7B9iE

Multifactories

The debate about freely accessible knowledge refers most often to something that happens on, applies to, or is somehow related to the web and the world of Internet and digital technologies.

These are environments where collaboration between individuals prove to work and to produce resources of free knowledge available to almost everybody.

Outside the web groups, companies, and institutions have an increased interest in sharing environments and cooperative networks.

For example, the European Union alongside the Horizon 2020 program brings attention to Sharing Economy and Social Business, as these are seen as relevant points to support the economic and social development of European Countries.

This chapter focuses on Multifactories, which are a type of collaborative environment where free access to common resources and free exchange of knowledge between people are key factors in the establishment and development of economic activities.

Multifactories are environments that prove that the concepts at the base of free knowledge sharing and free access to resources can apply to physical places and spread into "common" society, or people not involved in specific movements, or driven by a particular ethic purpose.

Multifactories also exemplify the social benefit of free knowledge sharing and how to make possible a tangible improvement in social assets through collaborative environments.

Multifactories are emerging working environments that present peculiar elements of innovation: a Multifactory is a shared workspace, different from a classical Coworking space, as it's not intended as a "desk farm," but an environment dedicated both to the development of services and to the production of material goods.

A Multifactory is a Community of Purpose, where the purpose is job creation and the concretization of better working conditions. It takes form as a Community Project, where all the stakeholders take an active part in designing its shape and in the shared definition of norms, rules, and governance system.

Modularity is another significant potential of the digital revolution that has not been fully realized[7]. An emerging mode of production premised on modularity, may point towards a more sustainable and inclusive digital transformation since it enables different groups to work independently on modules, push deeper into their processes and thus boost the rate of innovation. The module participants are free to engage in parallel experiments with a wide range of approaches, under the condition that they follow the design rules that allow the modules to fit together. Therefore, a modular system may offer flexibility and variety in its use and improvement, provided everybody agrees to the overarching rules. This makes complexity manageable by enabling autonomous experimentation in unforeseen ways. In addition, commonly mentioned benefits of modularity include cutting down the communication or transaction costs due to distributed problem-solving, enhanced reusability, easier and longer maintenance of the artifact, and advanced customization.

The digital revolution has engendered radical changes in the production processes in almost all industries. To spread the benefits of the digital revolution across society, much modularity-oriented institutional innovation is necessary. However, the way that modularity-infused policies and practices are implemented is not politically neutral. A commons-based modularity may reap the benefits of modularity towards a more inclusive and environmentally sustainable paradigm. Modularity is a core characteristic of CBPP[8], on Wikipedia, for example, the content is broken down into smaller components: entries, sections or paragraphs. People can contribute from one word to thousands of words (or figures). So, the modules allow for any size of the contribution to match different levels of contributors' motivation and time availability – a property called "granularity". Further, it is easy to put the various contributions into the final product. Similar design properties characterize the free and open-source software and the open hardware realm. Modularity enables sharing and human creativity through asynchronous and synchronous collaboration, going beyond the limitations of time and space.

Whenever peers can freely associate with each other to produce common value, in open collaborative systems facilitated by digitally networked technology, we have commons-based peer production. Despite all the obvious negative effects of monopoly-owned social media, the capacity to self-organize at scale, for billions of people, has created the possibility of new forms of value creation and value distribution, which is operating at both the margins and centre of society[9]. Peer to peer thus means the ability to connect at scale through digital systems, while commons refer to the capacity to create and/or manage shared resources in autonomous fashion.

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[7]Vasilis Kostakis, "How to Reap the Benefits of the "Digital Revolution"? Modularity and the Commons."

Halduskultuur: The Estonian Journal of Administrative Culture and Digital Governance, 2019 20(1), 4-19

[8]Benkler, Yochai, The Wealth of Networks: How Social Production Transforms Markets and Freedom. New Haven, UK: Yale University Press, 2006.

[9]M. Bauwens, Interview, Commons & P2P Observatory / Institute of Alternative Policies, March 2021.

In the first phase, this meant the capacity to co-produce free software, open designs and shared knowledge. These elements are now at the core of the current production system. They have fuelled to a great extent the dominant platforms, which could not exist without them. In the same time, however, commons-base peer production also functions as an exponentially growing civic practice and fuels many alternative economic projects. The growth of open source code still proceeds at an exponential rate.

The second phase came after the systemic crisis of 2008, when millions of urban commoners started creating urban commons and mutualizing provisioning systems. Since then we witnessed a tenfold growth of urban commons, most of them redistributive in nature. They mainly redistribute goods and services through commons-centric ecosystems (community land trusts, shared cooperative mobility etc). However, there are also projects producing goods and services as in the renewable energy sector or organic food. Today there are productive ecosystems, where production takes place by using commons-based mechanisms. Since a couple of years, we have therefore moved in the third phase, marked by the existence of productive common and open collaborative systems that produce material goods.

In the entrepreneurial level there are several examples of commons-based peer production in different parts of the world[10]. Some of them can be categorised as 'generative towards their commons market entities' and can work with commons. The tools they use are of particular interest.

