Managing the commons in the knowledge economy

Decentralised Citizens ENgagement Technologies

Specific Targeted Research Project Collective Awareness Platforms

d-cent

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Managing the commons in the knowledge economy

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Contents

1. Executive summary

This report presents an in-depth analysis of the concept of common goods and of possible political and management variation in the context of a knowledge-based economy. The research presents an initial critical review of the literature together with a concrete analysis of the development of the commons and common goods.

The report will be organised in three sections. In the first, entitled "From the theory of public goods to the new political economy of the commons" we will see how, for Ostrom's new theory of the commons, what remains as a central element defining common goods is the particular nature of certain goods, in continuity with the ahistorical and static approach to classification of goods (private, public, common, belonging to a club) driven by neo-classical inspired economic theory.

In the second section we will develop the approach of Common in the singular drawn up with the contribution of numerous studies in the theoretical framework of cognitive capitalism.

The third will deal with the historic and empirical analysis of the origin, sense and principal stakes at play in the dynamics of the common, starting from the key role of the transformations of labour at the foundation of a knowledge-based economy.

Throughout this journey, in the three sections different crucial aspects relating to the forms of regulation open to guarantee the sustainability of the commons and promote its development as a new central form of economic and social organisation will be faced systematically.

This research offers an exhaustive theoretical framework, tackling all the conceptual and historical issues on the evolution of the theory of common goods. At the same time however, it offers practical and regulative examples of models of self-governance of commons, in the context of the knowledge-based economy. This analysis offers the D-CENT project possible models of democratic management of resources and common infrastructures that are at the base of the experience of shared democracy in Spain, Iceland and Finland, with the aim of achieving middle and long-term sustainability. Specifically speaking, the analysis submitted here reports: (1) research into the market of identity and the opposing claim of social data as digital common goods and the need for public and common infrastructures of information and communication not based on the logic of the market and surveillance (D3.3); (2) models to implement a commons currency of the common that can support the activities of social movements and productive communities (D3.5); (3) the final report (D1.3) on models of sustainability and the general impact of this project.

Many of the examples proposed here, from the re-municipalisation of water, the self-management of cultural spaces to the free software and makers' movement, illustrate collective practices that establish new spaces, institutions or norms of participative and democratic sharing. These examples represent practices of re-appropriation and management of the common, new practices of labour, creation and production based on collaboration and sharing.

Moreover, from the concrete experiences analysed here, the idea emerges that the concept of common goods can constitute a concrete alternative, and that includes on a legal footing (Rodotà, 2011). Therefore the common is the product of a social and institutional structure that demonstrates forms of governing and social co-operation that guarantee its production, reproduction and spread. The new institutions of the common that emerge from these constituent

practices constitute a general principle of self-governance of society and self-organisation of social production, proposing a new division between common, public and private.

Obviously, the success of these new practices is a complex process that must rely on institutions which accord and guarantee reproduction over time and space of the commons and common goods: ways of management based on self-governance and collaborative economics; relationships of exchange based on reciprocity and gratuitousness; legal regimes that, like the invention of copyleft for free software, guarantee the accumulation of a stock of common-pool resources; distribution norms that permit the active involvement of the commoners in the development of the commons, guaranteeing a basic income, for example.

In this context, it becomes more and more essential and urgent to define the terms of an alternative model of regulating a knowledge-based society and economy at the centre of which the logic of the commons would perform an essential role.

1.1. Common and commons between theory and history. Elements for a methodological introduction [1]

Public and private still exist as the two indisputable poles of economic and social organisation and forms of property. Both in debates on economic policy and on systemic alternatives, it seems there is nothing between these two poles, or at least so it appeared until the recent rediscovery of the theme of common and common goods both in economic theory[2] and in political debate. We deliberately stress the term rediscovery. In fact, the forms of property and management based on common property in reality pre-date those founded on the notion of public and private.

To paraphrase Fernand Braudel, we can affirm that the issue of common and common goods is an old story that precedes, crosses and supplants the development of capitalism and modernity.

For historic reasons related to the development of the forces of production and institutions, it first of all took the form of common land linked to the sacredness of nature and the management of the earth and natural resources. [3]

So as far back as Roman public law the notion of res comunes omnium already existed. It related to things such as the sea, the air, the atmosphere or sacred places which belong to everyone for the simple reason that no-one has an interest in them or can establish a relationship of exclusive appropriation over them. On the legal front, the res comunes are on the other hand already differentiated from the res nullius, which are things without an owner but which can be appropriated.

But the story of what is common goes way beyond its juridical recognition in Roman law.

Different economic and social systems that preceded the advent of capitalism have been based on institutions and ways of organising production founded on forms of common ownership of the land or other natural resources.

The so-called primitive communities of hunter-gatherers previously theorised by Levis Henry Morgan (2011), the father of modern anthropology, thus present extremely significant analogies with the land commons which the Nobel Prize winner for economics Elinor Ostrom, theorised between the end of the 20th and the beginning of the 21st centuries.

The same can also be said of the methods of community production (or primitive communists) brought about by the Neolithic revolution (Amin, 1973). The rules of organisation of the societies

are based on principles of enforcement of what is common[4] which present numerous analogies with the principles of property and management of Ostromian commons. In these terms, one could even ask oneself whether the commons described by Ostrom and other authors are no other than the remnants of a historic period when these on the contrary carried out an ergonomic role.

Speaking more generally, even in other economic and social forms in which public and private institutions begin to establish themselves, what is common continued to play a key role, sometimes a dominating role, besides the State and the market.

An example of this is the case of the Chinese Imperial and tax system which was set up from the first Han Dynasty and saw a significant development of market economy already in the 11th Century well before Europe (Aglietta and Bui, 2014). Besides public ownership of the principle means of production and infrastructures, access to land and natural resources remained largely regulated by property rights founded on use established at a community level. The right of abusus remains excluded from this form of common property[5] and will be considered by many historians as one of the main "brakes" to capitalist development in China. Very similar means of access to land and natural resources can also be found in India up to the British colonisation and the subsequent introduction of private property and the systems of production and distribution linked to it (Hobsbawm, 1997).

The same is true, though with their own original rules, for the Mir Communities in Russia which persisted until the beginning of the 20th Century (Weber, 1991). Mir, which means assembly in Russian, was the decision-making body originating in rural Russian communities "obščina", which means precisely common.

In the history itself of the feudal system in Europe, emerging structures of public and private wove in and out with forms of property and governance based on commons, being either a Germanic inheritance, institutions that the Normans exported to Sicily and England, following the invasions in the first two centuries of the year 1000, or as the result of other local developments.

Even more, as shown by economic historians such as Karl Polanyi, Fernand Braudel or Immanuel Wallerstein, the crisis of the feudal system which followed the Black Death and the peasant revolts of the 14th Century is accompanied by a process of emancipation from feudal serfdom. In this scenario, the common lands managed by farming communities acquire great significance in the economic and social organisation of agriculture in England. Co-ownership of land hinges on forms of organised democracy in the villages which regulate access to natural goods (forests, pasture, hunting or fishing grounds) and the rotation of crops reconciling them with the aims of reproduction and inter-generational sustainability of the commons. This historical phase, together with the vitality of cities and the system of artisan self-governance of the corporations, is thus remembered as a period of relative prosperity and represents a sort of golden age of commons.

It is largely a reaction to this process of peasant emancipation based on common land that, as Polanyi and Braudel again remind us, initiates the movement of enclosures[6] and expulsion of the peasants from common lands. This is a fundamental stage in the process which leads to the setting up of the principles of absolute private property making land a fictitious commodity[7], that is to say a good that can be freely bought and sold on the market. This evolution will proceed at the same rate as the success of the figure of modern nation-states. State and market, public and private, progressively relegate the commons to the margins of society and assert themselves as the almost exclusive principles of economic and social order.

This process accelerated decisively with the expansion of the industrial revolution. Certainly, when it first began the labourers' movement seemed to revive forms of solidarity, self-governance and even property founded on common. As André Gorz (2008) reminds us, it is the "heroic age" of the trade unions, labour' cooperatives, and the Mutual Aid movement. Financial resources and means of production and consumption are shared "in the name of the right to life" and on the basis of a concept of the needs and ways of life that still remain largely extraneous to the logic of the market and capitalistic production. But these forms of resistance will not come to develop further, even if some of their ideals continue to strengthen exactly what is called the third sector of the Social and Solidarity Economy (SSE).

With the growth of Fordism and the Keynesian State, the dialectic between public and private becomes so all-inclusive that the organisation of solidarity will itself seem to be ever more taken up by the bureaucratic organisation of the welfare state. During the growth of the so-called Glorious Thirties, the same sense of the concept of common thus seems to sink definitively into the oblivion of history.[8]

Nevertheless, history is not a linear process, but proceeds through hybridisation, fractures and forks. Following the crisis of industrial capitalism and the emergence of an Knowledge Based Economy (KBE) on we simultaneously witness the representation of the functioning of the economy and society founded on the pairings of State-market, public-private being brought up for discussion again.

The problem of common and common goods rises up again in academic literature as it does again in political debate bit by bit lifting up the same veil that was drawn over its historical role. This return to strength is rooted in two main structural transformations of the contemporary economy which, in the theoretical field, are often made to correspond to two different types of commons.

The first transformation is without a doubt linked to the ecological crisis and the awareness of the finiteness of the planet and natural resources. This knowledge drives back into the forefront, though in largely unedited forms, the theme of so-called traditional, land-based or natural commons, relating to the conservation of rare or non-renewable resources. This has given new impulse to a theoretical formulation of which Ostrom's reflection (section 1) on commons-pool resources (CPR) undoubtedly constitutes the best formed expression in the field of academic economic theory. This has also been translated into multiple initiatives on a political and institutional level. The most significant of these are the recognition of the non-appropriable nature of natural commons in Iceland's project of constitutional reform in 2012 and in the new constitution of Ecuador in 2008.

Thus, for example, Article 34 of the draft of the new Icelandic constitution formulated through the device of participative democracy via the Web which mobilised the contribution of a great many citizens stated that:

Iceland's natural resources that are not private property shall be the joint and perpetual property of the nation. No one can acquire the natural resources, or rights connected thereto, as property or for permanent use and they may not be sold or pledged. Publicly owned natural resources include resources such as marine stocks, other resources of the ocean and its bottom within Iceland's economic zone and the sources of water and water-harnessing rights, the rights to geothermal energy and mining. The public ownership of resources below a certain depth under the earth's surface may be determined by law. In the use of natural resources, sustainable development and public interest shall be used for guidance.

As for the 2008 Ecuadorean constitution,[9] it specifies in Article 1 that "Nonrenewable natural resources of the State's territory belong to its inalienable and absolute assets, which are not subject

to a statute of limitations". It adds with fundamental juridical innovation in Article 10 that "Nature shall be the subject of those rights that the Constitution recognises for it". That is to say, as specified in Article 71:

Nature, or Pacha Mama, where life is reproduced and occurs, has the right to integral respect for its existence and for the maintenance and regeneration of its life cycles, structure, functions and evolutionary processes.

All persons, communities, peoples and nations can call upon public authorities to enforce the rights of nature. To enforce and interpret these rights, the principles set forth in the Constitution shall be observed, as appropriate.

Finally, a non-secondary role in order to lead to the juridical recognition of natural common goods, water in particular, has been played in Italy by the work of the Rodotà Commission, which was set up at the Ministry of Justice in 2007 with the aim of drawing up a draft of a law to reform the part of the Civil Code on the subject of public goods. This proposal, as well as defining public property and providing a classification of it, demonstrates the connection between public property and a person's fundamental rights. [10] The recent deliberation on common goods of Municipality of Chieri drawn up by a working group gathered around Ugo Mattei, as we will see better hereafter, takes up and develops this reflection giving the concept of common and common goods its most complete and well-constructed current juridical wording (Section 3).

The second transformation is connected to the development of an economy based on the driving role of knowledge and the spread of it. At the centre of this dynamics we find the meeting between the formation of widespread intelligence and the information revolution. This gives rise to the formation of knowledge-intensive communities and to forms of coordination of alternative activities in the principles of management both of the hierarchy and the market. The models of Wikipedia, free software and at the level of legal forms of copyleft are without doubt the best known expressions of this, although they barely represent the tip of the iceberg of a much wider, well-constructed and complex commons. It is the case of those that are commonly called the new commons of knowledge relating to the abundant immaterial resources and which slip out of the constraints of scarcity.

Nevertheless we note straightaway that this binary distinction between two types of commons, traditional commons and that of knowledge, defined according to the type of goods and resources is, to our minds, largely misleading.

On one hand, the so-called traditional and natural commons can, in fact, at the same time also fully claim to be knowledge commons. In fact, the working of a natural common rests on the mobilisation of complex knowledge, often passed down from generation to generation, through cumulative mechanisms of enrichment of knowledge and the savoir-faire tied to what in the knowledge economy are called learning by doing and by using effects. And in this way, for example in numerous traditional communities, they have been able to reach an extremely complex knowledge of bio-diversity drawing from it accurate selections of seeds and a rich pharmacopoeia which, besides, is attracting more and more strategic interest from large multinational companies in the pharmaceutical and agro-industrial sectors.

On the other hand, regulation of natural commons is today founded on the meeting and hybridisation of more modern knowledge and techniques with the rediscovery of the value of traditional knowledge which has permitted the preservation of natural resources over generations. The crucial importance of this interaction between KBE and natural commons has been recognised

in a farsighted way by the Ecuadorian government (as we will see in the last part of this report). As René Ramírez Gallegos (2014) underlines, this inclusion becomes the very basis of a transformation of the production matrix of the Ecuadorian economy and of the way it inserts itself in the new international division of work founded on knowledge.[11]

On the other hand and reciprocally, knowledge commons are thus not only concerned with immaterial goods, such as for example software, creating data banks or the production of codified knowledge. Their organisation principles can concern any type of material or immaterial activity, whether it is products made by humans for humans (health, education) or any other kind of good, service or resource.

From this point of view, common thus appears above all to be a social construction founded on the spread of knowledge and self-governance of production and not an intrinsic feature of the nature of particular categories of goods. These considerations will be an important theme in this report is to guide us through the critical review of the literature is the concrete analysis of the development of the commons and commons goods.

2. From the theory of public goods to the new political economy of commons: a historical and theoretical perspective[12]

In this section we will analyse the origins and theoretical principles that make up the so-called new political economy of commons started by Ostrom. From this perspective we will proceed in three steps.

First the neo-classical economic theory of private goods and public goods as an expression of market failures will be presented. As regards methodological, particularly as far as typology of goods is concerned, it constitutes an indispensable starting point in order to understand the subsequent introduction of the concept of common goods.

Following this a critical presentation of Hardin's theory of the tragedy of the commons will be made, the theory which reintroduced the debate on this theme in 1968 and with respect to which Ostrom's greatest work, Governing the commons (1990), constitutes a theoretical answer on the level of economic science and political science.

Finally, the analysis will centre on the main contributions of Elinor Ostrom's formulation, at the same time pointing out some of its limitations and internal contradictions.

2.1. The Samuelsonian theory of public goods as failure of the market

Already in the 1950s, within the framework of the standard economic approach Paul A. Samuelson (1954) develops the idea according to which several goods escape from market regulation due to intrinsic characteristics specific to them. Samuelson distinguishes two broad categories of goods: private goods which, according to the author, represent the vast majority of goods, and public or collective goods.[13]

2.1.1. Private goods and the issue of externalities[14]

Private good is distinguished by being rival[15] and excludable.

In this case, by excludable we mean a situation in which the holder of a certain good may through the exercise of a right of ownership prevent access to this good to anyone who is unable/does not wish to buy it at the price that the holder demands. Instead for rival we mean a good or a service the use or consumption of which by one subject cannot be shared by another subject. This postulate is closely related to the idea previously developed by Adam Smith according to which consumption is the destroyer of wealth.

These two characteristics, rivalrousness and exclusivity, are the very conditions required for fulfilment of a market transaction. In Economics of 1970 the manual of economic theory that was used at the time to train thousands of economists, to these two characteristics Samuelson adds a third element with heavy theoretical implications that go beyond the intentions of the author himself. This is the fact that in order for private goods to be considered fully so they must not generate externalities.[16] This assertion has heavy implications, particularly for the debate on the

extension of the range of common and public goods, since already during the Fordist era people began to notice a key element: hardly any act of production or consumption exists which is without externalities especially on the environment (pollution, the greenhouse effect, overexploitation of natural resources and so on). This fact gains ever more importance in contemporary capitalism with the devastating external effects of the ecological crisis and positive externalities of knowledge. The perception of the growing role of externalities has thus carried out an important role in the return of the naturalistic theories of common goods which we mentioned previously and the development of approaches underlining the virtues of open knowledge models of the knowledge commons (Moulier-Boutang, 2007).

It is furthermore a topic that can be mobilised to demonstrate that the sphere of Common is not limited to a particular range of goods according to their intrinsic features. In fact, if each act of production and consumption has immediate social effects it is no longer possible to exclude certain categories from the sphere of Common and affirm that in the framework itself of neoclassical theory, the primacy of private goods corresponds to a natural law of the working of the economy. We will return to this point later, for the time-being we come back to Samuelson's founding theory.

2.1.2. Public or collective goods as market failure[17]

Besides private consumer goods, divisible/rival and excludable, Samuelson identifies another category of goods: public goods, also called collective goods having a semantic shade of meaning which is not secondary.[18] For the author public or collective goods are a secondary category of goods production of which cannot be guaranteed efficiently by the market due to two intrinsic characteristics which are the opposite of those intrinsic to private goods: "non rivalrousness" and "non-excludability".

By "non-rival" we mean a good where the use or consumption of which by an agent does not prevent and/or limit that of another. In other words the marginal cost of utilising the good by an agent subsequent to the first is null. An oft provided example is that of listening to music on a CD: listening done by one person does not prevent or limit another from doing so.

By "non-excludable" we mean a situation in which it is impossible to exclude another individual from the use of this good by requesting payment of a price for it.

The examples which are most often given are those of defence, public street lighting or the light house at the entrance to a port, about which Victor Hugo once wrote famous passages in eulogy of this scale of common. Another example is that of codified knowledge or information as intended by Kenneth J. Arrow (1962).[19]

For all these reasons inherent to the nature of public goods, the market, guided by its criteria of profitability, cannot produce public goods without obtaining a sub-optimal situation. According to Samuelson, public goods must be financed by taxes and therefore they slip out of the sphere of commerce.

Finally, note that this approach involves two complementary and closely linked theses. The first is that public goods would be no other than a failure of the market. The second is that objective, ahistorical and natural economic laws would exist which would allow precise boundaries to be drawn around the respective spheres of the State and market according to specific characteristics of the goods (rivalry/non- rivalry, excludability/non- excludability).

2.1.3. Mixed goods: club goods and common goods[20]

Besides the contrasting cases of public and private goods, other types of goods have subsequently been identified in the literature which possess only one of the two characteristics described above or which possess different degrees of rivalrousness and excludability:[21] the so-called mixed goods.

Among these in 1965 James M. Buchanan identified a new category, that of club goods which are characterised by being unrivalrous and excludable. For example, this is the case of a group of individuals who create clubs in order to provide themselves with and use non-rivalrous goods and services on a small scale and can impede use of them by non-members.

Another type of mixed goods will be introduced by Ostrom, as we will see better below (cf. 1.3): this is common goods/common-pool resources that are distinguished by being rival (or subtractable) and difficultly excludable. Conventionally accepted examples are forests, water, fishing grounds, space or the atmosphere.

The following table summarises the classic way of representing public goods, private goods and mixed goods (club or common goods) in manuals of economic theory (cf. Table 1).

	RIVAL	NON-RIVAL
EXCLUDABLE	PRIVATE GOODS	CLUB GOODS
NON-EXCLUDABLE	COMMON GOODS / COMMON-POOL RESOURCES	PUBLIC GOODS

Table 1 The traditional classification of goods based on criteria of rivalry and excludability[22]

First of all, this approach expresses well the golden age of Fordist growth on a historical level, dominated by the figures of large corporations and the Keynesian State. Not at random Samuelson's approach makes no mention of the hypothesis of a form of management which would not take away from the sphere of the State and the market.[23]

Secondly, if it is pushed to its ultimate outcome, the issue of externalities of private goods could even lead to affirm that this approach fails in its attempt to define natural borders between categories of goods. The concept of collective good could extend to almost the entirety of production.

Lastly, Ostrom's political economy of commons fits in an original way into the theoretical framework of the approach founded on the intrinsic characteristics of goods to once again bring up for discussion this dichotomous vision founded on the pairings of State-market and public-private.

2.2. Garret Hardin and the tragedy of the commons[24]

Garret Hardin played a key role in reintroducing the debate on commons with his very famous article in 1968 entitled The Tragedy of the Commons. Note straightaway that the success of this article may be surprising taking into consideration the approximation of the hypotheses and the arguments on a theoretical and historical level. In particular, Hardin confuses and assimilates the concept of common goods with that of res nullius which, as we have seen, Roman law had previously clearly separated from res communes.

Hardin's article has two principal targets, as is also shown by the importance he attaches to the work published in 1883 by William Forster Lloyd, an obscure Malthusian economist who fought against the poor laws:

The first targets are the so-called assisted poor, considered as the main responsible for their fate. And it is from this viewpoint that Hardin reignites the polemic of classic economists against the poor laws and the Speenhamland decree that Karl Polanyi had considered the last bastion against the imposition of the logic of the self-regulated market, extending it to an attack on the institutions of the welfare state. This is a crucial aspect, though often forgotten today, of Hardin's contribution. For the latter, from a Malthusian viewpoint, the metaphor of the tragedy of the commons means also and above all the necessity to once more bring up for discussion the institutions which, through socialiSation of incomes, instigate opportunistic behaviour (free riding) which is responsible for the waste of the resources distributed (medical expenses, unemployment benefit, etc.). This aspect is central since, as we will see further on, other economists instead consider the institutions of the welfare state as a condition that goes with the development of a KBE. Strengthening them under the form of provision of an income for collaboration or a basic income would even be an essential instrument in order to safeguard the development of the modern knowledge commons.

The second target consists in attempting to demonstrate the impossibility of any form of collective management of resources and common property that escapes from the rules of the general movement of expansion of private and State property.

According to Hardin, in fact, when access to a resource is free and it is not defined by private or public property, individual behaviour of maximisation of the utility inevitably leads to overexploitation and the depletion of this resource. Only privatisation of it or, in second place, resort to making it state property, would be able to eradicate this behaviour and safeguard the resource.

As well as welfare, two key examples of this logic, according to Hardin, would be that of non-regulated extraterritorial fishing zones and that of the overexploitation of common lands in England before the Industrial Revolution.

2.2.1. The postulate of impossible self-governance of common goods: reductive hypotheses [25]

Note that Hardin's argumentation is based on a series of very precise hypotheses.

First of all, it is adherence to a primary methodological individualism based on the concept of an individual who is in essence selfish, who maximises his own interest and is non-cooperative. An individual, therefore, whose potential to destroy resources would be multiplied by the Malthusian trends of the population which lead to the multiplication of the poor.

In second place, as previously raised, the commons, i.e. common lands, are assimilated to a terra nullius (land without owners) with free access, that is to say completely deregulated. In short Hardin confuses, either deliberately or through ignorance, common property and lack of ownership deducing from this the absence of collective governance.

This confusion is all the more surprising and rich in topical implications that, as Ellen Meiksins Wood (2014) and Vandana Shiva (2001) recall, the concept of terra nullius has played a key ideological role in the politics of colonisation that England developed in the New World and Australia during the same period in which the process of enclosures was taking place. In this framework, English colonies proclaimed terra nullius the territories inhabited by the Native Indian population of America and the Aborigines in order to appropriate them freely. The justification produced is to be found in the fact that the populations of hunter-gatherers had not adopted the Western World's systems of cultivation and fencing of their own land. Consequently the type of knowledge and productive

interaction with nature that characterised these nomadic populations could not be considered to be work which, in John Locke's meaning, bestowed the right to property: these lands could be declared to belong to no-one and be privatised. In this way any right of the indigenous populations to the lands that they managed in common could be denied.

We note that today a similar logic governs biopiracy, that is to say the privatisation of knowledge (medicine, fertilisers, seeds etc) and plants selected by indigenous populations over generations and generations. Insofar as this "traditional" knowledge is kept on a strong tacit, informal and collective scale, and is not organised according to the paradigm of western science, there is no form of provision for the recognition or even protection of the knowledge of the rural communities concerning the ownership, use and improvement of traditional resources. Hardin's ideological sleight of hand which consists in assimilating and playing host to the confusion between common and terra nullius, thus allows the justification, just as it did in the time of the enclosures, for the privatisation of a common heritage.

2.2.2. Commons and overexploitation of lands: Hardin's argument disproved by the facts[26]

In confirmation of the theory of the impossible self-governance of common goods, Hardin takes the historical example of the behaviour of shepherds which in pre-industrial England seemingly led to the overexploitation of pastures until privatisation of the commons was rendered necessary.

We note that Hardin, perhaps deliberately, never specifies either the social status of these shepherds nor the exact historical date of the process he refers to. Nevertheless these missing elements can easily be reconstructed by an economic historian. It follows that the example provided by Hardin is totally misleading and overturns the real historic sequence of events. A broad historiography has clearly demonstrated that in England exactly the opposite took place.

That is, the process of overexploitation of pasture is consequent and not prior to the first great historic wave of enclosures and privatisation of common lands that developed in the 16th century. This process rested on the desire of the old feudal landlords and the growing agricultural middle-class to convert common lands into pasture allocated for raising sheep, in the context of the strong growth of wool prices due especially to increased demand from the Dutch manufacturing industry. In short, massive introduction of sheep onto common lands, hyper-exploitation of pastures and the reduction of lands set aside for subsistence farming are the consequence and not the cause of the privatisation of commons and with them of the structures of collective management that until then had guaranteed ecological balance between the population and resources.

The tragedy of commons which Hardin talks about is in reality nothing other than a tragedy of anti-commons, linked to the destruction of forms of property and governance of communal lands. It is what Thomas More had already well underlined in Utopia, when referring to the private appropriation of communal lands he wrote: "'*The increase of pasture,' said I, 'by which your sheep, which are naturally mild, and easily kept in order, may be said now to devour men [...]*"(More, 1516, 44).

To put it more precisely he described the situation thus:

"for wherever it is found that the sheep of any soil yield a softer and richer wool than ordinary, there the nobility and gentry, and even those holy men, the abbots! not contented with the old rents which their farms yielded, nor thinking it enough that they, living at their ease, do no good to the public, resolve to do it hurt instead of good. They stop the course of agriculture, destroying houses and towns, reserving only the churches, and enclose grounds that they may lodge their sheep in them. As if forests and parks had

swallowed up too little of the land, those worthy countrymen turn the best inhabited places into solitudes; for when an insatiable wretch, who is a plague to his country, resolves to enclose many thousand acres of ground, the owners, as well as tenants, are turned out of their possessions by trick or by main force, or, being wearied out by ill usage, they are forced to sell; them by which means those miserable people, both men and women, married and unmarried, old and young, with their poor but numerous families (since country business requires many hands), are all forced to change their seats, not knowing whither to go; and they must sell, almost for nothing, their household stuff, which could not bring them much money, even though they might stay for a buyer" (More, 1516, 44-45).

One of the gaps of Hardin's approach consists precisely in completely disregarding social relationships and therefore the institutions framing individual and collective behaviour. In fact, before the enclosures, rural communities lived and regulated the use of commons on the basis of pre-capitalistic social relations founded on reciprocity and sharing.

In this framework the actual exchange of goods, following the famous distinction initiated by Aristotle between two forms of money circulation (the good and bad chrematistics), obeyed the logic of the Commodity-Money-Commodity (C-M-C) sequence: a logic in which the aim of production and capacity of appropriation of resources are limited by the capacity of consumption. In fact, the purpose of land commons in this historic period, as in those studied subsequently by Ostrom, is principally to statically preserve the conditions of reproduction of the community and consequently the balance of the relationship between humans and nature.

The logic of predation and overexploitation of the resources of the commons that Hardin talks about originates from the poor chrematistics that economists like Marx and Keynes and theorists of monetary circuit[27] will draw on in order to represent the essence of the logic of the exploitation of capital. This is based on Money-Commodity-Money circulation (M-C-M^', where M^'>M), in which the objective of accumulation and profit leads to the detachment of production and use of resources from the rule of satisfaction of the sphere of traditional needs. The quest for enrichment thus drives the unconditional exploitation of resources until it destroys the traditional collective norms which allowed them to be preserved. This is what Wood (2009) himself affirms in his fundamental essay devoted to the agricultural revolution and the origins of capitalism in England, when he underlines how one of the key motives behind the enclosures movement was precisely the aim of suppressing the old community rules which prevented intensive exploitation of lands in order to maximise returns.

To conclude, that which permits explanation of the economic rationality of the agents at the base of the behaviour of predation of the common lands is precisely the change of property relationships introduced by the process of enclosures and privatisation of the lands. [28] In fact, this process drives the transition from a simple commercial community economy based on the C-M-C circulation, where money is a simple intermediary of exchanges, towards a capitalist economy founded on the formula M-C-M^', where money is at the same time the departure point and the end of the circuit: production and use of resources are no other than simple means to attain this objective in a perspective that is in essence short-run.

Despite these limits, Hardin's theories will be used to support measures of structural adjustment and privatisation promoted by the International Monetary Fund and the World Bank. They perfectly complement each other in a theoretical development which will find a much more sophisticated theoretical formulation in the theories of the agency and property rights. And it is in reaction to this historic and theoretical context that Ostrom's new theory of commons develops.

2.3. Ostrom's approach: the definition of common goods within the intrinsic characteristics of goods and social structure of the governance of common

The new political economy of commons of Ostrom and Hess develops an original criticism of Hardin's approach and the so-called tragedy of the commons.

This new approach renews the theory of property rights and of public or collective goods to arrive at a definition of commons that is organised around four central elements which we will analyse later in this section: the redefinition of the distinction between res nullius and res communes, the concept of the proprietary structure as a bundle of rights, the typology of goods and the principles of governance.

2.3.1. Common-pool resources: closed access versus res nullius[29]

First of all, contrary to Hardin, Ostrom – basing herself on the work of Ciriacy -Wantrup and Bishop (1975) – clarifies the confusion that there is in the literature on commons between common-pool resources in open access and common-pool resource in closed access.

In open access regimes (or res nullius), like the open sea or the atmosphere, no-one can claim rights of ownership and access is not regulated (though it could become so). In systems of common-pool resources with closed access property can belong to different types of institutions or bodies, members of a particular community, single individuals or businesses which share the common resource, but also exercise rights of exclusion of use of the resource in question. All the common-pool resources share two important features for economic activities. The first is due to the fact that it is costly to exclude individuals from use of the good either through physical barriers or through legal instruments: secondly the benefits consumed by an individual subtract the benefits available to others. Because of this Ostrom specifies that a common-pool resource closed access is articulated in a common property regime where this concept indicates a particular institutional set up and way of governance regulating conservation, maintenance and consumption of a common resource (Ostrom, 1990, 64; Ostrom, 1999, 335- 336).

This leads us to the way in which Ostrom faces the issue of property in commons.

2.3.2. Ownership of commons considered as a bundle of rights[30]

Ostrom records the problem of commons as a critical continuation, explicit or implicit, of the theory of property rights by Douglas C. North and its developments in the works of Alchian and Demsetz (1973) who were the great theoretical spokesmen of the renewal of neoliberal economic theory of property.

Ostrom, who was a pupil of North's, never directly, questions North's theories on the importance of the existence of well-defined private property rights as a central factor for development.

Nevertheless she rejects the overly-schematic opposition between State and the market showing that, for certain types of goods, forms of governance and ownership can exist that are different from public and private.

In Governing the Commons, Ostrom maintains that:

One set of advocates presumes that a central authority must assume continuing responsibility to make unitary decisions for a particular resource. The other presumes that a central authority should parcel out ownership rights to the resource and then allow individuals to pursue their own self-interests within a set of well-defined property rights. Both centralisation advocates and privatisation advocates accept as a central tenet that institutional change must come from outside and be imposed on the individuals affected (Ostrom, 1990, 14).

Ostrom goes further beyond this and states that the classifying dichotomy between public and private is often sterile:

Institutions are rarely either private or public –'the market' or 'the state.' Many successful CPR [common pool resource] institutions are rich mixtures of 'private-like' and 'public-like' institutions defying classification in a sterile dichotomy (Ibidem).

In order to demonstrate this theory Ostrom, unlike for example, Alchian and Demsetz, maintains that the fundamental dimension of property is not reduced to the mere quality of alienability that is to the power to sell a good. This limited concept renders the very idea of a non-absolute right of ownership like that held by the State or by a private financial agent inconceivable.

In order to understand commons, according to Ostrom, instead we need to think that rights of ownership of a good or resource can be broken up into a multitude of rights and obligations. Put more precisely it is a "bundle of rights" tied to the common resource and which can be distributed in a more or less equal manner between the commoners.

Schlager and Ostrom (1992), thus differentiate on a hierarchical scale five features of property rights that can be broken up and split in whole or in part between different individuals or financial agents. At the lowest level we find Access and Withdrawal (rights of access and withdrawal from a fishing ground or a pasture, for example): these first two rights which are often, but not always associated with each other, define the authorised users. At a higher level, the characteristics of Management, Exclusion and Alienation are found. These features define the rights linked not only to the customary use but also to collective decisions inherent to the running of the common.

This is an important point also because it means that the definition of a commons for Ostrom does not at all exclude the existence of a social hierarchy and profound inequalities between the participants (commoners). There exists an entire gradient of possible hybrid forms that can fit between the two extremes: one in which common only rests on a limited distribution of certain rights of use that does not undermine the essential features of the pre-eminence of private property; the second corresponds to a situation in which rights are distributed equally between all participants and prevent any form of appropriability of a resource for private purposes. This is the closest model, in our opinion, to the regulative idea of the democracy of commons and property founded on common. The system of "freedom" and mutual obligations typical of the copyleft regime is, on a legal level, one of the devices which most conforms to this ideal type model.

The Bundle of Rights means, contrary to widespread misunderstanding and to what the table regarding the typology of goods could suggest at first sight, that management of a common good implies processes of exclusion. To be sure this eliminates the possibility of exclusion based on prices, but not that of the exclusion of other individuals based on rules deliberated and decided by the participants in the commons. This is especially true for land commons (fishing and grazing grounds) based on small communities and rival goods that were the first and principle subject of Ostrom's research.[31] It is less so instead for knowledge commons due to their non-rivalrous and non-subractable nature.

This brings us to the new typology of goods proposed by Ostrom.

2.3.3. A new type of public and common goods based on the concept of subtractability[32]

In comparison with the Samsuelson theory of collective goods, as mentioned Ostrom introduces the previously inexistent category of common goods which pool rivalry (or better subtractability) and non-excludability, as for example common land (pastures, fisheries, forests, etc.).

From this perspective, the American economist, starting with her collaboration with her husband and colleague Vincent Ostrom (Ostrom and Ostrom, 1977), makes three essential theoretical contributions.

In the first place, the starting point of the Samuelson matrix is specified through the renaming of club goods as toll goods. An example of a toll good is represented by a motorway which is characterised by being non-rivalrous (with the exception of cases of traffic congestion) and excludable.

The second contribution concerns substituting the concept of rivalrousness in consumption with subtractability in use. For the concept of subtractability is meant, according to Hess and Ostrom (2007, 352): "Where one person's use subtracts from the available benefits for others (alternatively, rivalrousness)". The conceptualisation of the notions of subtractability and excludability aims moreover at showing that their intensity can vary according to the resources, from weak to high rather than considering them simply as being present or absent.

This innovation recalls ecological and collective problems that were missing from the notions of rivalrousness and non-rivalrousness in consumption. The term common-pool resource makes the ecological problem plain by referring to the equilibrium between the stock and flow necessary to guarantee the reproduction of a resource (cf. Box 1).

> "The term 'common-pool resource' refers to a natural or made resource system that is sufficiently large as to make it costly (but not impossible) to exclude potential beneficiaries from obtaining benefits from its use" (Ostrom, 1990, 30).
>
> For Ostrom the sole principle of non-exclusion through prices is not sufficient to define a common –pool resource since it interacts with concepts of stock (resources of system) and flow (unit of resources) which in turn are dependent on each other. In Governing the Commons a common good is that in which the overutilisation of flows causes the stock to diminish that is the concept of rivalrousness in its use. A good that can be overexploited is in opposition to a collective good, as intended by Samuelson, where utilisation of which by one individual does not prevent that of another. Ostrom uses the examples of resources of system: fisheries, water tables, pastures, irrigation canals, bridges, car parks, computer mainframes, streams, lakes, oceans and other bodies of water. Whilst for unit of resources she indicates the part of the resource system that individuals appropriate or use for personal aims. This, for example, is the case of the quantity of fish fished in a fishing ground, the quantity of water drawn from a water table, the quantity of fodder consumed by animals in a pasture, the number of times a bridge is crossed every year, the times places are occupied in a car park, the central processing units consumed through a computer system and a quantity of biological waste that a stream or other waterways can absorb each year. Ostrom, insisting on the necessity to discriminate between stock and the use of resource flows, emphasises how this distinction is especially valid in connection to renewable resources where it is possible to determine a rate of reestablishment

of the same. As far as knowledge commons are concerned, studied by Hess and Ostrom (2007) this reproductive stock-flow constraint does not exist seeing that codified knowledge, like information, constitute a resource that not only are not destroyed by consumption but grow thanks to their use due to the non-subtractable and cumulative nature of knowledge. These characteristics have been heightened by digitalisation which has reduced extraordinarily the costs of reproduction and transfer of codified knowledge. Unlike natural commons, dominated by an economy of scarcity we therefore find ourselves, with knowledge commons, in an economy of abundance. Scarcity, in this case, can only be produced artificially by means of barriers to access such as those tied to intellectual property rights. (cf. Ibidem).

Box 1. Common-Pool Resource[33] [34]

In this way Ostrom also allows us to consider, along Samuelson's lines, a more complex typology of goods and their possible hybridisations.

Finally, as previewed above, the most important novelty is the introduction of a fourth broad category of goods, "common-pool resources".

Following these changes, the graphic representation of the types of goods can be summarised by the table below (cf. Table 2).

		SUBTRATABILITY	
		HIGH	LOW
EXCLUSION	EASY	PRIVATE GOODS	TOLL *or* CLUB GOODS
	DIFFICULT	COMMON-POOL RESOURCES	PUBLIC GOODS

Table 2: The classification of goods in E. Ostrom[35]

1.3.4. Principles of management and the cooperative concept of an individual: beyond homo oeconomicus[36]

Even though she sticks faithfully to methodological individualism, Ostrom is opposed to Hobb's concept of a selfish individual, continually in competition to appropriate resources; a representation of an alternative individual is that of homo oeconomicus. She refutes the dogmatic and absolute aspects of homo oeconomicus and proprietary individualism. As a matter of fact, the American economist maintains that, as far as public policies are concerned, human beings possess a more complex structure of motivations and a greater capacity to solve social dilemmas than that postulated in the theory of rational choice. Ostrom's individual is also motivated by altruistic and cooperative behaviour which allow for collective action and the establishment of rules guaranteeing the perpetuity of the commons.[37] In this sense the American author makes an important contribution in thinking that common, beyond the inherent characteristics of the goods, as the product of a social construction establishing it as common. In Ostrom and Hess (2007), they reach this definition of common good, "a resource which is susceptible to social dilemmas". Dilemmas such as competition in the use, free riding and overexploitation of the actual resource. According to Ostrom, these problems can be solved theoretically within the standard approach if, contrary to what is usually done in models of game theory, they are integrated with the possibility of altruistic and cooperative behaviour.

Finally, through a series of monographic studies, Elinor Ostrom shows that commons land could have been managed efficiently and sometimes even more efficiently than when being managed as private property. The existence of well-defined property rights, as intended by North and Thomas (1973), could also be applied to common property on the basis of practices of deliberation and a system embedding rights and mutual obligations which the American economist summarises in eight basic principles of governance of the commons. The eight conceptualised principles identified characterise the institutional reliability of the systems which have demonstrated the capacity to reproduce themselves over a lengthy period of time. They are sound and lasting design principles for the self-management of communal resources (cf. Box 2). [38]

1) Clearly defined boundaries should be in place.

2) Rules in use are well matched to local needs and conditions.

3) Individuals affected by these rules can usually participate in modifying the rules.

4) The right of community members to devise their own rules is respected by external authorities.

5) A system for self-monitoring members' behavior has been established.

6) A graduated system of sanctions is available.

7) Community members have access to low-cost conflict-resolution mechanisms.

8) Nested enterprises—that is, appropriation, provision, monitoring and sanctioning, conflict resolution, and other governance activities—are organized in a nested structure with multiple layers of activities.

Box 2. Principles illustred by long enduring CPR institutions (Hess and Ostrom, 2007, 7)

Application of these principles allows enforcement of the common good through a complex system of management rules, deliberative practices, sanctions and mutual obligations that can come out both in customary use (and/or unwritten law), and the law or the contract.

1.3.5. Conclusions: open and unresolved issues of the new political economy of commons[39]

The work carried out by Ostrom and her research group has provided a decisive impulse to demonstrate, starting from an internal critique of the neoclassical paradigm, that it is necessary to overcome the simplistic state-market, public-private dichotomy.

As Mezzadra and Brette (2014) have also emphasised, the fact that Ostrom received the Nobel Prize in 2009, right in the middle of the worldwide economic crisis, is exactly because she demonstrated the fallacy of the idea according to which commons are condemned by virtue of their structure to self-destruct environmentally and economically and so must be regulated by the State or privatised.

Despite this indisputable merit, numerous criticisms have been launched at Ostrom's approach. Here we will limit ourselves to remembering some of the main ones expressed both in the field of economic theory and in that of other branches of the social sciences.[40]
According to a critical stream of thought of which Dardot and Laval (2014) are spokesmen, Ostrom's methodological individualism keeps pace with, as in Hardin, not taking into consideration an analysis of the social relations of production and therefore the historic setting in which

institutional rules were written. On this basis, transition from the tragedy, to what we could call the miracle of commons remains partially anchored to a judgment on the good or bad nature of human drives and behaviour.

The role of the economic and social structures in the economies in which commons develop is never dealt with: we remain in the scenario of an atomistic representation of society founded on a multitude of individuals who are in principle considered to be on an equal footing. From this point of view it is extremely significant that Ostromian criticism of Hardin's approach never leads to the historic confutation of this author's analysis, in particular as far as the role of the enclosures and privatisation of communal lands are concerned, in the tragedy of the commons tied to the overexploitation of pastures.