- **Enspiral**[11], in New Zealand is a coalition of a few dozen social entrepreneurs that created a joint cooperative. Their collective governance system is very strong, with annual team building exercises in the crown common lands, a social charter that is revised through an intense process every three years or so. They have innovative tools such as co-budget, which allows any member to pool a percentage of their income into a common pot. Then they can vote on any request for funding and investment by any of their existing members practising an innovative method of network investment. They also crafted Loomio, an advanced collective elaboration and decision-making tool, which is open source. They attracted investment but used a special vehicle in order to fully retain autonomy over their project.
- **Ethos**[12] in the UK is a large consultancy which recognized that many people contributed to their collective value, but only certain members can realize that value on the market. So they created two types of shares. The market shares are given to those working for clients, but they are split every so many years to be given to those that contribute to their networked value.

[10] https://www.fairshares.org.uk/

[11] https://www.enspiral.com/

[12] http://www.ethosconsulting.co.uk

- **Sensorica**[13] is a network for open hardware sensor production that is using the most advanced example of open value accounting. This means that collaborators input their contributions for peer review and that all incoming payments are then redistributed according to the accumulated 'merit' of each member. Their collective equipment is put in a collective infrastructure, a non-dominium trust and members only pay a very small premium over the true cost of the acquisition.

- **Fora do Eixo**[14] is a Brazilian network of musicians, their workers and sympathizers, which consists of 300 communities and 15 communes. The movement/enterprise/network funds studio's which musicians can use for free, but the usage is a debt to be repaid when they do their concerts. It has a bank, a school/university, a media network and a degrowth cooperative, as well as 4 mutual credit currencies etc.

- **Coopcycle**[15] is a cooperative of delivery bikers that aims to replace the monopoly of private platforms such as UberEats and Deliveroo, which are based on exploitation of the workforce. They use the innovative copyfair license that moves in the space between copyleft, where everything is open to everybody and copyright, which is exclusive private property. In the copyfair principle, the knowledge can be shared, but commercialization rights are dependent on reciprocity. It has also been endorsed and used by Coop des Communs, an alliance of commoners, cooperators and solidarity economy actors

- **The Fairshares**[16] approach in the UK is a model of innovative governance, property and reward distribution schemes. Funders and founders have limited shares that are subjects to demurrage (gradual diminishment over time), while workers, users and other stakeholders are also included.

However, in each of these cases scaling is very difficult in the absence of any public infrastructure of support, nor massive investments for these kinds of initiatives. Any scaling happens virally, through cooperation, self-organization and autonomous bootstrapping. The ecosystems of peer production are very weak and the traditional ecosystems of cooperatives and solidarity economy are not always open for these types of knowledge sharing practices and free association in open networks.

[13] www.sensorica.co/

[14] www.blog.p2pfoundation.net/understanding-the-background-to-fora-do-eixo-the-solidarity-economy-cultural-network-in-brazil/2013/01/03

[15] www.coopcycle.org/en

[16] www.fairshares.org.uk

3. THE OPPORTUNITY FOR A PREVAILING ROLE OF COMMONS ECONOMY DUE TO THE CHANGE OF THE PRODUCTION MODEL

3.1 VALUE CREATION: FROM EXCHANGE VALUE TO CONTRIBUTORY VALUE

Capitalism got born into feudalism[17]. It was a long term process of production model change that took more than hundred years. Technological and social evolution changed also the process of value accumulation. The commons narrative comes today to stress that something similar is happening the last decades into the framework of capitalist economy. Technological and economic evolutions occurring, have as a result a new system of value production mainly related to knowledge and information[18]. During recent years we arrived for first time in human history at the point that sectors of economy that deal with immaterial goods -mainly technology, big data, information, science, culture even emotions etc- became more productive for the economy, compared those dealing with material goods[19]. Top five companies up to the mid of '00 were from oil, pharmaceutical and bank sectors. A thing that was in accordance with classical capitalism. Today, the five biggest companies are Apple, Google, Amazon, Microsoft and Facebook.

Due to the 4th Industrial Revolution and extended digitalisation, changes of extreme importance are occurring to the production model and consequently to the value production process and are described by the term 'value shift'[20]. This shift is characterized by an increased capacity to create common value through commons-based peer production and other practices of collaborative economy. The process is described as a move from extractive models and practices that enrich

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17 E.J. Hobsbawm, Introduction to Karl Marx, Pre-Capitalist Economic Formations, New York: International Publishers, 1964), 20-27. G.A. Cohen, History, Labour, and Freedom, Oxford: Oxford University Press, 1988, 3.

18 Y. Benkler, The Wealth of Networks: How Social Production Tranforms Markets and Freedom, Yale University Press, 2007.

19 N. Smyrnaios, Internet Oligopoly: The corporate takeover of our digital world, Emerald Publishing, 2018.

20 In the respective discussion in economic theory there is not one answer about what value is, nor from where it is derived in contemporary capitalism. Where individuals and societies are willing to put their attention and energy varies among cultures, regions, ideological and social groups within a society and throughout historical times. In labour value theory what determines value is to be found in the objective sphere (reflecting an amount of labor, energy, capital, resources etc.). Whereas mainstream neoclasisical economics (marginalist school, Austrian economics etc) are questioning whether it is located in the subjective sphere as a simple correlation of individual desires or as a conscious collective decision and social contract.