Another limit which is often raised consists of the way in which the structures of the commons studied by Ostrom essentially correspond to experiences conducted on a micro-social and community level without reflection on the conditions of extending them on a broader scale in the economy. Moreover it is necessary to note how in Ostrom's analysis there is a sort of permanent hesitation between a definition of commons tied to the intrinsic characteristics of goods and on the other hand a definition resting principally on institutional principles of management and democratic participation.

On one hand, in fact, Ostrom places herself in the wake of the Samuelson school on the theory of public property and her new four-goods typology risks reestablishing a static and comparative approach of the practically natural demarcation lines between different forms of property and management deriving from the intrinsic characteristics of the same goods (Dardot and Laval, 2014).

Moreover, Ostrom remains so unbending on the Samuelsonian notion of excludability through prices for private goods that she defines common goods as non-excludable. So she seems to forget that her own analysis of forms of regulation of common goods rests in reality on forms of exclusion. It is also in this sense that common goods are distinguished from res nullius even if these forms of exclusion are performed on the basis not of prices but of regulated access.

In our opinion it would be necessary to overcome the limits of this typology of goods indicating that different forms of exclusion exist and redefining the meaning of this concept for common goods: in fact there is a profound difference between a selection of users through prices or instead, for example, through the establishment of shared rules of rationing in order to guarantee the ecological preservation of resources. From this perspective, in place of the concept of non-exclusion used by Ostrom for natural commons, that of responsible and participative inclusion seems to us more appropriate. This concept better permits indication of the way in which every type of common is always the product of the collective action of the commoners.

On the other hand, particularly in the last works in which her position becomes radicalised under the impetus also of the echo of her writings for social movements, Ostrom seems to place more and more emphasis on the dimension of the social structure of commons: from this point of view it is bottom up management and not the nature of the good which is the main factor qualifying a resource as common.

In the essay written for receipt of the Nobel Prize, which is also a theoretical and political testament drawn up by Ostrom not long before her death, we find two fundamental points which seem to confirm this hypothesis:

The first concerns the way in which Ostrom (2009) underlines the perverse effects that can result from State or private management of natural commons, such as the creation of a natural park, which would lead for example to the ejection of the native population who have managed that resource for centuries;

The second concerns the stress placed on the forms of participative democracy that can even intervene in the running of public services rendering them more effective. Although Ostrom does not make this point explicitly, the basic idea is that in variable proportions the principles of participative management of common goods can be combined with the bureaucratic ones of the State in the running of public services, until the way they work has been greatly modified following mechanisms of participative democracy.

Finally, it must be emphasised how Ostrom's approach completely disregards two central elements which are on the other hand at the centre of theoretical reflection of other schools of thought in order to explain the development of commons in contemporary capitalism.

First, she does not consider the changes of work bound up with the growth of its cognitive, immaterial and relational dimension, despite the growing role of these evolutions in the production of commons, particularly through means of information goods and production of man for and by man (Hardt and Negri, 2012; Vercellone, 2010; 2014). The absence of this is even more noticeable in relation to knowledge commons which, as the vast literature shows, have found their driving force precisely in the meeting between the formation of collective intelligence and the revolution of ICT (David and Foray, 2002). However, this gap leads Ostrom to separate, artificially in our opinion, natural commons based on rare and non-renewable resources and the knowledge commons studied with Hess, without taking into account that cognitive labour and knowledge are the common element that establish and render possible the social structure of any type of commons, independently of the nature of the goods, whether they be material or immaterial, subject to the constraints of scarcity or abundant.

Secondly, the absence of any analysis of money and the role that it could play in the development and governance of commons is astonishing. Certainly, this choice could depend partly, as we have seen, on the fact that Ostrom's monographic studies bring up local and micro-social examples, in which exchanges and social relations overshadow the role of money mediation. The fact remains that the exclusive choice of these examples leads us to suppose that the economy of common goods or commons would not be able to overcome the economic threshold in which the wealth and quantity of exchanges would require, for at least one of its functions, the establishment of money.

Some of Ostrom's imitators (Cornu, 2012) have begun to outline an analysis of money as a non-rival but excludable good, making an important contribution to the contemplation of complementary or alternative monies.

Nonetheless in order to really overcome this limit, it is necessary to face the joint issues of money and the statute of the labour force, as they are fictitious commodities, in the interpretation of Karl Polanyi (1944). [41] The relationship between money and social organisation of production, at the centre of which can be found the wage relation, is in fact one of the central factors conditioning, at a macroeconomic and social level, the hierarchy and organisations of the private, public and common spheres. This is a line of research which we began to explore in the previous report D3.4 Field Research and User Requirements with special reference to the theory of the monetary circuit.

3. Cognitive capitalism and the Common in the singular approach[42]

The Common in the singular approach enters the scheme of interpretation of the theory of cognitive capitalism that we have already mobilised in report D3.1 devoted to a Theoretical Framework on future knowledge-based economy (KBE). As indicated in the conclusion of report D3.1, this scheme of interpretation will therefore also be an essential methodological instrument in order to understand the origin and the stakes tied to the return in force of the dynamics of commons and face the problem of their role and sustainability in the age of cognitive capitalism.

From this perspective, the next sections of this report will be divided into three parts.

The result is a broadened vision of the logic of common that potentially crosses all of the junctions of social production together and therefore cannot be reduced to an enclave situated at the borders of the market and State economy. This concept – it needs to be stressed straightaway – is also essential in order to understand the densification of the network of exchanges and sectorial interdependences on which the establishment of a common currency, be it complementary or alternative, could rely.

In the first we will present the foundations of the approach of the Common in the singular. [43] We will see how it integrates the teachings of the Ostromian theories, at the same time offering an original theoretical scheme which proposes to overcome the main limitations.

This approach considers in particular that it is not in the nature of the goods, but in the new historical characteristics of cognitive labour that the constituent ontological principle of the new knowledge commons is to be found, whether they be material or intangible, social or land.

In the second section we will see how the development of the commons is closely bound to that of the new material and human productive forces at the base of a KBE and to the contradictory relations that the latter maintains with the forms of regulations of cognitive capitalism. In this framework, we will also highlight a central element omitted by the Ostromian analysis: the role that the guarantees and services of the welfare state perform in the development of a KBE and in setting up institutions of the Common. This is what will be called a model of "Commonfare".[44] The result is a broadened vision of the logic of Common that potentially crosses all of the junctions of social production together and therefore cannot be reduced to an enclave situated at the borders of the market and State economy. This concept – it needs to be stressed straightaway – is also essential in order to understand the densification of the network of exchanges and sectorial interdependences on which the establishment of a money of the Common, be it complementary or alternative, could rely. [45]

In conclusion, we will sum up several proposals relating to forms of regulation susceptible to favouring the sustainability of the commons and an open social KBE economy, emancipated from the tragedy of the anticommons of cognitive capitalism.

3.1. The theoretical and methodological principles of the Common in the singular theory

In contrast with the a-historical and limited concept of common goods proposed by the political economy of commons, the starting point of the Common in the singular approach is found in the analysis of the historical transformations of the cooperation of work and, consequently, in the nature of products.

In this framework, the "Common", as Negri and Hardt (2009) observe, is not an object, a substance that precedes and transcends human existence; "common" is the socially and historically determinate activity that incessantly produces new institutions which are at the same time the conditions and result of "common" itself.

Compared to the economic theories of common goods, this results in a twofold reversal on a theoretical and methodological level.

3.1.1. From the intrinsic characteristics of goods to work as the ontological foundation of Common

The first reversal consists in bringing back up for discussion the theory according to which the specific nature of certain goods is what renders a good common rather than private or public. [46]

The typology of goods, both the more classic one founded on the concepts of excludability and rivalrousness, and that of Ostrom founded on concepts of excludability and subtractability (cf. Table 1. and 2 section 1) risks inducing a schematic and linear vision of the division of the economy between the spheres of public, private and common. The pertinence of such a division is, in fact, belied by the simple observation of the real dynamics of the economy.

In fact, no good is destined, because of its intrinsic qualities, to become, ipso facto, the object of one way of management in particular: private, public or common.

Multiple examples can be produced in support of this affirmation.

Numerous goods, such as for example, health and education, are theoretically divisible in consumption, and therefore rival and excludable through prices, like private goods. Nonetheless they are often produced by the State, local bodies or by the "third sector" under the form of collective, non-commercial services.

The opposite is just as true, that is no value of use escapes from the sphere of commercial and profitable production, as such, as shown by the growing pressure that the private sector exercises on a whole series of public and common goods. [47]

The case of water is a model illustration of this. Considered to be a common good, it has been the object of a powerful process of privatisation, generating numerous social and therein also political conflicts in Europe. For example, in Italy in 2011, a referendum by popular initiative[48] sanctioned the victory of the refusal of a process of commodification that had been driven by various decree-laws inspired by European directives. Despite the result of the referendum, in numerous towns the re-municipalisation of water management encounters strong resistance.

Even goods which are considered pure public goods, such as defence, justice or domestic security, can be produced by the private sector in a logic of commodification and profit. In the United States the management of a significant part of the penitentiary system is entrusted in this way to the private

sector. Another emblematic and extreme case, as underlined by the studies of Gambetta (1992) in Italy is that of the Mafia-business, because it is an industry for private protection.[49]

A further illustration of the way in which the classification of a good does not prejudice its way of management, is that of knowledge. By its non-rival and difficultly excludable nature, it falls within the typology of public goods.[50] In reality, its production and the mechanisms of its circulation are far from being guaranteed by the public sector only and/or following a non-commercial logic. Knowledge is the object of a growing process of privatisation, as the strengthening of intellectual property rights (IPR) and the enclosures of knowledge that characterise cognitive capitalism bear witness. [51] On the contrary, knowledge-intensive communities, as in the cases of free software or Wikipedia, can produce knowledge as a common good, making it available free-of-charge, in an alternative way both to the logic of private and public.

In short, no objective economic criterion exists tracing a demarcation line between the sphere of public, private and common according to intrinsic characteristics of the goods.

These dividing lines are rather the result of political choices that express the relationships of strength and compromises that, at a given historic moment, establish themselves between the subjects and the interests that derive from each of these spheres.

The common is thus a product of a social and institutional construction that elects it to this status. It refers not to an essence that precedes it, but to the forms of governance and labour cooperation that insures its production, reproduction and distribution. Since it is so, the Common potentially concerns every type of resource, good and service, even if this does not mean overlooking the specific management problems that each of them may present. [52]

Finally, contrary to what the static typology of standard economic theory seems to postulate, the same characteristics of goods, the hierarchy of needs and the way of satisfying them evolve in the course of history. All these elements are the result of the historical dynamics of the development of the productive forces and social relationships that incessantly modify the norms of production and consumption.

Different observations allow us to illustrate the significance of this affirmation on an empirical and theoretical level.

Merely think how the development of collective production of man for and by man (health, education, research)[53], traditionally guaranteed in Europe by the collective services of Welfare, is taking on growing importance with respect to what was the sphere of predilection of the development of industrial capitalism and the great private corporation: industrial production of standardised material goods destined for the private consumption of families.

The same rival or non-rival, excludable or non-excludable character of numerous goods is changing however with the technological evolution of the forms of their production. For example, the digitalization of books, music and films frees the spreading of cultural goods from their physical medium, making them theoretically pass from the status of private goods (rival and excludable) to the state of collective goods (non-rival and difficulty excludable).[54]

Last but not least, this historic contextualisation is perhaps even more important for the subjects of the production that is for the composition of labour. On this subject think about how in the 1950s and 1960s the hypothesis itself of an activity of innovation and research that developed outside academic institutions or the R&D laboratories of large companies was practically unthinkable for economic theory. Today, on the other hand, the observation according to which a large part of

these activities rests on social networks and knowledge-intensive communities which organize themselves autonomously in society stands out more and more.

It is therefore the approach itself of the theory of public and common goods that must be inverted. One should not start out from an abstract typology of goods, but from concrete historical forms of labour producing the actual goods.

In short, it is the capacity of labour cooperation to organize itself in an alternative way compared to the private and public logics which determines in the last resort the propensity of a series of goods or resources to be managed according to the principles of Common.

Now, this growing capacity of self-organisation of labour depends in post-Fordist societies on the development of a widespread intellectuality and forms of cognitive organisation of labour breaking with the logic of the division of labour belonging to industrial capitalism. The social spread of knowledge and the reassembly of planning and implementation labour constitute the necessary pre-condition for the return to strength and the ontological foundation of the Common in contemporary capitalism.

3.1.2. From common goods to the Common in the singular: a new theoretical perspective

The second reversal consists exactly of talking of Common in the singular (with capital C) and no longer simply of common goods or commons. This theoretical innovation is of crucial importance. Common must not be thought of as a simple enclave compared to the norms of public or private, or better as a "third" sector that fits between the State and the market in order to correct the most flagrant "failures". It constitutes a general principle of self-government of society and self-organisation of production that can potentially contend for supremacy with the historic State-market pairing and become the leading principle of a new hierarchical structure between common, public and private.

Finally, by this concept we mean a mode of cooperation reintroducing democracy within production in opposition to the principle of hierarchy which characterises the capitalist firm as well as the bureaucratic logic in public administration. More precisely by extending the nice definition of informational common goods made by Benkler, "when no one uses exclusive rights to organise effort or capture its value, and when cooperation is achieved through social mechanisms other than price signals or managerial directions." (2004, 1110). [55]

The Common in the singular can therefore be understood in the sense of the tradition of Marxian economic thought or the historical school of economics (Sombart, Weber) as a real way of production (or economic system) in fieri.

Note that on these bases the theoretical approach of Common in the singular has two major implications:

- On one hand, this concept indicates a general principle of self-government of society that ideally makes democracy redescend to the same sphere as economy and strategic decisions related to the questions: how to produce? What to produce? For whom? To satisfy what needs? This is a fundamental break compared to systems founded on the State-market pairing where democracy remains relegated to the political level of representative democracy and completely separated from the economic sphere, a sphere in which strategic decisions depend on private and/or public property that both share the principle of absolute property.

- On the other hand, the introduction of the concept of Common in the singular modifies the sense and the hierarchy of the other notions used in the political economy of common goods. The notion

of commons thus outlines the concrete and decentralised expressions of this general principle; common goods are all the goods or resources managed by the commons, independently of their specific characteristics in terms of rivalrousness and excludability: common property outlines social relationships of property founded on use, mutualisation of resources and non-appropriability.

Obviously, as we will see, the achievement of the principles of the Common in the singular is a complex process that must rest on institutions that reciprocate and ensure reproduction over time and in space of commons and common goods: ways of management founded on self-management and collaborative economy; relationships of exchange founded on reciprocity and gratuitousness; juridical regimes that, like the invention of copyleft for free software, guarantee the accumulation of a stock of common-pool resources; norms of distribution that permit the active involvement of commoners in the development of the commons, guaranteeing a basic income, for example.

Let us make it clear that even from the perspective in which the Common became predominant in social organisation, [56] this would not mean the disappearance of every vestige of public and private, the State and the market. Rather it would mean the establishment of a new hierarchy between Common, private and public. [57] In particular for example, the possible supremacy of the logic of common would not mean that the institutions and guarantees of the welfare state would vanish, but the transformation of their way of management through the development of mechanisms of direct democracy and coproduction which would permit transition from a model of state-control to a model of the commonfare state.

4. Common and commons in the contradictory dynamics between KBE and cognitive capitalism[58]

The development of commons is one of the most nullifying expressions of the contradictions that oppose the logic of the KBE and that of cognitive capitalism (cf. Box 3). The expansion of commons originates, in fact, from a two-fold impulse. On one hand it arises from the endogenous dynamics of an economy based on the spread of knowledge which leads to forms of sharing and production based on pooling and free access to resources. On the other, it presents itself as a reaction to the movement that, in the opposite direction, leads to new enclosures of knowledge and the living in two principal ways:

The reinforcement of intellectual property rights according to dynamics that have accelerated since the eighties leading up to the current tragedy of the anticommons of knowledge;

The subjugation of the collective conditions of a KBE, especially the production of man for and by man of the welfare state, to the logic of cognitive capitalism that tends to bend the institutions of welfare to the principles of private management.

In this framework, the democratic re-appropriation of the institutions of welfare and the claim of knowledge as a common good are the principal grounds on which the dynamics of commons are expressed. Joining them could permit the emergence of profoundly different way of regulating the KBE compared to that promoted by cognitive capitalism and the neo-liberal model[59] of commodification of the economy. In the course of this section we will analyse these dynamics in order to deduce from them ultimately some devices open to guaranteeing the sustainability of the development of commons and the achievement of the principles of the Common.

Let us remember that cognitive capitalism is not a simple variant of what has been commonly called since the Lisbon European Strategy an "economy of knowledge" (or "knowledge-based economy").

These two concepts must instead be rigorously distinguished in order to understand how they interact and the tensions they generate.

The notion of knowledge-based economy (KBE) refers rather to a new stage of development of material and intellectual productive forces. Its emergence has been stimulated by the meeting of two factors: the rise of a widespread intellectuality stemming from an astounding rise of the level of schooling and the democratisation of teaching; the fall in costs and the decentralisation of mechanisms of circulation of knowledge permitted by the cluster of innovation (from the PC to the Web) tied to the new technologies of information and communication (NTIC). This dynamics is apparent in the ensemble of the economy as is shown by the importance of externalities tied to knowledge and to the spread of pockets of knowledge production and

treatment of information in all economic sectors, including those in which the intensity of technology is eventually relatively weak. Understood like this, the constitution of widespread intellectuality and the NTICs play a role comparable to that that the development of the steam engine and of the machines used had at the time of the first industrial revolution. The rise of a KBE maintains a complex relationship with the social relationships of property and the institutions of capitalism which tend to frame and subject it to its logic of value-creation. According to Andrè Gorz (2003), the KBE even contains "at its base a negation of the capitalist market-oriented economy" and the possibility of overcoming it according to a trend of which knowledge-based commons would be the archetype.

The concept of "cognitive capitalism" rightly indicates, after mercantile capitalism and industrial capitalism, the advent of a new historic system of accumulation in which the central stakes of improvement of capital focus on control of social and institutional conditions of production of knowledge and the transformation of the latter into merchandise. In this evolution, the accumulation of capital rests on "rentiers mechanisms", as we can see with the growth of finance and intellectual property rights (patents, copyright and brands).

Cognitive capitalism and KBE are therefore not identical, but refer to the logics of functioning which prove to be contradictory on several points. These are manifest both on the framework of the wage relation and at the level of the division between the social character of production and the private character of appropriation. The way in which expansion and strengthening of intellectual property rights encroach upon knowledge as a public good is one of the most significant demonstrations of this (the tragedy of the anticommons).

Box 3: Cognitive capitalism and knowledge-based economy: two different and contradictory concepts

4.1. From a welfare state system towards a commonfare system[60]

The institutions of the welfare state present themselves as key pieces at stake in the development of a KBE and the contradictory relationship that the public, private and common spheres maintain in this framework.

In order to illustrate this concept, we shall start form the interpretation of a stylised fact which is often used by economic theory to characterise the emergence of the KBE. We are referring to the historical dynamic by which, in the U.S., starting from the mid-1970s, the so-called intangible part of capital (R&D and, above all, education, training and health) would have surpassed material capital in the global stock of capital (Kendrick, 1994) and would have become the most decisive factor of development and competitiveness.[61]

4.1.1. Intangible capital and knowledge-based economy: the driving role of welfare institutions[62]

The interpretation of this stylised fact has many important and interrelated meanings which, however, are systematically concealed by mainstream economists. These meanings are nonetheless essential to understanding the role of welfare institutions and the profound and often misrepresented objective of the policies which aim at dismantling and privatising them.

The first meaning, on a conceptual level, is the following: in reality that which we call intangible and intellectual capital is fundamentally incorporated in humans. It corresponds to the intellectual and

creative faculties of the labour force, that which is often also called, using a controversial expression, the so-called human capital.

Prolonging this reasoning it could be affirmed that the notion of intangible capital in reality merely expresses the way in which in contemporary capitalism the "living knowledge" incorporated in and mobilised by labour now perform, in the social organisation of production, a predominant role compared to "dead knowledge" incorporated in the steady capital and in the managerial organisation of businesses.

The second meaning is that the increase in the part of capital called intangible is closely linked to the development of the institutions and collective services of welfare.

In particular, it should in fact be emphasised how is actually the expansion of the collective welfare services that has allowed the development of mass-education, carrying out a key role in the formation of what we can call collective intelligence or widespread intellectuality: it is in fact the latter, widespread intellectuality which explains the most significant part of the increase in the capital referred to as intangible which, as is emphasised, today represents the essential element of a territory's potential growth and competitiveness.

The third meaning refers to the way in which expansion of the socialised salary (pensions, unemployment benefit, etc.) allows a freeing-up of time mitigating dependency on wage relationships. From the point of view of the development of a knowledge-based economy (KBE), this freeing-up of time occurs, to use the words of the thesis of general intellect, as an immediate productive force. The socialised salary thus favours access to voluntary mobility between different forms of activities, training, self-improvement and labour which create wealth. Even though it is stigmatised today as an unproductive cost and brought back into discussion by workfare policies, it has made an indisputable contribution to the development of the quality of the labour force and the social networks of KBE. It should be noted that even from this point of view Bernard Friot (2010; 2012),[63] one of the major French theorists of the "sécurité sociale" (social security system), is right to defend the principals of the allotment pension system, founded on the mutualisation of resources, in the terms of a Common institution. [64] Considering the active role of a large number of pensioners engaged in the third sector and in knowledge commons, he goes so far as to state that, after all, it is their free and voluntary work that pays a large proportion of their pensions.