In commons, open and contributory systems, many contributors co-create value as a commons which can be used by all those that are connected to networks. The problem is that the income is generated by a fraction of the contributors connected to the marketplace. The capitalist value regime rewards ‘extractive’ production and consumption activities. Issues like the free labour of digital workers and social media users, the non-recognition of care work, and the ongoing ecological degradation of planet's resources are interlinked to the dominance of a system based on extractivism. Ibid p.3.

some at the expense of the others, to generative value models and practices that enrich the communities and the resources.

For knowledge commons, as for the big privet platforms, the network effect is decisive. The more people involved ends up to more value creation and social worth. Language is a good example, since it becomes richer and more important in relevance to the number of people using it. The use by one person doesn't exclude another, on the contrary, it is presupposed. The more people use digital commons as Wikipedia or Linux, the most important they become. And the value they produce is responding to the number of people that are using them at one time[21].

From a commons economy perspective a certain transition is occurring. From 'exchange value', we are segued to 'use value'. With capitalism, we moved from the earlier systems that were based on production for use value mainly, to a system that focuses on producing for exchange value and profit. Peer production is possible to scale due to the extensive digitalisation and is bringing us back to a use value logic, at least to a substantial extent. Every great societal transition has been a change in the value regime. Today there is a move from an exchange-based value system to a contribution-based value system, and contributions are nearly synonymous with use value. We have open collaborative systems, as Linux and Wikipedia, which are based on open contributions and free association of productive individuals that follow their own motivations in order to produce something that is of interest to them. In that type of production systems payment is not guaranteed, so it is indeed production for use value.

However, the shift goes deeper. Commons-centric economic systems are based on the shared value that is created through their commons. This is a value system that is no longer based on the exchange value of commodities - including labour as a commodity - but on contributions, hence they are contributory value systems. Commodity-based value systems are problematic since they systematically exclude the so-called externalities, as positive and negative social and environmental externalities. According to commons theory that is the reason that the current production system is destroying our physical planet. It does not recognize vital contributions by non-human systems, neither takes care of its waste products and their negative effects on the web of life. It conceives nature as a sink or inexhaustible tap of unrewarded value. A contributory system on the other hand, can take into account all contributions, positive and negative, of human or extra-human nature.

The first step towards a contributory and use value production system is the creation of commons-centric productive communities, which have a protective 'membrane' around them. So the exterior sources of income, at least in part, can be redistributed into the community through contributive logics. These commons-based communities can attract generative 'entredonneurial[22]' coalitions of

[21] On the concept of value creation in commons economy: M. Bauwens & V. Niaros, Value in the Commons Economy: Developments in Open and Contributory Value Accounting, Heinrich Boll Foundation & P2P Foundation, 2017. www.boell.de/sites/default/files/value_in_the_commons_economy.pdf?dimension1=division_ip

[22] Concept meaning 'giving to the in between', proposed to balance the concept of Entrepreneur which means 'taking from in between' and has therefore a predatory significance. More: www.wiki.p2pfoundation.net/Entredonneur

livelihood organizations, which reinforce the communities and the common resources. The trick is to use external income in order, not to create more capital, but to transform it into commons-value. It's the practice of 'transvestment[23]' (instead of 'investment', which is using money to create more money) that is transforming income to common value and can result to the contributors of the common resource. Through the process of use value, human needs economy and the aims of sustainable development are better served.

A contributory and use value production system can perform under an, at least, dual monetary system. One part of that system is the extractive money system, since human beings cannot survive without some extraction from nature, but it can be accompanied by many monetary systems based on contributions. Crypto technologies today allow us to design all kinds of intelligent tokens, that can manage the flows of contributions and relate them to the flows of extractive value. Before capitalism all societies had such dual monetary systems[24], some of them are still in use. For example at Bali there is a system that rewards contributions to the management of the watershed. However, today it is also possible to create current-sees for 'virtual' productive communities (all those that are not just territorial but also trans-local).

3.2 ENCLOSURES AND KNOWLEDGE COMMONS IN THE 4th INDUSTRIAL REVOLUTION

This new production system in creation through 4th industrial revolution, is possible to acquire two different forms. The extractive one, that will constantly renew itself on the base of new enclosures and making profit on the expense of collective intelligence, without giving back to society. And the contributory one. Today, an intense knowledge economy model that can be sustainable is possible. Able to distribute the gains to society and much more effective concerning value creation. Of course, certain changes to the institutional framework related, are presupposed.

Some of the key features of intense knowledge economy and its relation to the new model of value production are open source, open data, open design, open culture movements. There is to be found a new vision that will be decisive for the rebirth of commons discussion during last years. It is related to digital commons of design, of knowledge, of software, of culture. Except of Wikipedia and Linux there are myriads free/open source projects -from 3D printing to open food data policies[25]- highlighting the emergence of technological capabilities that reshape economic

[23] Concept meaning 'the transfer of value from one system of production to another'. More: www.wiki.p2pfoundation.net/transvestment

[24] Bernard Lietaer, Mysteries of Money: Beyond Greed and Scarcity, 2000.

[25] www.milanurbanfoodpolicypact.org/ , www.food.opendata.ch/

and consequently social environment, as the functional principle 'design global – manufacture local'[26].

For knowledge and information it is presupposed to be open and circulate freely in order to have the most brains possible involved. That is the way to maximize value production. On the contrary capitalism by its nature, needs constantly new enclosures, monopolies, patents, property rights, exclusive licenses etc, in order to maintain itself. Knowledge and information enclosures reduce the amount of value that can be produced and are bad for the economy. Commons and P2P economy have openness and free access as fundamental presuppositions. P2P modes of production are best adjusted to the type of economy evolving under the 4th Industrial Revolution, they maximize the benefits of networks among peers, of modularity and enable openness and circulation at their maximum. At the current economic phase extreme enclosures and privatization of every resource are a prejudicial practice in terms of value production, which means bad for the markets.

However 'openness', P2P and commons cannot protect themselves alone from corporate greed, monopolies and extreme deregulation. Bottom up innovation is vitally linked to new institutions and new rights. In human history, communities had to defend again and again their rights on land, natural resources, crafts, language, culture etc. Today, we need an equivalent for science and information, a new principle against new enclosures. In the lack of the appropriate legal framework and institutional stewardship, the more open and accessible data are, the more it works in favour of the big players in the market. And here comes the importance of regulation.

3.3 THE IMPORTANCE OF STATE AND EU POLICIES INTO THE FRAMEWORK OF 4th INDUSTRIAL REVOLUTION

The importance of the state as a regulator regarding productive transformation towards commons, is at the core of the whole process[27]. The commons transition plan is mainly referring to the Partner State model and the construction of the respective Legal and Institutional Framework[28]. Due to the technological changes of last decades we have arrived to a production model that is delivering maximum of profit through research and innovation, mainly in industries such as

[26] Vasilis Kostakis,Vasilis Niaros, George Dafermos, Michel Bauwens, Design global, manufacture local: Exploring the contours of an emerging productive model, Futures vol. 73, October 2015, p. 126-135. Several examples can be found at: Sustainable models for shared culture: Case studies and policy issues by CONSERVAS/Xnet, Barchelona Stichting Kennisland, Amsderdam World-Information Institute, Vienna National Hellenic Research Foundation/ National Documentation Centre (NHRF/EKT) Athens.

[27] Th. Kotsaka, 'Commons transition and the role of the state: A new question for the Left', στο W. Baier, E. Canepa & H. Golemis (eds) (2019), Radical Left in Europe, Transform Yearbook, London, The Merlin Press.

www.transform-network.net/el/publications/periodiko/overview/article/yearbook-2019/commons-transition-and-the-role-of-the-state-a-new-question-for-the-left/

[28] On Partner State: www.wiki.p2pfoundation.net/Partner_State

software, biotechnology - pharma industry, nanotech or artificial intelligence. Against the myth, none of these technological revolutions would have occurred without the leading role of the state. In many cases, from internet to nanotechnology, it has in fact been the state, not the private sector, that has had the vision for strategic change daring to think the creation of a new technological opportunity, making the large necessary investments and enabling a decentralised network of actors to do the risky research and to allow the development and commercialisation process to occur in a dynamic way[29].

What is new is that in intense knowledge economy when production and management of knowledge, research, information etc. are controlled by private actors we arrive to a typical market failure due to the enclosures effect. Private sector makes decisions on investments having a short term horizon, driven from short-term profit expectations. It is indicative that during the 80's, the distinction between basic research (discovery) and applied research (invention) stopped being applied - also an effect of the excessive deregulation started that decade. That meant that algorithms, human genome, plants seeds, GMO's etc. became subjects of patentability. The road was open for the market to privatise not only knowledge but also living entities (biopiracy). The social outcome of research and innovation, depends on the intellectual property rights system and the legal framework of research. Developments -especially in areas as biotechnology, big data or AI- can lead to an emancipatory path for society or to a collective nightmare. Knowledge production and research planning are too crucial for our societies and cannot be left to private interest alone.

State must intervene mainly by financing and organizing fundamental research. It is a presupposition that research results should be free, open and treated as a common good. The case of the pandemic and the need for treating not only the Covid19 vaccine, but all the medical technology involved as a common good, proved to a great extent that necessity. Following that argument we arrive to a certain division of labour between private and public. Private sector should be linked to applied research in large laboratories of large managerial enterprises, whereas

[29] There are certainly, plenty of examples of private sector entrepreneurial activity. From the role of young new companies in providing the dynamism behind new sectors (eg Google), to the important source of funding from private sources like venture capital. But this is the only story that is usually told. Silicon Valley and the emergence of the biotech industry are usually attributed to the geniuses behind the small high tech firms like Facebook or the plethora of small biotech companies in Boston or Cambridge in the UK. However, the algorithm that led to Google's success was funded by a public sector National Science Foundation grant. Internet itself was a public funded project. ARPANET (Advanced Research Projects Agency Network) was the forerunner of internet and an arm of the US Defence Department. Molecular antibodies, which provided the foundation for biotechnology before venture capital moved into the sector, were discovered in public Medical Research Council (MRC) labs in the UK. Many of the most innovative young companies in the USA were funded not by private venture capital but by public venture capital such as through the Small Business Innovation Research (SBIR) program.