The fourth meaning is defined in the fact that, contrary to a widespread idea, the social conditions and key institutions of a KBE are not reducible to only the private R&D laboratories of large companies.

These social conditions also and above all correspond to the collective production of man for and by man traditionally guaranteed by the institutions of the welfare state, following a logic that essentially, at least in Europe, still escapes from the trade and financial circulation of capital. Furthermore it is necessary to underline that this appreciation of the role of the welfare system is also confirmed by a comparative analysis on International scale. Comparison at international level in fact highlights a strong positive correlation between levels of development of non-commercial services and welfare institutions, on one side and on the other, that of the principal indicators of the economic and social effectiveness of a KBE (Vercellone, 2010; 2014; Lucarelli and Vercellone, 2011). A corollary of this observation is also that a weak level of social inequality, of income and of what is guaranteed by the welfare system goes hand in hand with a much more significant spread of the most advanced forms of organisation of labour, based on the centrality of cognitive labour (cf. Table 3). These forms of organisation of labour, in fact, slip from the grasp of competition based on costs and guarantee

lower vulnerability to the International competition from emerging countries (Lundvall and Lorenz, 2009. Cf. Table 3). [65]

Country	Percentage of employees by country in each organisational class				Exposure Index
	Discretionary learning	Lean production	Taylorist organisation	Traditional Organisation	
Austria	47,5	21,5	13,1	18,0	96,7
Belgium	38,9	25,1	13,9	22,1	101,2
Denmark	60	21,9	6,8	11,3	87,4
Finland	47,8	27,6	12,5	12,1	94,6
France	38,0	33,3	11,1	17,7	99,2
Germany	44,3	19,6	14,3	21,9	99,5
Greece	18,7	25,6	28,0	27,7	114,8
Italy	30,0	23,6	20,9	25,4	107,6
Ireland	24,0	37,8	20,7	17,6	106,5
Luxembourg	42,8	25,4	11,9	20,0	98,6
Netherlands	64,0	17,2	5,3	13,5	86,8
Portugal	26,1	28,1	23,0	22,8	109,6
Spain	20,1	38,8	18,5	22,5	109,2
Sweden	52,6	18,5	7,1	21,7	94,0
UK	34,8	40,6	10,9	13,7	98,7
EU	39,1	28,2	13,6	19,1	100

Table 3 National Difference in Forms of Work OrganisationTable 3. National Difference in Forms of Work Organisation. Source: Third European Working Condition survey 2000 in Lundvall and Lorenz (2009, 239).

In conclusion, the main factors of long-term growth and competitiveness of a territory depend more and more, as emphasised by Michel Aglietta (1997), on collective factors of productivity (general level of education and training of the labour force, the interactions of it within a territory, the quality of the infrastructures and research, and so on).

In particular, these are the factors that permit the circulation of knowledge in a territory, generating for the same businesses externalities of networks and dynamic learning economies, the essential foundations for technical progress and endogenous growth.

On a macro-economic level, this also means that the conditions of training and reproduction of the labour force are by now directly or indirectly productive.

To paraphrase Adam Smith, but reaching the opposite conclusion, the origin of "wealth of nations" rests ever more today on productive cooperation situated in society, outside companies, that is to say on social and institutional mechanisms which permit the circulation and pooling of knowledge, and with this a cumulative trend of innovation (Vercellone, 2011).The development of the knowledge commons, like the attempt by enterprise to promote "open innovation platforms" in order to capture knowledge produced outside it, are one of the key manifestations of this.

Despite their importance, teachings drawn from these stylised facts are generally ignored by academic output on the knowledge economy and by reports that contribute to the definition of guidelines of economic policies and structural reform in Europe.

This forgetfulness is all the more serious in a context where the policies of austerity and privatisation risk profoundly destabilising, together with the welfare institutions, the very conditions for the development of a KBE and thus of potential long-run growth.

The risk is thus to witness – notwithstanding the fact that it is happening for an opposite cause to that suggested by Garret Hardin's well-known article – what we can call a new "tragedy of the commons" caused by the dynamics of cognitive and financialised capitalism, a tragedy of the Commons that, it must not be forgotten, goes step by step with that of the anti-commons linked to the excessive privatisation of knowledge.

Numerous researches have in fact made it possible to highlight the short-sightedness of the neo-liberalist policies conducted in Europe today.[66]

Apart from the theoretical weight of the precepts of neo-liberalism, one of the explanations for the persistence of these policies (privatisation strategies) can probably be found in the stakes, represented for the large multinational companies by the control and commercial colonisation of the welfare institutions, and this is due to two main structural reasons:

The first reason is that health, public research, education, training and culture do not only form lifestyles and subjectivity, but, as we have seen, also constitute the pillars of regulation and orientation of a KBE.

The second reason is that the production of man for and by man also represent a growing part of production and social demand, demand which up to now, at least in Europe, has mainly been satisfied outside the logic of the market. In the face of ever more pronounced stagnational trends, since before the outbreak of the crisis, the commodification of the welfare institutions thus constitutes one of the last frontiers for the expansion of the logic of the market and the financialisation of the economy (for example through the transformation to a capitalisation pension scheme).

On this point we note that, contrary to the dominating ideological talk that censures costs and the supposed unproductiveness of welfare institutions, the objective of the neo-liberalist policies is thus not the reduction of the absolute amount of these expenses, but rather that of their reintegration into private sector commercial and financial circulation.

To be sure, the expansion of the privatistic logic in these sectors is theoretically possible.

Let us remember nevertheless that health, education, research, etc., correspond to activities that cannot be subordinated to the economic rationality of the private sector, unless at the cost of rationing of resources, profound social inequalities and, all in all, a drastic lowering of the social effectiveness of these productions.

The result would be an unavoidable drop of the very quantity and quality of the so-called intangible capital that, as we have seen, by now constitutes in contemporary capitalism the key factor in the development of the productive forces and potential growth.

Three principal arguments support these theses regarding the counterproductive character and the perverse effects of subjugation of the collective production of man for and by man to the economic rationality of the private sector.

1) The first argument is linked to the intrinsically cognitive, interactive and emotional character of these activities, in which the work does not consist of acting on inanimate matter, but on humankind itself in a relationship of co-production of services. As a matter of fact, on the level of criteria of effectiveness these activities escape from the economic rationality suited to capitalism, which is founded on an essentially quantitative concept of productivity that can be summarised through a concise formula: to produce more and more with a smaller quantity of labour and capital so as to reduce costs and increase profits. This type of rationality has without doubt given proof of some efficiency in the productions of standardised material commodities destined for private family consumption. In this way it enabled, during the Fordist growth, a growing load of commodities to be produced with less and less work, thus also with decreasing costs and prices, in this way satisfying a significant volume of needs, it matters little whether they be authentic, driven or superfluous. Nonetheless, the production of man for and by man respond to a completely different productive rationality and this is for three main reasons:

- due to their intrinsically cognitive and relational nature, neither the activities of work, not the production can really be standardised;

- in these activities, effectiveness in terms of result depends on a whole series of qualitative variables tied to communication, density of human relationships, uninterested care and thus to the availability of time for others, which the rationality of companies, or New Public Management, would be unable to integrate unless as costs and unproductive downtimes;

- lastly, as Boyer (2004) notes, in these activities, particularly in the health sector, technological progress which permits improvement in the qualitative effectiveness of production is translated almost systematically in a cost increase and a decrease in overall productivity of factors which sets off the increase in well-being of populations.

All in all, the attempt to raise profitability and productivity of these activities therefore cannot be carried out except to the detriment to their quality and so to their social effectiveness. We could even argue that in these activities today, the problem regarding the improvement of effectiveness and quality does not require an increase in productivity, but rather a reduction of it (Gadrey, 2010).

Here we have a first series of factors connected to their means of production which explain why these collective services are unlikely to be compatible with the logic of production and profitability of the private sector and on the other hand they appear as a terrain with a predilection for practices of co-production and mutualisation of the resources themselves to the logic of common.

2) The second argument is tied to the profound distortions that application of the principle of solvent demand would introduce in the allocation of resources and the right of access to these common goods. By definition the productions of Common are based on universal rights. Financing them cannot therefore be ensured except through the collective price represented by social contributions, taxation or other forms of mutualisation of resources.

3) The third argument is tied to the way in which in the production of man for and by man the mythical figure of a perfectly informed consumer does not exist in reality, he/she who would make their own choices on the basis of rational calculation of the costs/benefits dictated by research into the maximum efficiency of the investment in their own human capital. This is certainly not the main criterion that stimulates a student in his search for knowledge. It is even less that of a sick person who, in the majority of cases, is imprisoned by a state of anguish which makes him incapable of making a rational choice and predisposes him instead to all the traps of a commercial logic in which selling hopes and illusions is a means of making a profit. From this point of view it is interesting to note how the neo-liberalist policies of financial responsibilisation of the consumer in the field of health which also make him/her bear a growing part of the expenses of social protection, seem to take up, almost passage for passage, Hardin's old argumentation on welfare as an example of the tragedy of the commons. As Boutifilier (2014) demonstrates, these policies nonetheless not only do not lead to a decrease in expenses (quite the opposite), but appear to have profoundly perverse effects on treatments and therefore on the effectiveness itself of the human capital.

In conclusion, all these reasons tied both to their means of production, consumption and finance explain the economic and social tensions provoked by the continuation of a policy of transformation of the production of man for and by man into private goods. This would risk dismantling the structure of the most essential conditions at the base of the reproduction of a KBE. Experimentation of a model of commonfare finds here one of its principal justifications and could constitute, in the age of the KBE, a fresh form of re-socialisation of the economy, in the manner of Polanyi (1944).

4.1.2. Resistance to the movement of privatisation and commonfare model experiments[67]

Criticism of the bureaucratic model of welfare and the perverse effects of the New Public Management has gone hand in hand with social experiments and political and legislative proposals for a new welfare model based on the Common.

This process began in the seventies, when impressive movements challenging the bureaucratic logic of welfare developed. Today it is meeting with a new phase in the context of the crisis of the so-called sovereign debt and policies of austerity and privatisation carried out in its name.

Its structural foundations are found in the way in which the production of man for and by man are activities in which the knowledge dimension of labour is dominant and makes the development of fresh forms of self-government of labour possible, based on coproduction of services closely involving the users. On this subject, the concept of coproduction (Gadrey, 1991; 2002; Du Tertre, 2002), also used by Ostrom (1996) [68], is of crucial importance to understand the way in which the institutions of the welfare state and more in general local public authorities can be involved in a commonfare logic.

The co-production of a good or a service in fact indicates two closely linked dimensions: the first, as we have seen, refers back to a trait intrinsic to the logic itself of the production of man for and by man; the second happens more generally when part of the input which is necessary for its production comes not from those whose institutional job it is to deliver it, but from those who are, at least potentially, the receivers, making them active and recognised subjects. In this sense, the concept of co-production implies the development of forms of direct and participative democracy and arises as a salient trait of the passage from a bureaucratic and Weberian paradigm of public authorities to a "post-bureaucratic" paradigm (Castaldi, 2012).

Numerous examples permit us to summarise the meaning and the reach of this process.

4.1.2.1. Practices of self-government and organisation of the commons in the health service: some examples[69]

A first illustration takes us back to the seventies in Italy when a strong social movement protesting against total institutions opened the doors of mental asylums getting users and civil society involved in the experimentation of a model of co-production of the services and of "deinstitutionalisation".[70] Like in the Gorizia pilot experience, the model of management founded on co-production and the Common takes the form of a therapeutic community, where the whole of institutional life was regulated by incessant meetings and debate amongst doctors, health workers and patients.

In this sphere the concept and practice of deinstitutionalisation in Italy were far from denoting a simple de-hospitalisation. As underlined by Rotelli, De Leonardis, Mauri (1986) they were instead considered as:

a complex social process that tends to mobilise as players the social subjects involved, who tend to transform the relationships of power between patients and institutions, which tend to produce mental health structures that wholly replace internment in Psychiatric Hospital and originate from the dismantling and reconversion of material and human resources that were lodged there.

In this sense, the authors went on, "deinstitutionalisation does not dry up with the so-called Welfare crisis and […] offers important directions for producing innovation in post-welfare social policies" (Ibidem). [71]

This bottom-up logic of opening and management is also what inspired the formation of Psichiatria Democratica (Democratic Psychiatry) constructed not only by psychiatrists but also by nurses, social workers, patients and citizens – and which proposed to support the new psychiatric procedures and to create constant links with the Unions, Political Parties and all the movements that were doing their best to eliminate mental hospital exclusion.

This process of de-institutionalisation became a reality between 1971 and 1979 in the dismantling of the mental asylum structure in Trieste (1977). It culminated in 1978 with the passing of Law no. 180 1978, commonly known as the Basaglia Law, which ratified the closure of the mental asylum as a structure appointed for the cure of mental illness. This achievement and institutional recognition will show at the same time the entire complexity of the relationship between common and public, in a context in which the first depends on political will and the financial means mobilised by the second. The result was that the application of the law took place patchily, with situations where it was respected and others where on the contrary it was completely disregarded. Moreover, in the absence of a decree to put this into effect, specifying directions for application of the rule and guaranteeing allocation of funds, "for setting up psychiatric structures providing care – such as Mental Health Centres, Family Homes and Therapeutic Communities – it was the Regions who regulated its application together with the competent Local Health Unit (USL)" (Riccato, 2013). [72]

A similar spirit in the nineties also animated the movement of the co-ordination of nurses in France, which declared the key role of interaction and co-production of service with the sick to be the central element of the concept of their professional work and of a non-bureaucratic management of healthcare institutions.[73]. We find this in more recent experiences of self-government, partly dictated by the urgent healthcare situations created by the policies of austerity, which have developed in Greece and Spain.

Likewise in Greece, in order to face up to the dismantling of the public health system, since 2011 about forty self-managed healthcare districts have developed thanks to the initiative of organisations of doctors, volunteers and plain citizens who collected and shared medicine, instruments and

medical supplies. The defence of guaranteed "universal" healthcare in this framework goes hand in hand with the experimentation of self-managed welfare. Independently of the outcome of the crisis and the coming out of a situation of healthcare emergency, these forms of mutual aid from the bottom can transform in a lasting way the organisation of Welfare in Greece compared to the previous state-bureaucratic model.

Of great interest from this perspective of the right to healthcare as an institution of Commons, is also the experience of the Centro de Autogestión Primaria en Salud ([Primary Self-management Health Centre] CAPS) in Barcelona which is integrated in the more general project lead by the Cooperativa Integral Catalana ([Integral Catalan Co-operative] CIC). Since 2010 the CIC self-organises a diverse set of productions and services ranging from after-school care, training, social housing and workshops up to the medical centre which guarantees each citizen consultations and therapies in exchange for hours of work and "ecos", an alternative money.

A further illustration of this is the formation of networks of counter-expertise formed by associations of citizens in the field of health. In this case, as well as an activity of putting information at people's disposal, the commons perform a bottom-up role of production of knowledge, as in the case of ACT-UP for AIDS in France that since 1989 has made an essential contribution to the improvement of treatments and to a more equal relationship between the sick and the healthcare professionals.

4.1.2.2. The home as a common good versus the rentiers logic[74]

Another fundamental example of the dynamics of the commons is that of movements for access to a home as a universal right of citizenship.

This dimension of the claim of Common has a long historic tradition which nonetheless takes on ever more important significance for the strategic role that it performs in cognitive financialised capitalism.

A particularly interesting case on this subject is that of the movements of squatters[75] and self-managed social centres, in that the dimension of the right to housing is divided into, in the majority of cases, a vaster spectrum of common goods, such as the right to culture. In this framework, the right to housing nonetheless has a strategic aspect in as much as we can state that in the age of KBE, the main land commons is exactly that of housing. For cognitive labourers it has practically the same importance that access to common lands had for the English peasant in the 15th-16th Century. For a knowledge-based labourer, the fact of living in nerve centres of the metropolis or in a poorly-served periphery conditions his/her professional route and lifestyle decisively. More in general, the quality and access to housing are the diriment elements that determine, in a KBE, the capacity of a territory to attract a cognitive labour force and knowledge-intensive intangible investments. This finding is all the more true that, thanks to the ability of the Internet to favor "cooperation between brains" in network, the house becomes, as pre-industrial times, also a vital centre of the production and not just more of the place of reproduction of the potential energy of the labour force.

As shown by authors such as Florida R. (2002), Mouhoud E.M. (2013), Scott A. J. (2014), the economies of agglomeration and the externalities of knowledge that make up the innovative strength of a territory depend on the social quality of an urban environment (access to housing and services, cultural freedom, tolerance).

Also for these reasons the issue of the housing commons finds itself at the centre of contradictory relationships that the conditions of development of a KBE maintain with the logic of the yield of cognitive capitalism.[76]

Housing is in fact the subject of a powerful trend of enclosures and intense speculative activities. They cause the income to rise to the advantage of a financial élite of property entrepreneurs who control the policies of regulation of the territory and leads to the gentrification of the pulse centres of metropolises. The result is the expulsion or in any case the degradation of the conditions of life of younger, more precarious and dynamic subjects of the knowledge-class and the so-called creative class. [77] Just think, on this subject how, according to the estimates of Piketty (2014), the main factor of the growth of rentier income in the last thirty years is to be found exactly in property income (cf. Figures 1 and 2).

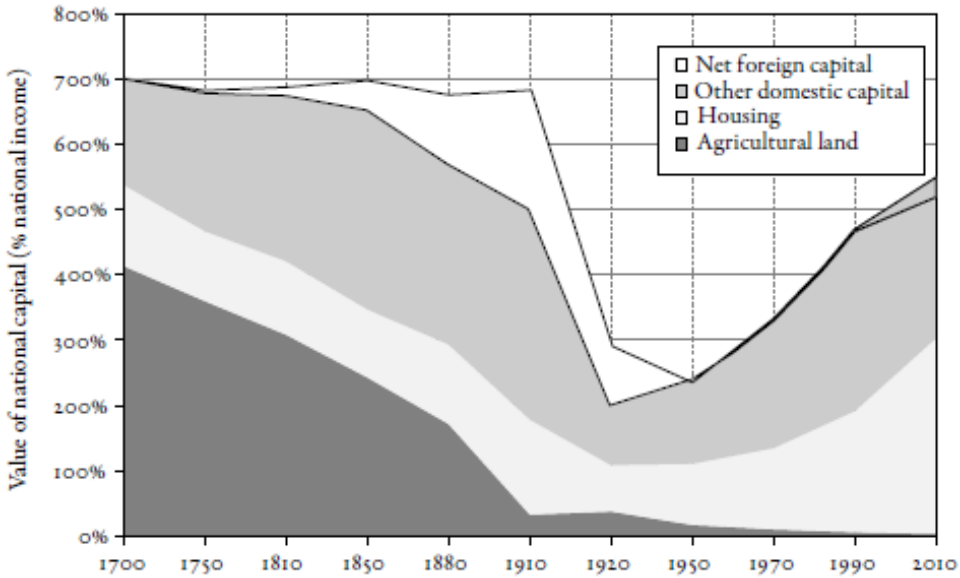

Figure 1:. Rate of growth of capital in Britain (1700-2010) Sources and series: see piketty.pse.ens.fr/capital21c.

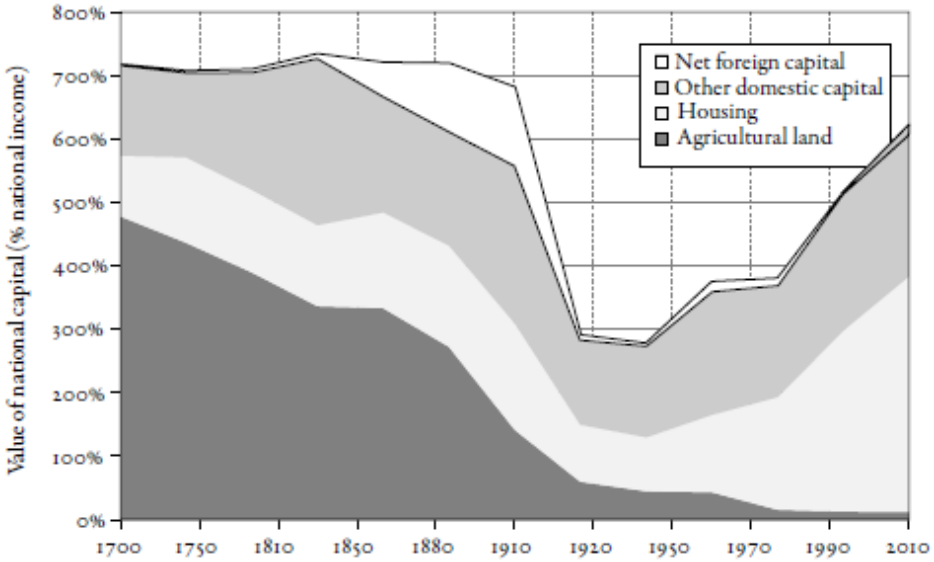

Figure 2: Graph 2. Rate of growth of capital in France (1700 - 2010) Sources and series: see piketty.pse.ens.fr/capital21c.