For an extensive research on that issue accompanied by specific policy proposals: M. Mazzucato, The entrepreneurial state, Demos 2011. www.demos.co.uk/files/Entrepreneurial_State_-_web.pdf

public sector should take care about fundamental research and secure that the basic knowledge of humanity is treated as a common good[30].

During last decade the current system is undergoing a whole series of crises. This means that it is likely that the necessary solutions should be different, exhibiting a different logic. The logic of the merchants when feudalism entered its crisis mode, was not itself feudal. The logic of the commons is not a capitalist logic, since it is no longer about commodities, but about contributions. The institutional and regulatory logic accompanying them is also different. The agents and stakeholders become codependent on their shared commons. At the core there is the contributive community and its stigmergic31 collaboration based on mutual signalling in open systems[32]. Agents and stakeholders need to make a living, so they create market activities. However, these market activities should be generative to the human and extra-human commons instead of destroying them.

It is important to manage common infrastructure through commons institutions, such as FLOSS Foundations which are democratic or multi-stakeholder governed. This is an image of a potential societal form which has common institutions at its core, the only kind of human institutions that has been historically capable of maintaining resources over a long term. Ethical economies that are embedded in the societal logic of those commons can be reinforced by a 'partner state'. Partner state is defined as a core of common good institutions that are responsible for the maintenance of res publica and res comunes as a whole. It manages the facilitating mechanisms that allow commons to thrive and generate their capabilities to the whole society. Specific institutions that have the power to protect the commons, including the web of life, are of essential importance. Which is more, they could introduce self-organization and democracy in the sphere of production. Mutualization of knowledge in material production massively reduces the human footprint. The idea is to maintain the complex social services of modernity, but with a dramatically lower footprint. In order to implement commons oriented policies there are certain tools that can be operated by a partner state drawn from emerging practices: licenses protecting commons like

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30 As data shows there is a strong argument on the extreme importance of EU's policies on that area since Europe generates more scientific output than any other region in the world. Europe is the leading economy in terms of public investment in science, research and innovation and even though its population is only 7% of the world population, 20% of global R&D and 1/3 of all high-quality scientific publications comes from Europe.

www.ec.europa.eu/info/research-and-innovation/strategy/support-policy-making/support-national-research-and-innovation-policy-making/srip-report_en#sripreport2018overviewandfindings

31 Stigmergy is a mechanism of indirect coordination, through the environment, between agents or actions. Is a form of self-oranisation. It produces complex, seemingly intelligent structures, without need for any planning, control, or even direct communication between the agents. More at www.en.wikipedia.org/wiki/Stigmergy

32 M. Bauwens, 2021, Interview, op.cit.

GPL[33] or Creative Commons[34], cooperative banks[35], P2P Accounting[36], Public Commons Partnerships (PCP)[37] instead of the overused Public – Private Partnerships (PPP) that has been applied even for public goods like water or health, causing indefensible damage to societies, etc.

An example of commons oriented applied policy in the research and education sector is Open Educational Resources (OER)[38]. Researchers, teachers, professors, institutions share their knowledge and educational material by putting them under Creative Commons license and being available in an open and functional Public Reserve free for people to reuse, revise, remix and redistribute. A general Partner State approach and strategy and appropriate legal forms of common ownership and stewardship are new emancipatory tools that EU can have in its tool-kit. It is a case for a targeted, proactive, entrepreneurial state, able to take risks, creating a highly networked system of actors harnessing the best of the private sector for the national good over a medium- to long-term horizon.

That kind of policies is possible to reduce the harm of the monopoly derived from intellectual property and patent systems. Commons and P2P policies can serve as a tool for EU and member states in order to challenge digital monopolies. Information economy erodes markets ability to balance prices since markets are based on insufficiencies whereas information are abundant. The defence mechanism of capitalism is to create monopolies -the giant high tech multinationals- at a scale that has never happened the last 200 years. Which is more, there is the idea of the positive externalities of globalization that brings system balance as a counterpart of negatives, an idea similar to the 'invisible hand' that balances market. Open knowledge circulation is considered one of the most important amongst those. However, when patents and intellectual rights are used in an extreme and greedy way in order to capture knowledge for short-term private profit alone, then we arrive to a value production reduce and the system is forced to unbalance.