Legenda[78] From the diagrams it emerges how the value of property in England and France varies over the course of time: from 1700 it follows a decreasing trend up to the 1920s to then start to grow. But it is from the '90s that there is a marked increase in the value of property tied to housing, with an even more marked trend in France.

This process goes hand in hand with the development of the financialisation of the economy. In the contemporary knowledge-based and intangible economy, enclosures linked to housing appear to perform a similar role to that performed at the time of the birth of capitalism, by the land enclosures. Furthermore we can note that the evolution of the legacy tied to agricultural lands undergoes progressive decline with the development of industrial capitalism, until it has a totally scant weight in today's Great Britain.

In reaction to this trend of land enclosures one of the main dimensions of the creation of new commons is the movement to occupy houses both for the purpose of inhabitation and for the development of activities of self-managed associations/productive and cultural activities.

Amongst the numerous illustrations of this process on a European level, we can dwell on an example on some of the most significant cases where the issue of the house is closely bound up to that of culture and other self-managed production practices.

On this subject, for example, the historic experience of the Tacheles (Berlin) is particularly significant. [79] The Kunsthaus Tacheles (House of Art) was a workshop and a gallery of modern Berlin art, as well as a cultural and crafts centre in the central quarter of Mitte. In 1990 a group of artists called Tacheles occupied a shopping centre built in 1909 managing to block the demolition which was under way and very quickly to have it classified as a historical monument. In constant conflict with the logic of real estate speculation, Tacheles resisted up to 2012 when it was finally cleared and everyone made to move out at the owner's request – the Jagfied group which is specialised in the area of luxury property and which sold it in 2014 to a New York investment fund for 150 million euro.

The large building, visited in its last years by about 400,000 people each year, gave space to, amongst other things, 30 studios, show rooms, modern art sales rooms, an art cinema, a large space for concerts and readings. An entire floor with a stage was used for low-cost theatre productions and especially for free contemporary dance shows. A large bar and restaurant were places for convivial refreshment. One wing of the Tacheles was also set aside for the production and commerce of crafts from many countries and bookshops in various languages. Artists and craftspeople originating from different places made their income from the activity they carried out at the Tacheles. It operated according to rules which respected all the characteristics of a real Commons: the pooling of resources associated with collaborative practices of production and management by assembly of the strategic decisions for the future of the commoners.[80]

The history of the centri sociali (Social centres) in Italy is another case model because of its persistence over time and the spread of the phenomenon. These are self-managed social spaces most of which are squats or sometimes granted by local authorities. The spectrum of the activities is vast and goes from the opening up of disused buildings up to the organisation of a wide range of cultural and productive initiatives. One of the most emblematic experiences is without doubt that of the Cantiere (Construction site) and the space of the Mutuo soccorso (Mutual aid) in Milan.[81] It all began in May 2001 when a group of young students and temporary workers entered one of the many abandoned buildings in the city, which in the past had been home to the famous Derby Cabaret. After 16 years neglect, the community renovated the space, restoring it to young people,

to its quarter and the city turning it into a "common place" where ideas and ways to build social alternatives are under construction. The Cantiere has rapidly become the fulcrum of experiences of sharing and cultural creation offering study rooms, offices, internet access, low-cost concerts, a bookshop and a theatre. The jewel in the crown of this rich cultural ferment is the Università Popolare (Popular University), a place for the elaboration and exchange of knowledge through debates, conferences and self-study training courses. Particular attention is paid to the teaching of languages and the informed use of new technologies. Services such as legal aid counters, crèches (especially for migrant workers), and centres for ecological co-working are provided as well. The Cantiere, through alternative organisational principles and practices both to the bureaucratic logic of public and to the commercial one of private, constitutes a metropolitan knowledge, cultural and social Common. It is the advanced exemplification of a broader and more diverse logic, in continuous evolution to the point that it is difficult to have precise statistics to describe the breadth of the "Social Centre" phenomenon. On this subject we note that the concept of an alternative currency within this universe could perhaps be a factor in the increase of self-awareness and growth of the productive complementarity. This perspective would be much stronger if a part of the social centres made a qualitative leap towards forms of cooperation which characterise the hackerspace and the Fab Lab (Fabrication Laboratory) as is happening especially in California.

The experience of social centres and the building of metropolitan commons in opposition to the logic of land yield combined with the multiplication of experiences that mobilise knowledge-based workers on a more specific terrain: that of theatre squats.

4.1.3. Culture commons the Teatro Valle Occupato and the Fondazione Teatro Valle Bene Comune[82]

On a terrain which is often close in as much as it is partly tied to the land commons we have movements which are pressing for the conception of and to permit the collective re-appropriation of culture as a common good.

From this point of view, one of the undoubtedly most significant experiences, also on a legal level, is that of the Teatro Valle theatre in Roma.

In 2008 a small group of people working in show business decided to get together to start to talk and make themselves known. This is a central part of temporary and cognitive labour, characterised as Cristina Morini (2014) emphasises, by the fact that "the work of art and show business is by its nature characterised by its intermittency" by alternate periods of work and unemployment which all carry out a directly productive role making it difficult to be able to distinguish work time from non-work time. [83]

The issue of access to spaces for culture and that of the guarantee of an income are, even more so than for other knowledge-based workers, closely bound.

On the basis of this, they start to mobilise, for example reading the 2007 European Statute of Artists on the stage, participating in conferences, public debates, demonstrations and meeting government ministers. In 2010 "the show business workers", join other intangible workers, students, researchers, professors, journalists and editors in demonstrations. On 14th June 2011 they decide to enter and occupy one of the oldest theatres in Rome, the Teatro Valle.

One of the main reasons that drove to occupation of the theatre was the project in which in place of theatrical and cultural performances, according to the then- mayor Gianni Alemanno, "a car park was going to spring up".[84] The experience came to an end in August 2014 after three years squatting

in the theatre with an agreement with the new administration of the city council, the Comune di Roma, that had to, in principle, guarantee elements of continuity in the established practices, within the legal logic of public.

In brief for the protagonists of the Teatro Valle Occupato squat it is a matter of building an open stage, a project to share independent spaces in Rome and in Italy with companies, artists and operators in order to experiment a joint design and a different organisation of work based on cooperation; a place of training and self-training where access to knowledge and quality is guaranteed. [85]

The experience of the Teatro Valle Occupato goes beyond the simple collective practice of establishing a joint space to share. It represents a practice of re-appropriation which wants to transform itself into a constituent of a new way of doing politics without delegating, of fresh work practices, of creation and production based on collaboration and sharing.

From meetings with jurists (in particular Stefano Rodotà and Ugo Mattei[86]) and with sentiments committed to the movement against the privatisation of water, the idea was born that the concept of common goods can constitute a concrete alternative, even on a legal footing, "to the institutions led by a logic moved by the sole objective of private profit and the bureaucratic logic of the public sector".[87]

From this intuition the Fondazione Teatro Valle Bene Comune was born, a foundation that sets out in its preamble the statute of common good and its relationship with the public:

we who in common from 14th June 2011, occupy, re-appropriate and openly and publicly restore the "Teatro Valle" of Rome to the community, hereby intend to embark on a course to establish full legal recognition of the "Teatro Valle" of Rome as a Common Good. We have reacquainted ourselves with the "Teatro Valle" and brought it to life not only to defend it in the interests of all, but also in order to undertake a process to establish culture as a common good which is able to spread and contaminate every public space, sparking a profound transformation of the way we act and think [...]. The common good is not given, it manifests itself through shared action, it is the fruit of social relations amongst equals and an inexhaustible source of innovation and creativity. The common good originates from the bottom and from the active and direct participation of citizens. The common good is self-managing by definition and defends its own autonomy both from the interests of private owners and public institutions which govern public goods following private-sector logic. We know that common goods constitute a new legal category, independent as regards the title of belonging, directly tied to the putting into effect of values promised in the Italian Constitution born out of the Resistance, but removed from our common way of life because they have continuously been betrayed by private and public oligarchies.[88]

This is then a

constitutive course for building a new institution of the, which unhinges the mechanism of party interference and is the inspiring principle of new cultural policies thought of from the bottom by those who love and produce culture. A place which is neither public nor private, but governed by the community of artists and citizens who put themselves on the line to take care of and decide which direction to give to the "Teatro Valle". Each head is worth one vote in the assembly, whatever their economic means, according to the inalienable principle of equality between persons. [89]

In the management of the Teatro Valle, in such a way the concept of common goods comes to take on the characteristics of direct democracy that concerns the introduction of a new principle in the social, economic and legal system. It is therefore in the idea of openness, sharing and participation

that the principles of commons lie, understood as the political practice of acting collectively in the experience of the Teatro Valle Occupato. A modus operandi is outlined following the practice of self-management as the basis of this new way of conceiving, organising, establishing, and living society, and a modus constituendi which passes through a course marked by conflict in acquiring and governing common goods.

It is difficult to say what the exact future of the Teatro Valle will be, of this structure which is by now suspended between public and Common, following the end of its occupation. Taking up the terms of the message communicated by the Teatro Valle Occupato, the idea is that of a "project for a participative theatre run in a shared manner by a formal public institution and an informal institution, created from below, shared in and inspired by the principles of common goods." [90]

In any case, the experimentation carried out with Teatro Valle Occupato and with the Fondazione Teatro Valle Bene Comune offers a solid platform of teaching for other experiences of the same type that are produced and reproduced in Italy, as in Europe.

It does not want to limit itself to the limited sphere of the theatre, but intends to put itself forward as a general principle based on the commons to extend to the whole of society. It concerns a structured course that starting from this experience is trying to introduce recognition of common goods in the Italian legal system. The establishment of the Rodotà Commission should be read in this framework.

4.1.4. Legal commons: recording the concept of Common and common goods in the working rules themselves of local public authorities

The historic inheritance of a tradition of decentralisation and local self-government that dates from the Revolution of the Comune in the 12th Century, the belated birth of a unified State and the fragility of its legitimacy, the intensity of social movements that have crisscrossed it since the crisis of Fordism, partly contribute to explaining why Italy is, in Europe, the place in which the same legal deliberation on common goods has been brought further ahead and faced in the most explicit way.

The statute of the Teatro Valle Occupato, the work of the Rodotà Ministerial Commission on common goods, and their continuation in the LabSus (Laboratorio Sussidiarietà [Subsidiarity Laboratory]) network illustrate this.

4.1.4.1. The Rodotà Commission: for the introduction of the notion of common goods in the Italian civil Code[91]

At a higher institutional level compared to the Statute of the Fondazione Teatro Valle Bene Comune, are found the works of the Rodotà Commission, the LabSus network and the Comune of Chieri's Regolamento dei Beni Comuni (Regulations on Common Goods) which attempt to enter the concept of common goods in the rules of the functioning of public authorities themselves.

The Commissione sui Beni Pubblici (Commission on Public Goods) was established in 2007 by the Ministry of Justice to draw up a draft law enacted under delegate power for the modification of the norms of the Civil Code on the subject of public goods.

The reasons behind its establishment are to be found in the necessity to integrate in the Italian civil Code the effects of economic and technological changes linked to the revolution of what is intangible and the ecological crisis.

In the face of these challenges, the Commission preliminarily proposes modification of the definition of "good" (included today in article 810 of the Italian civil Code), to make it include "intangible things,

the utility of which can be the subject of rights: thinking of financial goods or the spectrum of frequencies".[92] Following this change, a new distinction between three categories of goods is also introduced: common goods, public goods and private goods. Thus for the first time, within the Institutions that hold legislative power in Italy, a new category emerges "that of common goods, that do not enter 'stricto sensu' in the category of public goods, since they are of common title, they can belong both to public persons, but also to private ones." [93]

In the proposal of the text put forward by the Commission to the Senate common goods are defined as, the:

things that express functional utility to the exercise of fundamental rights as well as the free development of a person. Common goods must be protected and safeguarded by the legal system, also for the benefit of future generations. Holders of common goods can be public or private legal persons. In any case their collective enjoyment must be guaranteed, within the limits and according to the ways fixed by law. When the holders are public legal persons common goods are managed by public subjects and are not for sale; concession of them is permitted only in cases the law allows for and for limited duration, without the possibility of extensions. Common goods are, among other things: rivers, streams and their springs; lakes and other waters; the air; parks as defined by law, forests and wooded areas; mountainous areas at a high altitude, glaciers and perpetual snow; shores and coastlines declared environmental reserves; protected wild fauna and flora; archaeological, cultural and environmental goods and other protected areas of the landscape. Regulation of common goods must be coordinated with that of civic use. Anyone has access to the jurisdictional protection of the rights connected to the safekeeping and enjoyment of common goods. Except in cases of legitimisation for the protection of other rights and interests, the State is exclusively legitimised to exercise an action for damages caused to a common good. A legal action for the reversion of profits is also up to the State. The requirements and ways of exercising the above-mentioned actions shall be defined by the delegated decree. [94]

Nothing followed the proposals advanced by the Rodotà Commission. The innovations of merit and method that the work of the Commission produced, however, remain at the disposal of a community, that starting from the actual considerations of the Commission arrive at making their own decisions, with respect to the theme laid down by the category of "common goods", with the referendum of 12 and 13 June 2011.

The 2011 water referendums are, in fact, the basis for building a fresh alliance between the democratic practices of active participation and the world of scholars (for the most part jurists). The result of this will be the reconstitution of the Rodotà Commission on 13 April 2013 which intends to develop, with a bottom-up methodology, a collective work of reflection structured on two levels:

- to start from the innovations experimented from the bottom (civic uses, sentences, Statutes, like that of the foundation of the Teatro Valle) to identify the legal instruments to strengthen or to create for legislation on common goods;

- the collective production of a multi-textual, joint, emendable and open elaboration, like in the model of the Icelandic constitution, fitted to strengthen the public space of a shared vista of common goods.

4.1.4.2. The Labsus network and the experimental model in the Municipality of Chieri[95]

The activity of the LabSus (Subsidiarity Laboratory) network enters coherently into the perspective of the New Rodotà Commission.

LabSus, since 2005, has concerned itself with creating a "container" able to review the initiatives that citizens in different Italian regions have undertaken to safeguard common goods: environment, monuments, territory, space, streets and schools, etc. Since its creation LabSus has catalogued over three hundred cases of community management of goods. Its purpose is to boost and augment the "density of participation" within the Italian territory, in order to contribute to the realisation of a new model of democracy. A "container" that wants to make citizens aware of the experiences which have succeeded, so all the processes tied to the different systems of self- regulation of the care, management and exploitation of the common good.

"The Italy of common goods' made up of resources, physical and intangible, which are neither private (of single individuals) nor public (of the State), but of all" as the president of LabSus, Giorgio Arena states.[96]

In the LabSus structure, the concept of common often remains limited to the threshold of a simple collaboration between administration and citizens, with ambiguous elements on the hybridisation between common goods and private management entrusted to businesses for profit.

Starting from the platform drawn up by LabSus and the Municipality of Bologna, the "Regolamento comunale per la partecipazione nel governo e nella cura dei beni comuni" originates[97] in the Municipality of Chieri. This is an "experimentation of the democracy of the common", where the production, sharing and management of common goods plays a central role.

The regulations drawn up by the Municipal Authority of Chieri, made use of the contribution of Ugo Mattei in his capacity as deputy Mayor. They were approved as an experiment for two years by town council resolution no. 105 of 24 November 2014. The philosophy of the text proposes to render the citizenship participatory in the management and shared care of common goods. A participation that must guarantee and protect access and use over time of all those goods that the community recognise as being common goods. In the definition of common goods, the following are recognised, all those "goods, physical, intangible and digital, that the community, even through participative procedures, recognise to be functional for the exercise of an individual's fundamental rights, collective and individual well-being and in the interest of future generations".[98]

In short, the concept of common goods has clearly been thought out as a social construction and not on the basis of the intrinsic characteristics of the goods. From reading the regulations seven main fundamental principles can be inferred:

1) Participation. The prominent aspect of the text, as already introduced, is the principle of participation in the identification, care and regeneration of the common good.

2) Access and Management. The text approved provides for a well-defined and skilled framework of subjects who will take care of the common goods. In fact, the regulations speak of "autonomous subjectivity" or "reference community", defined as all those subjects, singly, in association or in any case joined in, even informal, social format that do their best to identify and work for the care and regeneration of common goods. If these bodies organise themselves stably around a determined common good, these autonomous subjectivities will establish a "reference community". Democratic institutions open to everyone "on the basis of internal regulations of self-government" which make fundamental values out of access and transparency in management together with the fact of being

non-profit-making. The regulations also provide that the management of the common good can be shared between citizens and the Municipality of Chieri. Under some aspects, for example belonging to a territory, identification of a precise "overseer" appears to recall several characteristics of the principles of governance of the commons devised by Ostrom, that of the "clearly defined boundaries", which define the subjects who are part of it (cf. Section 1).

3) Responsibility and inclusivity. The management of the common good is based on the relationship of trust and responsibility, "pact of sharing" that is established between the municipality and the citizenship that proposes to take care of the common good. A pact that must guarantee inclusivity "in order to permit every citizen, be they male or female, to join in intervention, avoiding any 'private' vision of the common goods". The sharing, management and access to the common good seen both as a unifying value of the community and as an instrument aimed at removing substantive inequalities and guaranteeing the broadest enjoyment of resources and services.

4) Property. Both public spaces and buildings and private spaces for public use are considered amongst the goods of common interest. The regulations seem to undermine the principle of absolute public property. In fact, it excludes the direct alienation that is the sale of goods by the Municipality to individuals or private bodies. Nonetheless it provides for a community land trust[99] that is an institution that permits the transfer of property to foundations that like in the Statute of the Teatro Valle, manage the common good in an open, participative and continuous way over time. The text also provides for the presence of other non-typical associated subjects not considered by the Italian legal system. The Municipality of Chieri at the request of the citizenship, and in compliance with the laws in force, will do its best for the recovery of abandoned private goods in view of community management of the good.

5) Innovation and social production. Another of the innovative principles drawn up at Chieri concerns the encouragement of the social innovation of shared services. It is emphasised how sharing the common good must be targeted not only at social cohesion in a strict sense, but must above all facilitate the production of collaborative services. The aim is to improve and broaden the offer of public services and to face new social needs. Sharing of goods and co-production of local public services is promoted by all subjects in order to active generative processes of physical, intangible and digital common goods. These processes are fulfilled through different forms of organisation, such as committees, co-operatives, social enterprises, start-ups, etc. Special stress is given to promoting urban creativity, as a form of social cohesion and upgrading of the territory. For this purpose new forms of work are encouraged, such as co-working spaces. Another of the more interesting aspects lies in the significance given to digital innovation in the perspective of digital common goods.

6) Environmental and Financial Sustainability. Within the spirit of the text the value of safeguarding and the continuity over time of the common goods is emphasised. The issue of environmental sustainability is raised in correlation with that of financial sustainability. To this end measures of co-partnership of the municipal body in the financial costs of managing and caring for the same common goods are identified. Although not being able to guarantee in toto financial cover of the costs, the Municipality of Chieri can be the guarantor standing surety to obtain funding for the care and management of the common goods.

7) Instruments that guarantee. Last but not least is the principle that concerns the means of legal protection of the commons goods which introduces, alongside the classic instruments of justice, innovative Giuria dei beni comuni (Citizens' juries).

The regulations on common goods of the Chieri Municipality have been one of the first to be approved and several Italian municipalities are starting up similar procedures. All the "experiments" like that of the Teatro Valle Occupato we mentioned, are trying to combine "movements with the law" as Ugo Mattei points out. Experiments that are fulfilled just starting from "small territorial situations that create innovation, and ecological conversion and these realities become a network, each contaminating the other: thus the fire leads to real transformation. From the bottom-up".[100]

In conclusion, it can be stated that the Chieri model drives integration of the principles of the Common in the mechanisms of local public authority the furthest possible, from within public law.

From this point of view, the regulations inspired by Ugo Mattei promote effective laws and mechanisms in support of two main principles characterising the development of the commons:

- on one hand, the logic of co-production goes as far as to pass on to members of civil society some of its prerogatives in terms of management and property favouring the passage from the logic of state welfare to a logic of commonfare;

- on the other, what is emphasised is the key role of policies that, both in terms of offer of the infrastructure and of funding permit the development and sustainability of the information commons, free software and in this perspective of the makers. That which brings us to a second terrain of development of the knowledge-based commons.

4.2. The knowledge-based and digital economy between the dynamics of commons and the new enclosures[101]

In cognitive capitalism, the dynamics of the knowledge and digital commons is the other side of the coin, the reciprocal antagonist, of what is called the tragedy of the anticommons, tied to excessive privatisation of knowledge. [102]

Besides, the entire history of the development of a KBE and the information evolution itself is an illustration of this crucial aspect. From the conception of the first software up to that of the Web protocols released by Tim Berners-Lee into the public domain, not forgetting the legal innovation of copyleft, the open nature of information technologies and the standards of the net is largely the product of a social construction of the commons. A construction in permanent conflict both with the state logic and with that of ownership by the great oligopolies of the Internet and High-Tech industries.

This evolution enters the in-depth debate which has started again of the regime of knowledge and innovation inherited from industrial capitalism and founded on the public-private pairing.