New forms of ownership, new forms of lending, new types of legal contracts: a new entrepreneurial subculture has been created, but we are still at the point of trying to describe it by

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[33] www.gnu.org/licenses/gpl-3.0.html

[34] www.cambridge.org/core/services/open-access-policies/open-access-resources/creative-commons-licenses

[35] For example: Several examples at https://www.tni.org/files/publication-downloads/highres_public_finance_for_the_future_we_want_book_online_version_0307.pdf

[36] https://commonstransition.org/p2p-accounting-for-planetary-survival

[37] An applied example of Public Commons Partnership (PCP) can be found at the port of Capri: http://labgov.city/thecommonspost/the-port-of-capri-public-private-commons-partnership . More on Public Commons Partnerships: www.wiki.p2pfoundation.net/Public-Commons_Partnership

[38] In the following map it is possible to find the OER's in different countries www.oerworldmap.org/resource/.

What is an OER? www.wiki.creativecommons.org/wiki/What_is_OER%3F. In 2017 a new legislation from the Greek Ministry of Education aimed not only to facilitate OER's, but also to give motivations to researchers, teachers and professors to contribute to it. According to the legislation projects in the fields of education, research, culture and technology should have as a deliverable also OER's. Greek Official Gazette, 'Organisation and function of university education, regulations for research and other provisions', FEK A' 114/04.08.2017 (in Greek).

terms such as 'commons' or 'P2P production'. The important question is 'in what ways is capitalism going to be affected by these evolutions'[39]. In a system that needs constantly to grow in order to maintain itself, removal of economy sectors from a mere expansionary logic represents an ominous perspective. Wikipedia for example, deprived 3 billion out of advertising industry. It can be an alternative, but only if those small scale structures are going to be nourished, fostered and protected as part of a political plan and official applied policies. At least in their first steps. And that presuppose a radical change in our mind set about technology, ownership and labour.

Aspects of partner state approach can be found in some innovative urban practices such as the 'Bologna Regulation[40] for care and regeneration of the Urban Commons' or several policies of Barcelona en Comu citizen platform[41]. The Bolognia Regulation is based on a change in the Italian Constitution allowing engaged citizens to claim urban resources as commons and to declare an interest in their care and management. After an evaluation procedure, an 'accord' is signed with the municipality specifying how the city will support the initiative with an appropriate mix of resources and specifying a joint 'public-commons' management. In Bolognia itself dozens of projects have been carried out and more than 140 other Italian cities have followed. The key is a logic reversal: the citizenry initiates and proposes, the city enables and supports.

The current economic system is constructed over a formalised institutional structure (IMF, World Bank, WTO etc) and a legal framework that supports it. New institutions that will support the commons and P2P paradigms in order to escalate and be protected from capitalist enclosures are necessary. The creation of local institutions that will protect commons oriented enterprises and make possible for the people working on them to have a decent living can be crucial. For instance, institutions like a Chamber of Commons that will manage open licenses -like PPL or Copy Sol- and support P2P and cooperative economy. It will protect and reinforce openness and commons in the same way that capitalist institutions support enclosures and private. It will provide the institutional chance for those that are involved in social economy, for public administrators, policy implementers and entrepreneurs to exchange ideas and propose reinforcing policies. Assemblies of Commons bringing together, in local, national and EU level, citizens and commoners that maintain common goods can also be very useful, as can be a Commons oriented Entrepreneurial Association. An EU association that will connect the existing commons-oriented enterprises, in order to share expertise and raise a common voice[42].

In European Parliament there were groups like the Commons and Public Services Intergroup and Progressive Caucus have included commons in their agenda. A Commons Discussion Agenda can be formulated and it will be necessary for future coordination. It seems that commons could be

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[39] P. Mason, PostCapitalism: A guide to our future, Farrar Straus and Giroux, New York, 2015.

[40] www.labgov.it/wp-content/uploads/sites/9/Bologna-Regulation-on-collaboration-between-citizens-and-the-city-for-the-cure-and-regeneration-of-urban-commons1.pdf

[41] www.barcelonaencomu.cat/sites/default/files/win-the-city-guide.pdf

[42] The institutions referred are described at: Transnational Institute (TBI) & P2P Foundation, Commons transition and P2P: A primer, March 2017, p. 42-43.

classified in the agenda of issues that are fertile in terms of political synergies among different political groups. Political parties are the eligible agent to fight at the parliaments -the assigned legislative authority national and European- for the necessary legislation adjustments in constitutional level and in private law, like legal forms of commons ownership. All the above mentioned are interrelated to administrative participatory mechanisms that also can –and should be- institutionally enforced, like participatory legislation or participatory budgeting[43].

[43]For a policy recommendation on the economic and political framework that could be useful in that effort: M. Bowens & V. Niaros, Value in the Commons Economy: Developments in Open and Contributory Value Accounting, Heinrich Boll Foundation & P2P Foundation, 2017, ch.3. www.boell.de/sites/default/files/value_in_the_commons_economy.pdf?dimension1=division_ip

4. AFTER COVID-19: COMMONS AND P2P AGAINST PANDEMIC

Under the situation created due to Covid-19 and the respective pressure for health systems, it became obvious that the current model of research & development, pricing and supply of medicine cannot respond to needs. For most countries that have been substantially weakening their public infrastructures during the last few decades, Covid-19 has been especially devastating. The pandemic showed to what extent our public services has been left exposed to a possibility of health crisis. The business plan applied to the provision of public health services has undermined the capacity of confronting cases of emergency. Systematic state, EU and market failures contributed to a further loss of legitimacy. Which is more, it has also been visible - one time to many- the prioritization of 'too big to fail' entities above the welfare of EU citizens.