4.2.1. Knowledge as a public good and product of a specialised sector: the Fordist paradigm

In order to better comprehend the sense of this process on a theoretical and historical level, it is useful to start again from the dominant concept of knowledge theorised in the Fordist era by the founding fathers of the economic theory of knowledge and sociology of the science, that is respectively by Kenneth J. Arrow and Robert K. Merton.

4.2.1.1. The basic model of the economic theory of knowledge and market failures[103]

Arrow's article (1962), Economic Welfare and the Allocation of Resource for Invention, is considered to be the founding essay on the KBE.

The author's approach, Nobel prize-winner for economics in 1972, rests on two principle arguments.

The first concerns the agents and the methods of knowledge production. According to Arrow, the essentials of scientific and technological knowledge are created by an élite of researchers who act and reflect in separate places from the rest of society and situated at a distance from production, in R&D laboratories and in highly-intense technological industries. The activity of innovation is thus represented as the result of a sector specialised in the production of knowledge on the basis of a function of production that combines highly qualified labour and capital. [104] The second argument concerns the nature of knowledge or information[105] as an "economic good". In continuity with the neo-classical typology of goods, knowledge (or information), according to Arrow presents three main characteristics that make it an imperfect public good: its non-rivalrous, difficultly excludable and cumulative nature. Unlike material goods, consumption of knowledge does not destroy it. On the contrary, it is enriched when it circulates freely amongst individuals. Every new item of knowledge generates another item of knowledge following a virtuous (not vicious) circle that permits each creator, as Newton reminded us, to be "like dwarves perched on the shoulders of giants". For these reasons, knowledge is a good which is difficult to control. In other words, Arrow emphasises how it is very simple for subjects other than those who invested in the production of the knowledge to come into its possession and use it without paying any market price. This transferability of knowledge is so much higher that it assimilates knowledge to information, mistakenly supposing that it is perfectly codable.

Given the characteristics of the knowledge as economic good, Arrow considers that its production represents a typical example of market failure: that is the production of knowledge, if left to mechanisms of the market and the initiative of private enterprise, would lead to a sub-optimal situation. The marginal private advantage of the economic subject who makes investments is lower than the social one. For these reasons, the State must intervene and play an active role in the production of knowledge, particularly in the finance and organisation of fundamental research. Its results must be placed freely at the disposal of the rest of society as a public good. Certainly, Arrow also predicts instruments aimed at boosting applied research in companies, for example through intellectual property rights. Nevertheless, he considers that these instruments are unable to eliminate the gap between social advantages and private benefits, taking into account also the short-run horizon on the basis of which businesses make investment decisions according to profitability.

In short, a precise division of labour is established between public sector and private sector research: the first provides basic knowledge mainly tied to fundamental research free of charge, like a public good; the second develops applied research in the framework of the large R&D laboratories of the large managerial enterprises. Innovation is internally produced and resort to the monopoly of intellectual property performs a secondary role.

4.2.1.2. The norm of open science according to Merton[106]

Merton, the founding father of sociology of the science actually shares this representation. He completes it defining the ethos of the science and the norms of regulation of the public activity of scientists' research according to the principles of open science.

From this perspective, in a 1942 article entitled The Normative Structure of Science, revised and reprinted in 1973 in The Sociology of Science, he defines four "institutional imperatives" (Merton, 1973, 270-278):

a) Universalism: knowledge and scientific results are judged independently from characteristics inherent to the subject that formulated them, such as social class, political and religious opinions, sex and ethnic origins (Merton, 1973, 270-273).

b) "Communism": in the non technical and extended sense of common ownership of goods [our underlining], is a second integral element of the scientific ethos. The substantive findings of science are a product of social collaboration and are assigned to the community. They constitute a common heritage in which the equity of the individual producer is severely limited […] The scientist's claim to "his" Intellectual "property" is limited to that of recognition and esteem which, if the institution functions with a modicum of efficiency, is roughly commensurate with the significance of the increments brought to the common fund of knowledge.

And it is Merton who states that common ownership exactly "of the scientific ethos is incompatible with the definition of technology as 'private property' in a capitalistic economy" (Ibidem, 275).

In short, results and discoveries are not the property of a single researcher but a legacy of the scientific community and society as a whole. A scientist does not obtain recognition for his own work unless by making it public and therefore placing it at the disposal of others. The researcher's objective thus becomes that of publishing the results of his own research first and as fast as possible, instead of keeping them secret and/or submitting them to the monopoly of intellectual property, as on the other hand is more and more the case today in the field of scientific research.

c) Disinterestedness: each researcher pursues the primary objective of the progress of knowledge, obtaining recognition from his community of peers. This recognition can be translated into reputation and career advancement, but not into the possibility of personal enrichment based on privatisation of knowledge through, for example, patents or other business initiatives for profit.

d) Organised Skepticism: it consists in institutional devices, like Peer Review, which permit the systematic presentation of scientific results to the critical examination of the peer community.

In brief, according to Merton, the "institutional imperatives" for publication, pooling and free circulation of research results make it possible to guarantee a system of open science and common ownership, though within a limited community of researchers and people working in those areas. This is a logic that, as we will see, presents some analogies with the model of free software and common ownership set up by copyleft, [107] with which it will constitute an original construction.

4.2.2. The development of cognitive capitalism and the crisis of the Arrowian and Mertonian paradigm of knowledge

Whether it is in connection with the representation of the subjects of knowledge production, the regulatory role of the public sector or the ethos of the science, the Arrowian and Mertonian paradigm is in crisis today.

All these pillars of the regime of knowledge and innovation in force in the age of Fordist capitalism have been profoundly destabilised by two opposing dynamics passing through cognitive capitalism.

4.2.2.1. Knowledge as a socially widespread activity[108]

The first is about the way in which knowledge production slips away more and more from the traditional places assigned for its production. In short, in contrast with what the Arrow and Merton models postulated, [109] learning and intellectual labour are no longer, as Smith stated in The Wealth of Nations ([1776] 1981, 70), "like every other employment, the principal or sole trade and occupation of a particular class of citizens". They progressively spread and become manifest within society, even through the development of decentralised and autonomous forms of organisation compared to the norms of public research centres and those of large private companies (Vercellone, 2013). [110] As David and Foray underline (2006, 10) "a knowledge economy appears when a group of people intensively co-produce (i.e. produce and exchange) new knowledge with the aid of ITC" sometimes establishing genuine knowledge commons.

At the centre of this process we find two subjective and structural transformations. In the first place, as previously emphasised, the success of a widespread intellectuality. It is only the latter that can, in fact, explain the development of knowledge-intensive communities which are able to organise themselves, share and produce knowledge. It is a new dynamic, completely inconceivable even at the end of the 20th century by theorists of economy and the sociology of knowledge. A dynamic that can go from the simple creation and sharing of a database, up to complex forms of co-production of intangible and material goods. As in the case of free software, biohackers and even more so, the makers, knowledge commons can develop on a technological frontier that challenges the supremacy of the public sector and large private companies on the level of economic efficiency and capacity for innovation.

On this terrain, as we will see better in the next section, there is the meeting and hybridisation between Merton's science ethos model and new forms of open knowledge promoted by the practices and cultural models tied to the development of a collective intelligence. This is what Boyle (2007) calls the logic of "Mertonianism Unbound", implicitly referring to the title of Landes' essay on the industrial revolution, The Unbound Prometheus. With this term he designates the way in which thanks to the information revolution the boundaries of common knowledge goods can and must be made as broad as possible, extending to a public which is no longer limited to scientific research professionals only.

4.2.2.2. Towards the science paradigm 2.0: New Public Management and privatisation of knowledge[111]

The second dynamic at the base of the destabilisation of the Arrowian and Mertonian model is, on the contrary, a powerful process of privatisation of knowledge that goes hand in hand with as the subordination of public research to the short-run imperatives of private profitability. The result is a debate about the concept of knowledge as a public good and the traditional role assigned to the State in its regulation in the Fordist era.

The starting point of this evolution is found in the United States between the end of the seventies and the beginning of the 1980s in a context in which the debate on economic and industrial policy is dominated by two themes:

- The problem of the loss of competitivity of American industry compared to Japan, including on the level of the number of patents. The cause of this is principally attributed to the inability of the US to use the superiority of its research system efficiently on an economic level.

- The new opportunities of coding and privatisation of knowledge opened up by the meeting of the information revolution with life sciences.

This has resulted in the drawing up of a new strategy oriented at moving the norms of International competition ever more to the bottom of the production sphere, on the same level as the results of basic research. Under the thrust of the finance and lobbying of the large-scale enterprises in the pharmaceutic, information technology and biotechnology sectors, between the 80s and 90s this strategy is marked by four main institutional innovations.

The first is constituted in 1980 by the Bayh-Dole Act, which marks the birth of the Science model 2.0.[112] This grants universities and non-profit-making institutions the right to exploit and commercialise inventions made with public research funds in their laboratories. The law equally encourages universities to transfer patented technologies to the private sector, in particular through exclusive licences. This opportunity is strengthened in 1981 by The Economic Recovery Tax Act (Pub. L. 97–34), which allows significant tax relief to enterprises that conclude partnership agreements with universities in the field of research.

The second innovation refers to the 1980 sentence of the Supreme Court (in the Diamond vs Chakrabarty case) which extends protection to any natural product created through genetic engineering, recognising that genetically modified bacteria are patentable in themselves, that is to say independently of their process of exploitation. Starting from this moment, the instances of obtaining patents on cell lines, gene sequences, animals and plants have multiplied. The same is true for living organisms that are sufficiently modified to be able to be considered manufactured products. The distinction between discovery and invention is practically erased. Researchers can use their patents to sell the exploitation licence to a laboratory of their choice or use it to create a business. [113] To paraphrase Boyle, but reaching the opposite conclusion here, science 2.0 creates the "Merton Bound", at the same time setting free the forces of self interest in science.

The third concerns the extension of the IPR (Intellectual Property Right) to software according to a process produced through two principal stages. In 1980, following the recommendations of the National Commission on New Technological Uses of Copyright Works (CONTU) the US Congress extended the possibility of copyright protection to software. As Mangolte (2013) recalls, it is nonetheless patents that are used initially. The United States Patent and Trademark Office (USPTO) in fact rapidly accepted the introduction of patents in the field of software whether or not they were tied to hardware. However, their validity was strongly fought over on the legal front as the algorithms were still connected to ideas and not to tangible artefacts. Because of this, the copyright route seemed securer as an ownership strategy, at least until the decision relating to a case in favour of patents on software backed by a 1996 USPTO document. From this date on the number of patents granted soars passing, according to USPTO data, from 10,818 to 38,874 in 2007.

Finally, in 1994 the agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) for the first time in history establishes at world level a regime of IPRs which are binding for all the countries of the globe, in contrast with the USA's essentially national regulation upon which besides the strategy of technological catching-up besides had relied in the past, like all the other countries in course of industrialisation.

In conclusion, the reorganisation of the relationship between public and private sector and the IPRs regime leads to a real explosion in the process of patenting that is demonstrated through a radical break with respect to the long-dating historic trend regarding the number of patents filed between 1883 and the beginning of the1980s (Figure 3).

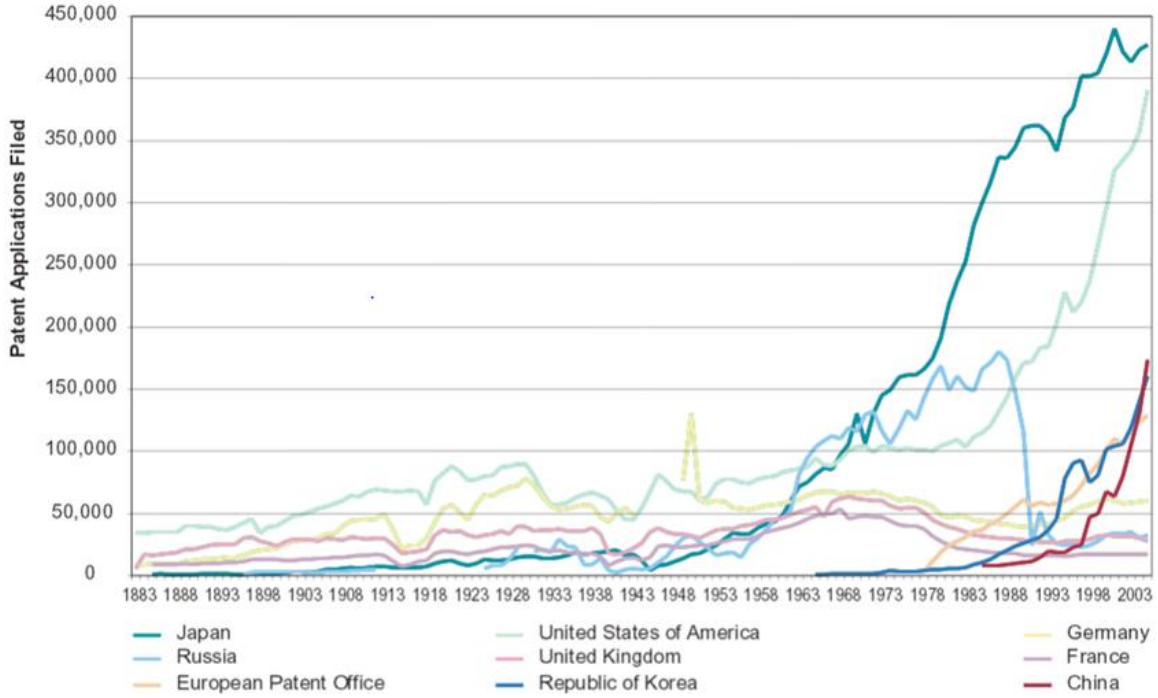

Figure 3: Evolution of Worldwide Patent Filings in the long run (WIPO PATENT REPORT: Statistics on Worldwide Patent Activities, 2007) Source: WIPO Statistics Database

4.2.3. Patents: a necessary evil or a useless evil? [114]

In D3.1 we have already emphasised how the excess privatisation of knowledge that seems to characterise contemporary capitalism is the object of numerous criticisms and is accused of creating a tragedy of anticommons. In the framework of this report, we propose to complete this analysis highlighting different key elements of this debate that will enable us to better understand the tension between the ownership dynamics of cognitive capitalism and the dynamics of open knowledge and knowledge commons.

A first element concerns the extension of the field of patentability. In industrial capitalism the possibility of resort to the monopoly of intellectual property of the patent was limited to technical devices and products that had to prove their originality, that is to say to be an expression of human creativity and not therefore come from nature, but be registered as technological artefacts inherent to the "arts and crafts". The strengthening and extension of intellectual property rights that has been produced since the '80s, is not only about the possibility to patent ever more superficial devices, for example Amazon's idea of the "click".[115]. It concerns the weakening itself of the traditional frontier between discovery and invention and therefore between basic research and applied research. Algorithms, sequences of the human genome, plants, seeds, genetically-modified organisms, even the isolation of a virus,[116] have now entered the range of patentability in fact permitting the privatisation of something living and of knowledge as such, of all that is often described in classic texts of western political thought as a legacy of all humankind to share together (Hardt and Negri, 2012; Shiva, 2001).

The second element concerns the way in which the obsession for privatisation of knowledge at any cost leads to an inefficient use of resources. According to the statistics drawn up by Marc-André Gagnon (2015), in the pharmaceutical industry for example, the administrative legal costs for obtaining and defending IPRs are higher than those devoted to R&D. This disproportion between unproductive expenses and investment in R&D is even more considerable if integrated with the expenses mobilised on publicity and marketing to promote products and services with an ever more

superficial innovative content. On this subject, as Gagnon again reminds us, according to the data supplied by the medical journal Prescrire, more than 80% of the new pharmaceutical products released on the market, between 1981 and 2010, would appear not to bring any authentic therapeutic improvement. The patent then becomes more and more an instrument to renew monopoly rents by replacing, without significant innovations, the blockbuster drugs becoming part of the public domain and therefore in the production of generic medicines.

The third element concerns the misleading nature of the traditional argument according to which the patent is a necessary evil, in the framework of a difficult arbitration between static inefficiencies (a patent translates into price increases for the consumer and a lower use of the invention) and dynamic efficiency, tied to the increase of the rate of innovation. As a matter of fact, it is argued that in the absence of a provisional monopoly guaranteed by patents, certain innovations would not come about due to lack of profitability. To demonstrate the weakness of this theory, researchers such as Michele Boldrin and David K. Levine (2008) have emphasised how in the case of an authentic invention, that is not banal, characterised by a certain level of technical complexity, the advantage of time that the innovator has at his disposal is a competitive factor sufficient to justify and remunerate investment in the innovation. The reason is simple: knowledge does not correspond only to its coded part, but rests on a blend of tacit knowledge that require a long time to be learnt, before a potential competitor can manage to imitate and improve the innovation in question (Vercellone, 2014). In conclusion, it is possible to maintain that the patent, especially as far as authentic radical innovations are concerned, is not a necessary evil. It is purely and simply a useless evil (Boldrin and Levine, 2008), at least if one reasons from the point of view of the dynamics of innovation and not from those of the monopoly rents that large enterprises can obtain thanks to holding these patents. [117]

Besides, two pieces of empirical evidence back the theory according to which the tightening of the system of patents has served more to feed the monopoly rents of large enterprises than to stimulate the dynamics of innovation. The first is that the explosion of patent applications which happened in all the OCDE countries starting from the 1980s, did absolutely not go hand in hand with a parallel increase of the Total Factor Productivity (TFP) which, according to economic theory, ought to constitute the principal indicator of technical progress. On the contrary, compared to an explosion in the number of patent filings (cf. Figure 5) which went, for example in the United States, from an average of 90,000 a year in the 1960s, to 345,000 in the1990s, leaping up again in the first ten years of the 21st century (482,871 in 2009, 501,162 in 2013)[118]„ it is necessary to observe that the dynamics of the TFP in the last fifty years has not shown any tendency to grow (Boldrin and Levine, 2008, 79).

This observation is perhaps even more evident for the agricultural sector, in the light of the effects produced by the 1970 law known as the US. Plant Variety Protection Act (PVPA)[119], then by the 1980 sentence that, as we have seen, extended patent protection to any natural product created through genetic engineering. Actually the TFP has remained stagnant, whilst the variety of plants has followed a heavy regression and hundreds of millions of farmers have found themselves deprived of the actual possibility of re-using the natural seeds of the patented plants.

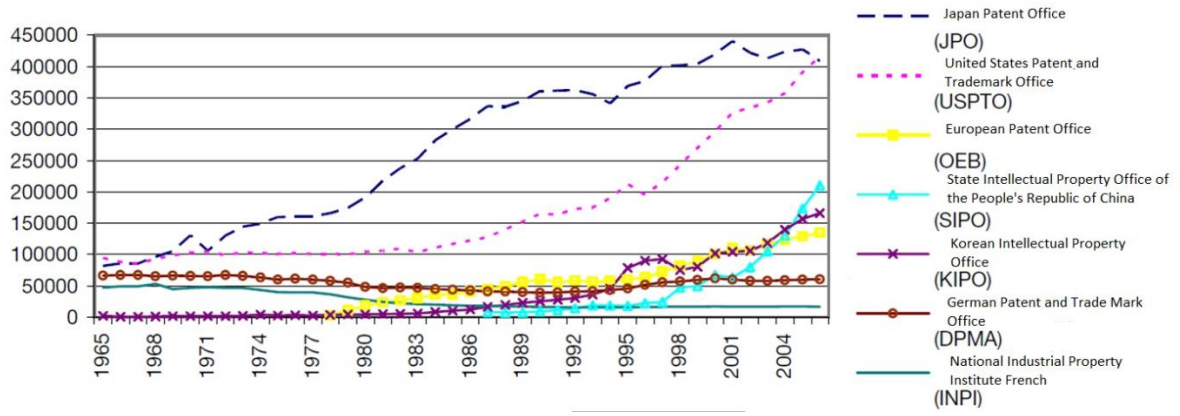

Figure 4: Trends in Patent Filings at selected patent offices (1965-2006) Source: Lallement R. (2008, 3). Data from Centre d'analyse stratégique d'après les données de l'OMPI et de divers offices (DPMA, INPI, JPO, OEB, SIPO et USPTO)

The second item of empirical evidence is the observation according to which the increase in the number of patents is associated, in the United States, as in Europe, with a strong deterioration of the average quality of the patents in terms of innovation originality (Boldrin and Levine, 2008; Lallement, 2008). As shown in a detailed empirical study by Rémi Lallement for Europe, this evolution goes hand in hand with a use of IPR that, particularly as far as large enterprises are concerned (40.8% of patents), tends more and more to favour the functions of patents as instruments to block competition: this is the main role performed by those that in the table (Table 4) are described as patents to "block the competition" or "sleeping", that is filed not in view of potential innovation, but to exercise the power of blackmail if someone really invents something that could have a connection with the descriptions supplied by the patent in question (for example a part of the source code). [120]

The saga of the patents war which at the beginning of this decade saw the involvement of Google, Motorola,[121] Nokia, Samsung and Apple in different intersecting processes for violation of IPRs, is an illustration exemplifying this logic.

Table 4: Patent use. Distribution by technological class and Distribution by inventors'employer. Source: Lallement R. (2008, 98) [122]

	Internal use	Licensing	Cross-licensing	Licensing	Blocking Competitors (Unused)	Sleeping Patents (Unused)	Total
Electrical Engineering	49.2%	3.9%	6.1%	3.6%	18.3%	18.9%	100.0%
Instruments	47.5%	9.1%	4.9%	4.3%	14.4%	19.8%	100.0%
Chemicals & Pharm	37.9%	6.5%	2.6%	2.5%	28.2%	22.3%	100.0%
Process Engineering	54.6%	7.4%	2.0%	4.9%	15.4%	15.7%	100.0%

Mechanical Engineering	56.5%	5.8%	1.8%	4.2%	17.4%	14.3%	100.0%
Total	50.5%	6.4%	3.0%	4.0%	18.7%	17.4%	100.0%
Large companies	50.0%	3.0%	3.0%	3.2%	21.7%	19.1%	100.0%
Medium sized companies	65.6%	5.4%	1.2%	3.6%	13.9%	10.3%	100.0%
Small companies	55.8%	15.0%	3.9%	6.9%	9.6%	8.8%	100.0%
Private Research Institutions	16.7%	35.4%	0.0%	6.2%	18.8%	22.9%	100.0%
Public Research Institutions	21.7%	23.2%	4.3%	5.8%	10.9%	34.1%	100.0%
Universities	26.2%	22.5%	5.0%	5.0%	13.8%	27.5%	100.0%
Other Gout. Institutions	41.7%	16.7%	0.0%	8.3%	8.3%	25.0%	100.0%
Other	34.0%	17.0%	4.3%	8.5%	12.8%	23.4%	100.0%
Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

A last series of elements that confirm and clarify the affirmation according to which the patent is often more of a pointless evil than a necessary evil is provided by the long-run dynamics of economic history. In reality, it is in fact very difficult to find an example of a radical innovation in economic history, caused by the existence of the system of patents as an instigative factor.[123] Rather, we notice an inverse causative sequence and this fact can be observed on a dual level. On one hand, the principal radical innovations in history, as in the classic example of the patent on James Watt's steam engine[124], would have happened independently of the existence or otherwise of a system of patents. It is only because this possibility existed that the inventor or more often a financial advisor (such as Bulton in Watt's case), took advantage of the existence of the patent like a deadweight effect. On the other hand, the same institution or the tightening of IPRs is a phenomenon which in the historical sequence follows and does not precede a cluster of radical innovations. Proof of this is the same historic genesis of the first structured legislation on patents, developed in Venice in 1474 to then spread to the rest of Europe. In fact, it was produced after and in reaction to the problems of controlling knowledge generated by the invention of movable type printing and by the spread of the information revolution of the so-called Gutenberg galaxy (May C., 2002). This observation is perhaps even truer for the information revolution in contemporary capitalism which, as Bill Gates himself explicitly acknowledged, could never have happened if at that time we had had the arsenal of IPRs that has developed since the 1980s.

In fact, "If people had understood how patents would be granted when most of today's ideas were invented and had taken out patents, the industry would be at a complete standstill today" (Bill Gates, 1991). And it is necessary to merit Bill Gates with his intellectual honesty as well as for giving an exact forecast of the perverse effects that such a tightening of the IPR system has had on the dynamics of innovation. As shown by the works of Bessen and Maskin (2000), "the re-enforce intellectual property regulations in the United States during the 1980s reduced innovation and translated into a decline in R&D in the industries and corporations that were most active in patenting their work", and this in stark contrast with the dynamism and innovative capacity of which the model of open source and copyleft is proof in the same period.

More precisely, as we will see better in the next sections, three logical-historical steps can be distinguished in the development of the information revolution and the new knowledge commons.

In the first, the dynamics of the principal radical innovations at the base of the information revolution are driven from the bottom. In this framework, resort to IPRs is still relatively rare and not structured by the new norms of privatisation which will gradually come into force starting from the 80s. It is a process in which the very concept of technological innovation strongly bears the stamp of the dissenting counterculture of the American campus and of what Boltanski and Chiappello (1999) have called the "artist criticism". With this concept they describe the creative members of the protest against the standardised world of Fordism and of what Marcuse had called the universe of the "one-dimensional man".

In the second, continuation of this dynamic of open science and open knowledge innovation must be placed even more explicitly in opposition to the ownership model. In contrast with the development of biopiracy and the processes of privatisation and standardisation of the living, this conflictual logic also concerns more and more the construction of the commons of biodiversity and agriculture. Two consequences ensue. The movement of the commons has to give itself a more formalised organisational structure and conceive original legal forms of common ownership such as copyleft to protect itself from the "predatory" practices of the private sector. The great oligopolies that have formed in the framework of the information revolution set up strategies that lead to the tragedy of the anticommons of knowledge and to processes of recentralisation of the net which, like for the platforms of the well-known GAFA (Google, Apple, Facebook, Amazon) destabilise its open and decentralised structure.

In the third, the protagonists of the ownership model become ever more aware of the limits that the logic of fencing in and secrecy tied to the IPRs implies for their own capacity of innovation. It appears more and more to be a limit in the face of an embittering of the competition in the International division of labour knowledge-based. To compensate for this impasse digital and bio-technological capitalism sets up strategies which try to recover the commons model from within, by imitation or co-optation. At the same time, the logic of the knowledge commons spreads more and more to new activities and productive branches, defining, after the model of free software, that of the makers which appears to lay the foundations of a possible new industrial revolution.

4.3. The information revolution of the PC and the Net: in the beginning was the Common[125]

The development of the commons and the principles of free software are often considered to be a reaction to the property excesses of cognitive capitalism and the information revolution. This concept provides an inexact picture of a technological revolution that found its driving force in the

system of private capitalist economy and in the role of Big Science organised by the public research system.

Thus, in standard presentations of the IT revolution the idealised figure of the great businessmen of success Bill Gates-style often crosses that of the Advanced Research Projects Agency Network (ARPANet), an embryonic form from which Internet was born subsequently in 1983, created in 1969 by Defense Advanced Research Projects Agency (DARPA) responsible for the development of new technologies for military use of the USA.

The part of truth contained in this reconstruction is a little like the tree that hides the forest of creative effervescence of multitudes of hackers and hobbyists mobilised much more by the search for technological virtuosity[126] than by that of personal enrichment and profit.

The IT sector is perhaps the best contemporary illustration of the way in which the monopoly of intellectual property is not the cause of innovation. It is rather a consequence that intervenes when the development of a sector, having reached a certain degree of maturity, sees the way to build economic rent and prevent dynamics that could undermine them in resorting to and strengthening the IPRs.

More generally, the main innovations at the base of the start of the information revolution and the conception of the Internet could not have taken place without the determining role of practices founded on the Common and driven by alternative motivations both to the logic of private and that of public.

It is not only the fact that at the dawn of the ICT revolution, in the '60s and '70s, practises of sharing the source code and the gratuitousness of software constituted the norm of co-operation in the work of those employed in IT (Mangolte, 2013). It is also and above all the fact that the birth of a new socio-technical paradigm never obeys narrow technological determinism, but is the result of a social construction that is engraved in a trajectory of innovation that expresses the interests and visions of the world of the players who are its protagonists.[127]

So, unquestionably, on the level of innovative practise, the anti-authoritarian countercultures which developed on American campuses in the sixties and their meeting with the open knowledge culture which at the time still innervated the university world in the United States, have been of decisive importance in the history of the IT revolution. As Delfanti (2013a) stresses "from the bond between activists for the freedom of information who dreamt of using computers as an instrument of communication for the resistant communities and the hobbyists of Silicon Valley [...] the libertarian ethos emerged that partially guided the evolution of computers towards what they are today" (Ibidem, 30). [128]

In turn Michel Lallement (2013) proposes a winning historic reconstruction of the experiences of the counterculture of the hippy community that developed in California in the sixties and seventies and in which were embedded personalities such as Gordon French and Fred Moore, founders in 1975 of the Homebrew Computer Club, the first real model of hackerspace. It is right in this club, that around the first accessible personal computer, the Altair 8800, they are to produce innovative experimentations and decisive meetings for the conception of our modern personal computer.

In the same way, as Daniel Cohen (2006) reminds us, "it is through ICT that students brought up in the protest culture of the sixties find the way to shatter the standardisation of the world created by their parents. We can measure the 'sociology' of these discoveries following the episodes that will

lead to the birth of Internet" (Cohen, 2006, 34). [129] So at the beginning the Arpanet communication network is used by universities in contact with the Pentagon.[130] Therefore, continues Cohen:

It passes into the public domain thanks to the invention of the modem, in 1978, by two students at the University of Chicago who wanted to communicate free of charge, outside the Department of Defense's server. One year later in 1979, there are three students at Duke and North Carolina Universities who develop a modified version of Unix which makes it possible to connect computers through a simple telephone line. Thanks to the accompanying progress of optical electronics, the technology of package transmission takes flight. Internet originates from these evolutions that connect all the computers of the planet through the telephone line (Ibidem, 34-35).

It is again this libertarian and democratic "ethics" of open knowledge that leads Tim Berners-Lee and Robert Cailliau to convince the European Organisation for Nuclear Research (CERN) to release in 1993 the WEB protocols, including the source code of the first navigator, [131] into the public domain. Rapid diffusion is made possible in this way, thanks to the lack of patents on the standard of the net, and this happens while in the United States we witness the rise of software patenting and in France Minitel's closed pay-for model still predominates.

In short it is a very precise socio-technical trajectory thought out on the basis of the Common and in function of the creation of the infrastructures of the Common that allows open and original structures to be conceived according to a dynamic that will find two fundamental and closely bound achievements:

- the free software model with its best known concrete creations like GNU/Linux, Firefox, Apache, LibreOffice, Thunderbird and VideoLAN Client (VLC).

- the open architecture of the web the nature of which Tim Berners-Lee himself explains in these terms, describing the way in which he conceived the World Wide Web:

the great thing about Internet is that it represents an open space that has no central control hub and does not lay down any constraints. I tried to design the Web in the same way, just as if it was a large sheet of white paper: and it is exactly for this reason that the Web has permitted the birth of absolutely innovative and unexpected phenomena. The most important thing is that Internet is a creative medium. I have no desire to tell people what I want them to do. The most important thing is that we are all amazed by the things that people are able to achieve using the technology. Tim Berners-Lee quoted in Grazzini E. (2008, 171). [132]

In short, in the spirit of Tim Berners-Lee, the Web is designed like a global hypertext in which all the sites in the world can be consulted and fed by everyone.

In this manner, personal computers put in a network through Internet are, at least potentially, like "a universal tool accessible to everyone thanks to all the knowledge and all the activities that can in principle be put in common"[133](Gorz, 2003, 21).[134]

It needs to be clearly stressed that from this point of view the information revolution and its emblematic product, the net, are not limited, as is often stated by mainstream theorists of the knowledge economy, to bringing about an extraordinary reduction in the costs of transmission and codification of knowledge itself. [135]

It introduces two other greater qualitative breaks compared to previous information revolutions in the history of humankind, in particular, after that of writing, the revolution of movable type printing that gave rise to the formation of the Gutenberg galaxy.

- The first break consists in the fact that information and knowledge, like all digitisable cultural products, can now circulate independently from a material medium, like for example, a book. This dematerialisation not only drastically reduces the costs of the technical reproduction of intellectual labour making them enter an economy of abundance and at zero marginal cost. It also results in their emancipation from the control mechanisms, censorship and selection that in the past the State and market could exercise over them acting on their material media.

- The second qualitative break consists in the way in which the Net radically destabilises the terms of the classic producer/consumer, creator/public, issuer/user dichotomies, that up to today had structured the workings of all traditional media. Internet, in particular, in fact consents the transition from a classic relationship pattern from One → towards Everyone, usually mediated by a mercantile or administrative/bureaucratic relationship, to an interactive pattern from Everyone → towards Everyone. The circulation of information and the production of knowledge can thus become a cooperative process that mobilises the intelligence of multitudes on a global scale. It is a dynamic of which one of the best exemplifications is without doubt that of Wikipedia, the open encyclopædia that has actually, for the number of terms, but also for the reliability of the content, now definitively won the competition with the noble Encyclopædia Britannica. On these lines, Grazzini is not mistaken when he states that: "Wikipedia, developed thanks to the free and spontaneous cooperation of collective intelligences, can represent for the knowledge society what the Encyclopedia of the Illuminists represented for the middle classes" (Grazzini, 2008, 191). [136]

This decentralised and democratic aspect is undoubtedly the most revolutionary trait of Internet that which makes it the most suitable infrastructure of the Common for the development of a KBE based on the autonomy of cognitive labour and collective intelligence. Again for this reason, bringing up for discussion again the neutrality of the net and its open structure is the objective on which the attempts at recentralisation of the Internet are focussed in order to re-establish the supremacy of mercantile mediation and/or bureaucratic-administrative control of the public. This logic stirs up animated disputes due to its perverse effects on the freedom of citizens and the dynamics of the circulation of knowledge that constitutes one of the key conditions for the development and sustainability of the commons.

Around what is at stake here a complex and highly conflictual dialectic is unravelling more and more that opposes the *spirit of Common*[137] from the dawn of the KBE to that of a new spirit of digital and cognitive capitalism, which is trying to reabsorb the former within its operational mechanisms.

4.3.1. The spirit of Common: the meeting between the Mertonian culture of open science and the hacker ethics[138]

Like Max Weber spoke of the spirit of industrial capitalism, relating it to the protestant ethics, it is possible to speak of a spirit of Common that has innervated the open nature of IT technologies and the standards of the Web just as the resistance to the growth of ownership capitalism.

Like the spirit of capitalism, the spirit of Common also has a historical and socio-cultural base which it is possible to formalise in an ideal-type model.[139] It presents itself as the result of the meeting and hybridisation between the ethos of open science described by Merton and the hacker spirit of collective intelligence defined by Pekka Himanen,[140] according to a model that under many aspects is incarnated in the figures respectively of Richard Stallman and Tim Berners-Lee.

The new generation brought up on widespread knowledge takes up and reformulates the four fundamental Mertonian principles of universalism, communism, disinterestedness, and organised

skepticism for its own account, integrating them in a new system of values in which the main points are the following:

1) *Universalism* is structured around the criticism of the closure and the claim of official scientific institutions to hold a monopoly on knowledge. In the hacker spirit and that of the counterculture of widespread intellectuality the values of sharing and cooperation extend to the whole of society, independently of the qualifications and the professional status of an individual: this is a typical aspect of a society based on collective intelligence.

2) *Communism* or scientific communitarianism, in which knowledge is considered to be common ownership, takes up the basic imperative again of the publication of results of research and putting them at the disposal of the whole of society. In the hacker philosophy this need is combined however with the awareness that publication, as in the case of an open source software, as an instrument is no longer sufficient to prevent attempts at private appropriation. From this perspective, as we will see better later on, legal-institutional mechanisms are thought of that, as in the case of copyleft, permit the creation of a protected common ownership, that is of a non-appropriable public domain, to which each can add something, but not take anything away for private benefit.

3) *Disinterestedness*. As in Mertonian open science, the hacker philosophy pursues the disinterested objective of progress of knowledge. It differs however from the ethos of the man of science which remains largely structured by the Weberian ethic of work as a duty and an end in itself (Merton, 1973). Rather, disinterest is associated with a Fourierist concept of work thought of as a creative, even if terribly serious, game. It is about the passion of the cognitive effort, recompense for which, as in the Mertonian model, consists above all in the recognition of ones peers and the community of users.

4) *Organised Skepticism*. Finally, the hackers as in the science world have adopted the model of organised scepticism and open knowledge as the most functional for the production of new knowledge. The hacker spirit differs however because of its refusal of academic hierarchy and a structured career of regulated bureaucratic passages. [141]

On this basis, it elaborates two new closely bound principles lacking from the Mertonian universe of open science: the principle of the do-cracy (the power of doing) which indicates research much more driven by individual autonomy which opposes any external directive and interference, potentially giving each person the influence that comes out of their own initiatives; the principle of direct horizontal cooperation intended as a form of self-organisation in which individuals co-ordinate themselves allocating themselves tasks that they carry out taking full responsibility for them. We note that the last two principles are also the most general expression of the culture refusing work directed by others and aspiring to self-management that has characterised the main social movements of widespread intellectuality over the last decades, from the experience of the social centres in Italy up to that of the indignados in Spain.

4.3.1.1. Do-cracy, horizontal co-operation and cognitive division of labour: the controversy on the nature of the productive model of free software and open source[142]

This combination between direct co-operation and glorification of individual autonomy in which the individuals themselves allocate themselves tasks and objectives and appeal to others to carry them out, gives rise to a particularly effective form of cognitive division of labour.[143]

This model of self-management of cognitive labour rests on different strongly autonomous small groups. As Pascal Jollivet (2002, 165) stresses "the work carried out in these hacker communities, like in project Linux, for example, is directly co-operative and voluntary work the structure of which is horizontal".[144] These characteristics are important for two closely bound reasons.

The first is that they correspond to a form of co-ordination belonging to the commons, in alternative both to the hierarchy and the market, the effectiveness of which made it during the '90s the most serious competitor to the monopoly of Microsoft and to the logic of the ownership model of the so-called new economy (Boyer, 2002).

The second is that the explanation for the effectiveness of these models constitutes an important controversial element with some defenders of the standard neo-classic approach of labour economics. In particular, economists like Lerner and Tirole (2000), refute any originality in the model of labour organisation in the hacker community of the Linux type. They maintain, in fact, that there is really nothing different in the world of hacking and free software compared to the traditional way enterprises function. Hacking stars, like Linus Torvalds and Richard Stallman would in fact carry out a role in the productive organisation of free software identical to that of a company director. Pascal Jollivet (2002) basing himself on Pekka Himanen's analysis supplies numerous elements to refute this theory. He states first of all that the relative lack of organisational structures does not mean that they are missing. The organisational structure is that of a horizontal network that, however, does not profess to be totally flat. Actually in the free software project there are prominent personalities who, inside small committees, have an unquestionable influence over certain choices, in particular over the contributions that have to be integrated or not in the programme in question.

Nonetheless, despite appearances, there is a fundamental difference between these figures and a hierarchical superior. As Himanen (2001, 81) emphasises "the statute of authority is open to everyone". This is a decisive point characterising the institutional specificness and the production model of free software projects: the means of production are in fact placed in common and no-one can take advantage of the property right of the software produced in the framework of the project under free license. Here there is a substantial divergence compared to the classic enterprise model in which the power of ownership of things (production tools and capital supplied) confers the power of direction over men and the right to appropriate the product of the labour. So, for example, in the models of the Agency theory (Jensen e Mekling, 1976), which Lerner and Tirole refer to, the managers or leaders are, according to the supremacy of private property rights, agents of the shareholders only. In a classic enterprise – and this is even truer in companies where the main capital is the so-called human or intellectual capital - this hierarchical institutional structure can lead to recurring conflicts between the ostentation of ownership and the ostentation of the decision-making power to those who hold adequate knowledge (Weinstein, 2010). The rigidity of the structures of control and decision-making tied to ownership in fact often interfere with the mechanisms that should guarantee the most efficient forms of organisation of a cognitive division of labour (Vercellone, 2013; 2014).

In the free software model, the absence of ownership instead determines the social and material conditions which ensure that authority is effectively open and removable, guaranteeing democracy and collective deliberation both as far as the way labour is organised and the purposes of the production. For this reason the free software model is also more flexible and reactive than the hierarchical model. As a matter of fact, if the decisions taken by one of the micro-structures of arbitration are considered unsatisfactory by a significant number of contributors to the project,

nothing is simpler than setting up the process of removal of the leadership of project in hand. Concerning this it is sufficient for a dissident group to duplicate – which is perfectly legal in GPL licenses – the program source codes, set themselves up as a holding group of an alternative project with an internet site appealing to other contributors so that they join the new project (Jollivet, 2002).

The absence of private appropriability of private goods produced in a project of the free software type (right of duplication and modification) thus constitutes a fundamental institutional incentive to do things in such a way that the traditional schemes of hierarchical authority of an enterprise (or of administration) are not reproducible. This mechanism explains not only why "the statute of authority is open to anyone", but equally why it is "solely founded on results". In this way no-one can occupy a role in which his work is not subjected to the examination of his peers in the same way as the creations of any other individual (Himanen, 2001, cf. 80-82). The individuals to whom authority is delegated temporarily and revocably are those who enjoy the greatest admiration from their peers.

4.4.Copyleft and common property in the free software movement[145]

For certain authors, like Dardot and Laval (2014), common is constituent acting and forms of institutionalisation of common property outside a permanent procedure of commoning cannot exist. For other authors, like Coriat (2015) and Broca (2014) the example of the legal regime of copyleft would on the other hand prove it is possible to set up a form of common property that guarantees free access to a stock of resources independently of the activity of commoning.

Examination of the free software model allows us, in our opinion, to demonstrate the innate error in both these positions. The case of copyleft rests in fact on a close synergy between a form of common property founded on rights of use, on one hand, and a logic of cooperative acting belonging to the Common as it is the way of production organisation, on the other hand. There is no disjunction, but a process of reciprocal fertilisation between the activity of commoning and the legal regime of copyleft. This process illustrates the way in which, to paraphrase Hardt and Negri (2012), labour co-operation that is the ontological foundation of the Common can generate legal forms that promote coherent governance for it and its reproduction.

The same history of the dynamics through which the free software movement arrived at the formulation of copyleft is a demonstration of this theory.