Pandemic crisis created an upsurge in mutual aid, a full-scale mobilization of makers and peer production movements which were featured on TV and newspapers for first time in that scale. They became a visible part of society. In global level, an intense activity took place concerning commons practices such as open research and science, utilisation of software and hardware under open licence, data sharing etc. In the beginning of the pandemic the first tools from commons and P2P tool kit that proven useful were 3D printing, open data, open licences and free software. The Covid-19 crisis itself has shown remarkable mutual aid initiatives but also the capacity of the maker movement to produce solutions where the state and market failed. It has, also, shown the lack of public-commons cooperation protocols when they were urgently needed.

The pandemic effects will be especially devastating for the small business sector and the local economies. Commons and P2P communities propose cosmo-localism as a necessary response to the crisis. A relocalisation that will achieve a subsidiarity of material production and local resilience. At the same time, in order to avoid that such relocalization will become regressive isolation and potentially, a struggle of all against all, they stress the importance of translocal and transnational cooperation and the creation of the necessary institutions that can maintain such cooperation. It is very possible that the economic impact of the pandemic on member states and the EU, will stimulate self-organization and mutualization as alternatives to funding of large social reforms. It is important to focus on local territories and cities and on how they will strengthen local territorial development.

Which is more, the type of commons communities organisation and networking follows principles such as P2P, horizontal networks, openness, autonomy, modularity, flexibility etc, that allow speed and effectiveness in coordination. For example, open research in pharma production ensures viability due to data, time and resource sharing and the substantial contribution of patients. During the first months of the pandemic the shortage in several medical equipments became a big problem. Several initiatives were created, showing excellent reflexes, as part of an international coordination network of groups and individuals that advance openness and makers culture[44].

[44] https://menoumemazi.org/3d-printing/

They started by mapping the current infrastructures and created a common pool of data and methods of making medical equipments and covering relevant needs. Their aim were to get organised through horizontal processes in order to contribute with no cost or gain. Their motive was solidarity and the promotion of open data and design through a shared framework. There were mainly makers and researchers that were involved to participatory technological design and 3D printing. They wanted to create a horizontal network of coordination for research labs, medical structures, doctors, makers and individuals that have at their disposal the necessary tools and knowledge for facing the shortage of medical equipments, under the guidance of people working in hospitals. The aim of these type of initiatives is to cover the gap left by state and market.

There were many examples of that kind in EU. Probably the most known was a case in the north of Italy – a periphery that during the first phase of the pandemic (spring of 2020) suffered disproportionally a lot, compared to other EU peripheries. During the peak of Covid-19 attack the respirators valves were in shortage. People were dying just because there were not enough valves available. The Italian state had asked the constructing company to provide more and the answer was that is was not possible for them to cover the needs created. Volunteers from a maker space offered to construct valves using their 3D printers. 3D printers are open hardware, free of patents, and the volunteers were able to create their own open designs. They just asked for permission from the company (to open the patent due to emergency) in order to proceed to valves printing, for free. As product of P2P production and in the absence of patent rights the valves cost could be reduced to 1$. The company denied claiming their patent rights on valves design, but the makers proceed even thought.

Treating this case as a case study, the company had the right to refuse. But again, the protection of patent rights and any kind of copyright cannot be over the public interest especially in occasions of pandemic crisis or national security risk. It is important that international trade agreements include provisions that in that cases give the right to states to offer the opportunity to local pharmaceutical industries to produce genosomes, bypassing the big pharma patents. However, in order to apply that provision the state or the EU should activate its right and ask from the company to negotiate the patent. There are cases such as the Nacto company in India that got the permission from the Indian Government in 2012 to produce anticancer pharmaceutics, since Bayer was not offering it to a logical price. There is legislation also in state level like the 4605/2019[45] in Greece that foresees compulsory licensing, not only in cases of public health crisis, but also when there are harshly practices from pharmaceuticals part, like excessive pricing.

During the pandemic a discussion concerning vaccine for Covid-19 as a common good started at global level. It is the first time that the issue of open science and open research, of public finance public good, climbed at the top of the political agenda. Vaccine information is a public good and countries should be able to produce it at local levels. The results on the absence of such policies are a reason for the delayed vaccinations for EU compared to countries such USA, Canada, UK, Israel etc., not to mention poor countries and the mutations risk that threats humanity due to the delays.

[45] It was legislated in April 2019 as an initiative of the Ministry of Finance and Development after coordination with the administration of the Hellenic Industrial Property Organisation.

THE IMPORTANCE OF OPEN SCIENCE AND OPEN RESEARCH IN CRISES PERIODS

The importance of open science is billowing under pandemic as an emergency and this time is not traced to communities of commons or open design. The research model that is connected to trade patenting has depleted its dynamic and is certainly not able to respond to state of emergence as the one that EU is currently facing. Especially on pharma business, companies prefer to direct research resources to the discovery of effective drugs that act in similar way to those that already exist, than to spend in order to eliminate diseases, since in the second case their profit is not guaranteed. Medicines that are used once and not demand periodical use, offer very low profit opportunities compared to the huge profit percentages that pharma business is used to.

Which is more current pharma research is quite reliant on public money, yet they are then able to privatize the gains. A practice that was also repeated for the Covid-19 vaccine with EU money and no provisions protecting public interest. Much more problematic is that Pharma business receives the money of tax payers and then they are able to privatize the gains and engage in predatory pricing or prioritize the rich clients first.

Public financing of research with provisions preserving public interest and cooperation between researchers on directions of highly social importance, are today necessary. The dysfunctions of the current pharma business model and the inability of the patent model to provide answers to the pandemic crises, puts under dispute the organising model of pharmaceutical innovation.

The gains of open research and open science appear today more necessary than ever. Vaccine information should be treated as a public good, and then countries should be able to produce it at local levels. Open science gives the opportunity of scientific information sharing almost in real time through internet with no cost for the user and the provision of open access to research publications and scientific data. That model makes science more effective through a more functional sharing of scientific resources, it ensures highest reliability and responds to the social needs.

According to the European Commission's, European Open Science Cloud in the case of SARS pandemic, only the basic means of scientific information existed and 20 months were needed in order to arrive to the first vaccine test to humans[46]. In the Covid-19 case we faced an unprecedented augmentation to the instant sharing of scientific data on behalf of scientists[47]. It is indicative that there were scientific magazine's editors that for first time, provided free access to

[46] https://www.eoscsecretariat.eu/news-opinion/open-science-covid-19-vaccine.

[47] Open research and open data initiatives for Covid19:

https://coronavirustechhandbook.com/,

https://app.jogl.io/project/118fbclid=IwAR2C0NG8lCrc8es7B1QW2mwGYcwKUucGeynbRdm2DSYr1LDSaKL3wiKmxKU,

https://pages.semanticscholar.org/coronavirus-research,

articles and studies concerning the pandemic[48]. It is that reflex that needs to be reinforced institutionally, since there are to be found new answers and abilities to face the current crises and the future ones. The 4th Industrial Revolution provides new technological capabilities that can be better optimised through the open access model in science and research, through treating knowledge as a common.

In an effort to reinforce directly the disposable scientific information concerning Covid-19 internet activists, hackers or 'internet pirates' for some, took the law in their hands and leaked more than 5.000 absolutely related scientific articles, that were available before only on contribution[49]. During the same period platforms, like Sci-Hub, were offering research articles concerning Covid-19, bypassing copyright regulations. Their aim were to gather a complete open access research catalogue on Covid-19, available to scientists, journalists and epidemiologists all over the world, in order to get info that will be useful in their effort to save lives[50]. That initiative was part of an important movement supporting open source and internet activists that risked to face legal actions on behalf of some of the biggest academic publishers.

During the first months of the pandemic several calls were around the planet, making use of last decades well established commons networks[51]. Massive calls were addressed to EU institutions in order to take legislative initiatives that would support open science and open data[52]. Indicative was the Free Software Foundation's (FSF) initiative[53]. Also before the pandemic free software activists, scientists and professionals from the health sector, had claimed that private medical software and hardware is an immoral regime, unable to respond to social needs[54]. During last year it became obvious that the arguments above, reached a much wider audience that would have reached under normal occasions.

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48 The academic journals *Wiley*, *Springer Nature* and *Elsevier* are amongst those that temporary suspend reader fees and cosigned a common statement-appeal in order to reinforce the free sharing of research findings and data concerning Covid-19.

49 https://www.reddit.com/r/Open_Science/

50 https://newseu.cgtn.com/news/2020-02-17/Pirates-and-publishers-both-battle-COVID-19-O5lxgDGZCU/share_amp.html?__twitter_impression=true

51 The Free Software Foundation call and the respective operational framework here. Video-call from the Fab Lab Network with a demo of their work here.

52 For example: http://www.ghadvocates.eu/en/the-fight-against-covid-19-public-investments-shall-count-for-people/, https://www.pressenza.com/el/2020/03/evropaiki-simmaxia-gia-ta-prosita-farmaka-apaitetai-gia-covid19-isxiri-apantisi-apo-sistimata-dimosias-ygeias/ (in Greek), https://www.ghadvocates.eu/the-fight-against-covid-19-public-investments-shall-count-for-people/.

53 President and founder of FSF is Richard Stallman, activist of digital liberties and creator of the GNU software which is operational related to Linux. Linux is broadly used as an alternative to Microsoft's monopoly. He is also the creator of the open licence, General Public License (GPL).

54 https://media.libreplanet.org/u/libreplanet/m/freedom-devices-and-health/

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FORCE

force@enainstitute.org
www.enaforce.eu

ENA Institute for Alternative Policies
8 Zalokosta Str.,106 71,Athens, Greece
+30 210 364 7912
info@enainstitute.org
www.enainstitute.org