As we have seen, practises of direct co-operation and sharing of the source code and programs were a continuous norm at the dawn of the IT revolution in the 1960s and 1970s. The commons as a method of organisation of production, exchange and circulation of knowledge pre-existed, in short, the institutionalisation of the free software movement. The latter did not intervene until the logic of Common had to face more and more the development of ownership strategies that marked a turning point in the dynamics of the IT revolution and Internet.

In the eighties, as Mangolte (2013) recalls, in enterprises in this field, in fact, growing resort to IPRs (Intellectual Property Rights) becomes popular which the programmers, breaking with historic tradition, are obliged to integrate in their practice, whether they want to or not.

This is a general reversal of the rules of behaviour that will progressively contaminate the universities themselves and the research centres where the Mertonian norm of publication of research results and making them available in the public domain was still in force.

This break-up was particularly unpopular with the community that set itself up from 1974 around the development of the operating system Unix and in which the University of Berkeley performed, together with Bell Labs from the AT&T group, a predominant role, both for UNIX and for the management of the 5TCP/IP networks required for the development of ARPANet. Following the breaking up of the AT&T group, Bell Labs, having become independent enterprises, can develop commercial activities in IT, restricting conditions of access to the codes and increasing the cost of licenses. The conflict between the ownership strategy of Bell Labs and the University of Berkeley users lead to the disintegration of the Unix community which had been working up till then, on an international level, according to principles close to those of open source. The result has also been the multiplication of Unix owners (AIX, HP-UX, IRIX, Solaris 2, etc.)[146]

It is in this context that Stallman takes the initiative to promote in September 1983 the GNU project. The aim is to create a group of free software around an operating system compatible with free Unix, with an open source code, accompanied by very extensive rights of use, rights that the author grants to all users.[147] The name GNU which means "Gnu's not Unix" was chosen deliberately, exactly to emphasise the opposition between the philosophy of the new project and the logic that had led to the break-up of the original Unix community. From this perspective, rejection of the ownership model is united to the desire to reproduce the model of sharing and horizontal co-operation of the first Unix.

This is an important point as well because, in our opinion, it shows the unjustified character of certain criticisms levelled at Stallman according to which he was a libertarian tormented exclusively by the matter of ownership, without harbouring any interest instead on the conditions of production in the software world.

To dispel any doubt, we need merely remember how Stallman explains with extreme clarity that the birth of the GNU project was above all a way of escaping from "a world in which the higher and higher walls, those of different companies, would have separated the different programmers (or user-programmers), isolating them from each other" (Stallman, 1999, 64).

We could add that here he demonstrates extreme lucidity on the "negative externalities" that the ownership model, by its nature pyramidal and hierarchical, would have had on the development of the most effective forms of organisation of cognitive labour, leading to an individualization of the wage relation and a fragmentation of labour collective. In fact, it is one of the main causes of the inefficiency of the ownership model on the matter of innovation and product quality, particularly if compared, as we have seen in the previous section, to the free software model of horizontal co-operation.

Since the beginning of the free software movement these two objectives, preservation of an open and horizontal co-operative model and the fight against the drift towards ownership of cognitive capitalism, are therefore inseparable.

For this reason also, the GNU project sees its number of participants increase progressively and in 1985 Free Software Foundation (FSF) is founded. Its purpose is to defend the principles of free software and establish norms that make it possible to say clearly if a program is free or not. This is also the sense behind the creation of the General Public License (GPL) or GNU-GPL license.

In short, what before was a spontaneous form of co-operation and open source sharing, must now organizse itself in an institutional way and at the same time formulate forms of ownership that oppose the advance of copyright and the patentability of software.

The dynamics of shared production innovation of free software will thus give life to a greater legal innovation. We refer to copyleft, that is to say to the creation of a common property, of an inappropriable public domain, "to which each can add something, but not take away any part of it" for his benefit, as the legal professional Eben Moglen explains, advisor to the FSF (quoted by Mangolte, 2013, 1)[148].

In the light of the same experience lived with the crisis of the first Unix community, Stallman and the members of the FSE are in fact aware of two key elements needed to permit the sustainability of the logic of the free software commons.

On one hand, in an economy dominated by the supremacy of absolute private property and the tightening of the IPRs, a simple open source logic that limits itself to spilling knowledge and information into the public domain is vulnerable and unable to prevent their retrieval inside owner strategies. The latter can completely legally help themselves to open source resources (like the source code) released into public domain only to then conceal them in a new product subject to copyright and/or patents;

On the other, the reproduction of the commons and the accumulation of a stock of inalienable common-pool resources implies the formation of a group of institutional forms (rules of governance, incentive norms and forms of property) that canalise the behaviour of the commoners towards these ends.

To this end, it was necessary to make use of private property devices in some way, particularly copyright, to turn them against it and place them at the service of a completely different logic based on the inalienability of resources.

Copyleft (of which the general public license GNU is the first and main codification) is in fact a technique that uses the same legal instruments as copyright as a means to subvert its restrictions on development and the spread of knowledge.

As Stallman states: "copyleft uses copyright law, but flits it over to serve the opposite of its usual purpose: instead of means of privatising software, it becomes a means of keeping software free" (Stallman, 2002, 22).

As Coriat (2015) emphasises through this extraordinary tour de force, Stallman with the GPL license, and associating copyleft with it, has "created not only an inviolable public domain, but also a public domain that enriches itself permanently due to the properties of knowledge"[149]. In other words, in order to guarantee the sustainability of the free software commons, the private property devices are astutely used and subverted to create a protected public domain in which "no 'free rider' can any longer operate to strip the creators, which is what was permitted by the absence of rights before software with a GPL license" (Ibidem).

Stallman is extremely clear also on this point:

To copyleft a program we first state that it is copyrighted; then we add distribution terms which are a legal instrument that gives everyone the rights to use, modify, and redistribute the programs code or any program delivered from it, but only if the distribution terms are unchanged (Stallman, 2002, 91).

The source code is in effect open and authorises all users to help themselves to the software, modify it and improve it on condition that they pass on these rights, in turn making all the applications public, freely accessible and usable.

Fundamentally, these rights are the four "fundamental freedoms" that define free software according to the FSE:

1. The freedom to be able to use software for every aim.
2. The freedom to be able to gain access to the functioning of software, to adapt it for specific purposes.
3. The freedom to be able to make copies for others.
4. The freedom to improve the software and make these improvements as open and accessible as possible for the public good.

We note that the four freedoms at the base of the free software licences are in general completed by additional conditions meant to eliminate possible impediments for free use, distribution and the modification of copies. They are what Ostrom would call the control measures and essential sanctions for governing a commons, like for example, ensuring that: i) the copyleft license cannot be revoked; ii) the labour and versions derived from it are distributed in a form that facilitates modifications (in the case of software this is equivalent to requesting both distribution of the source code and all the scripts and commands used for that operation so that the writing the programs can take place without impediments of any sort); iii) the modified labour is accompanied by a precise description to identify all the modifications made to the original work through means of user manuals, descriptions, etc. [150]

For this capacity to closely combine forms of co-operation and alternative ownership, the free software commons and the GNU copyleft licenses have now become one of the principal reference points of the resistance to a tragedy of the anticommons of knowledge that is spreading well beyond the world of IT.

They present themselves, at the same time, as concrete proof of the possibility to oppose this tragedy and proof of the existence of an alternative model, founded on the Common, capable of giving proof on the matter of quality and rate of innovation of a superior efficiency both to the private model and the public one.

Evidence of this lies not only in the development of the most well-known creations such as Linux, Debian, Mozilla, Guana, etc., but in the more general multiplication of small and large community projects. In 2009, as Mangolte (2013) shows through the analysis of free or open source projects registered on the site sourceforge.net, the number of ongoing projects being carried out exceeded 162,000 units. And the very great majority of these projects (about 62.5%) were conducted in the framework of the GNU – GPL licenses (cf. Table 5).

Table 5: Set of Projects present on SourceForge (July, 2009) Source: Mangolte (2013, 14

	Number	In percentage (%)
GNU General Public License (GPL)	101,425	62.44
GNU Library or Lesser General Public License (LGPL)	17,440	10.74
BSD Licenses	11,257	6.93
Apache Licenses	6,352	3.91

Licenses style X11 (or MIT License)	4,263	2.62
Academic Free License (AFL)	2,812	1.73
Artistic License	2,030	1.25
Mozilla Public License	2,385	1.47
Common Public License 1.0	1,394	0.86
Open Software License 3.0 (OSL3.0)	1,261	0.78
Public Domain	5,896	3.63
Other Licenses (less than a thousand projects)	5,913	3.64
Total (Licenses Not Specified excluded)	162,428	1.00
Licenses not specified excluded from total	1,889	

Besides, the interest of copyleft as a mechanism of protection of the free circulation of knowledge is proven by the extension of this model, beyond the universe of free software or open source, to a whole group of other cultural and scientific practices.

It is exactly to facilitate this process that, in 2001, Lawrence Lessig, professor in the Law Faculty of the University of Stanford and recognised as one of the greatest international experts of copyright, founded Creative Commons licence (CC), a non-profit-making organisation. It proposes to provide all those who desire to leave their cultural content free or partially free from IPRs a way to find an alternative legal solution, through copyleft licenses inspired by the experience devised by Stallman. Apart from Wikipedia, Arduino, numerous journalistic sites or sites of governmental statistical information have registered the protection of their content under the CC license.

Under this impulse, the CC license also contaminate the scientific community where a growing number of researchers reject a logic of ownership that denatures the "disinterested curiosity" of learning and prevents the sharing of information. Obstacles that besides, according to researchers, go hand in hand with the free exploitation, by a limited number of peer-review journals, of their work and the public resources of universities. Just think on this subject of the way in which a growing number of journals not only rely on the free work of researchers who publish in them. At the same time they ask universities to bear the growing costs of access to the journals and, in certain cases, also payment of a sort of levy to authorise definitive publication of an article in a ranking journal, even in the case of positive review. The consequence is the risk of creating a semi-market of publication and of a collusive system of economic rent that unites ranking journals and prestigious universities, discouraging people's creativity and the diversity of approaches and research centres.

The universalist Mertonian ideal of open science and learning and organised scepticism risks being overtaken by the logic in which the very publication of research results becomes a commodity and/or intangible capital that must be used for the evaluation of the university-enterprise.

In any case, the CC licenses are spreading more and more in the world of scientific research. Think, as we have seen, of the GISAID (Sharing Avian Influenza Data) platform or again of Harvard

University's Personal Genome Project which is using the CC license to map and publish the study of the genome of 100,000 volunteers, in such a way as to advance research in the field of personalised medicine. The Personal Genome Project (PGP), started in 2005 under the initiative of the Professor of Genetics at Harvard University, George Church, aims to create a database that includes the sequence of genomes and information deriving from the medical case history and family history of the subjects participating in the study. The long-term objective of the PGP is to establish significant correlations between genotype, phenotype and the environment that will therefore permit understanding the causes of multifactorial diseases such as cancer, cardiovascular or neurodegenerative diseases. All the genetic data are covered by the CC license and are of public dominion through Internet so that all researchers can access the data freely and boost their research.

Nevertheless, in the case of software like in that of the scientific research peer-review journals "drawing a clear separation between an open science, oriented at sharing and a private science subjected to access restrictions and oriented at the market hampers Peer Review journals", - as Delfanti (2013a, 50) opportunely stresses, our understanding of a complex and multi-faceted phenomenon.

It is what is shown by, for example, the exemplary case of Craig Venter, a symbol of the new figure of a scientist businessman and privatisation of research. At first, with the company Celera Genomics, he developed a profit strategy founded on the unscrupulous use of IPRs in the sequencing of the human genome. In this framework, Celera Genomics competes with the Human Genome Project co-ordinated by Francis Collins which respects a more classic logic of publication of the results on Internet. Celera Genomics and Craig Venter do not hesitate to take advantage in the logic of free riding, plundering the results made public by the Human Genome Project. In order to reconstruct the genome more rapidly, Celera Genomics in fact acknowledged having used not only its own data but also those published progressively by the international consortium co-ordinated by Collin. [151] It is not pointless to observe that this predatory strategy probably could not have happened if the results of the Human Genome Project had been protected by a legal formula of the copyleft type. In any case, this fact stirred up massive indignation in the International scientific community and public opinion. Also because of this (reputation is a market value), Craig Venter, in a subsequent bio-genetic project, Sorcener II, [152] converted to a business model integrating the principles of open data and open science. It is not entirely a matter of abandoning the profit logic, but of moving to a strategy founded on the proceeds of the IPRs, a strategy in which open access to the codes becomes the instrument enabling him to sell the services and the Know-How of his business to companies that intend to make use of it.

This change in strategy is representative of a more global evolution of cognitive and information capitalism. As we will see better below, it no longer restricts itself to opposing a logic of ownership to a logic of Common. It is now looking to integrate the same logic of the commons as a resource for the creation of value inside a new form of capitalism. This new form corresponds to what Andrea Fumagalli (2015) qualifies, with a striking expression, as "cognitive biocapitalism", to indicate exactly, like all life forms, the human common in its most basic form would now be placed directly or indirectly at the service of capital exploitation.

4.5. The metamorphoses of cognitive capitalism and integration of the criticisms of the multitudes: can the spirit of Common be diluted inside a new spirit of capitalism[153]

Fernand Braudel (1979) had already emphasised how the principal strength of capitalism is to be found in its extreme flexibility, in its capacity to adapt incessantly its forms of governance of society and capture of the surplus. It is in this way that, though still remaining faithful to its systematic principles (the logic of profit and unlimited accumulation of capital) different configurations of capitalism have succeeded each other in the course of history: mercantile capitalism, industrial capitalism, and then cognitive capitalism. And the history of these metamorphoses certainly does not stop there, with the formation of cognitive capitalism in the 1980s and 1990s. Boltanski and Chiappello (2011), in their essay Le nouveau esprit du capitalisme,[154] insisted on the way in which capitalism regenerates and continually transforms itself integrating the criticisms that have been launched at it, even absorbing "ideas that were initially extraneous to it, if not clearly hostile" (Ibidem, 60).[155] After having shown, how the transition from Fordism to post-Fordism in France, relied on the integration of the "artist criticism" that had found its climax in the events of May 1968, the authors affirm that this method of analysis can also be applied to a more recent period, that is to the transformations of the regulation of cognitive capitalism.

Sébastien Broca (2015), in a recent article, accepts this invitation, indicating the way in which it is exactly the criticisms aimed at the ownership model by the Internet multitudes and in particular from the free software movement that contribute to explaining the most recent evolutions of the digital economy.

In fact, the neoliberal regulation of cognitive capitalism had rested on a very precise triptych, closely putting in order commodification, propertisation and corporatisation, where the last concept designates the development of the power of large multinational corporations and the new oligopolies of the digital economy. Nevertheless from the beginning of the new millennium, this neoliberal triptych seems to come untied giving life to more flexible and original combinations.

Thus, for example, "*massive participation of WEB multinationals in the eco-system of free software shows that 'corporatisation' may at times adapt itself to giving up some 'propertisation' and 'commodification'. An entire part of the digital economy sees some of the most powerful multinational companies in the world build commercial and industrial strategies around software subjected to regimes of open property, most often free and partially produced by volunteers during their free time. This giving up by the most recent capitalism of what is often considered one of its foundations needs to be explained, even though – Broca points out – it is merely a partial giving up*." (Ibidem, 1).[156]

4.6. The problems of the sustainability and autonomy of information commons: tendencies and countertendencies[157]

The attempt of the large corporations of the digital economy to integrate the logic of open source software and more in general the mobilisation of collective intelligence in a new business model takes on, in fact, ever more important and diversified dimensions. Rapid mapping of the phenomenon is doubtless necessary to better interpret the tendencies and countertendencies that meet there. First of all, it makes it possible to identify four main and often intertwined tendencies.

The first concerns the choice of some of the principal groups of the digital economy to involve themselves actively, both in terms of financial and human resources, in the financing and development of large open source projects. The exemplary case is, first of all, just that of Linux,

which in the 1990s incarnated the only real alternative capable of destabilising the monopoly of digital ownership capitalism represented at that time by Microsoft. By then 85% of the Linux code would be written by employees of Samsung, Intel, Red Hat, Google, Facebook, or even IBM (Linux Kernel Patch Statistics, 2014).[158] Each of these corporations employs programmers to carry out the modifications that it considers strategic for its business, benefitting at the same time from the work of the other enterprises and above all from that of volunteer contributors.

The second tendency concerns the development of companies exclusively specialised in open source. In particular this is the case of Red Hat which joined Nasdaq back in 1999 and at the end of the decade 2000 boasted business figures of over a billion dollars (Boldrin and Levine, 2008). This is a company that began its affairs selling an easy-to-install, modified and personalised Linux system. Though the base system had been obtained free-of-charge by Red Hat, experimentation and personalisation allow the company to sell services associated with the free software. The latter work like almost free appealing products for which it is possible to supply a range of paying services, such as installation, personalisation, assistance, training, etc. The business model is thus based on the work of supplying know-how. It does not rely on copyright or patents and is compatible with the principles of copyleft.[159] This type of model constitutes the form of organisation between the logic of commons and that of the market that undermines least the philosophy of free software and the autonomy needed for the reproduction of the commons. A very different case is instead that of the profit strategies founded on the spread of software with a system of "multiple licences". In practice the same software is distributed both in an ownership version, and in a free software version that has less functionality or is limited to a limited number of platforms. The free software is thus transformed almost by magic into a simple by-product advertising the ownership software. We find here exactly that logic of free exploitation of common goods that copyleft proposed to prevent. It is not by chance that this strategy uses especially the characteristics of the Berkeley Software Distribution (BSD) licence, which allows starting from an open source software to develop a product that is not free, as long as the merit of the author is acknowledged. Note however that the importance of the development of this type of licence must be seen in proportion; for example, in 2009, over the total open source projects, as we have seen (Table. 5) those with a BSD licence represented little less than 7% of the total, a percentage that instead rose to almost 62.5% for the GNU-GPL licences.

The third tendency is well represented by the hybrid model of IBM. After having been (and it largely remains so) the business leader in terms of the number of patents registered, IBM has progressively opted for a strategy that tends more and more to combine the IPR proceeds, for the most profitable products, with the revenue from the know-how services for open source products.[160] To promote this turning point with the public and the image of a large business protecting open source, IBM also announced the decision in 2005 to consent to free access to 500 of its patents[161] as well as its future contributions to the international standards of access to electronic commerce. Despite these announcements, we are very far from an abandonment of the ownership model and the practices associated with it. The software strategically detained by IBM, as mentioned, remain essentially closed. What's more, IBM continue to make unscrupulous use of the thousands of patents in its possession to blackmail potential competitors and start-ups. Like for example in 2010, the company TurboHercules, a start-up that had developed an open source emulator that made it possible to work IBM's 'OS mainframe (z/OS) on simple x64 servers, it was successfully threatened by IBM with a lawsuit for violation of intellectual property on 173 patents held by Big Blue. In short, collaboration with Linux and other open source projects has nothing of the philosophical adhesion to the principles of free software. It is based solely on a very precise observation: free access of the

partners of IBM to the source code of part of its programs makes it possible to improve them constantly. This route is all the more unavoidable as the development of Internet drives companies to research the inter-operability of their IT systems. IBM, using what is free like a sort of almost free R&D laboratory, hopes to be able to spread its technologies far and wide in this way, in order to sell the know-how of its engineers to make them work.

The fourth tendency is written in the sphere of a more general mobilisation of the work of the producer-consumer (prosumer) and collective intelligence. The development of the WEB 2.0 performs an important role in this evolution for different reasons. In particular, the practices of sharing and Peer to Peer of the prosumers have profoundly destabilised the traditional business model of IT, publishing, music and audiovisual corporations. Response to this technological and cultural challenge has led the "principal Web businesses to invent original forms of creating value. In the new digital capitalism, it is no longer only a matter of making the highest margins possible on the sale of goods produced inside it and protected by IPRs. The logic is to create eco-systems in which the users participate (freely or at a low cost) in the production of the contents whose value increases indirectly through advertising or the sale of services", (Broca, 2015, 5), especially databases, as in the Google or Facebook models.

In short, while the first cognitive and digital capitalism had as its main objective that of increasing the price of outputs creating an artificial scarcity of resources thanks to IPRs, these new models try rather to diminish the cost of the inputs, particularly by planning the use of forms of free labour for the creation of value and innovation (Terranova, 2000; 2013; Bria et al., 2013; Zukerfeld, 2014; Broca, 2015). Mobilisation of the activity, most often free, of the prosumers and collective intelligence can take very different forms. They range from the collection and use for commercial purposes of data and the identity of the users, the externalisation of simple and repetitive tasks, like the purchase of a ticket on-line, up to complex activities of artistic creation (like the videos on YouTube) or that participate fully in what the new knowledge management calls the model of open innovation. On this subject, as well as the volunteers of free software, an exemplary case of the use of the users' creative work in an open innovation model is that of the Lego brand Mindstorms. Mindstorms is specialised in the production of "programmable bricks", assembly of which allows you to build Robots. The product was initially aimed at a public of children. However, Mindstorms rapidly realise that on Internet a community of adult enthusiasts has been created who exchange information in order to "crack the bricks programs", and "program their sensors and command systems". Lego-Mindstorms observes these dynamics with extreme diffidence at the start and threatens to bring a lawsuit for violation of intellectual property. Then they change their minds, becoming aware that this spontaneous community of hobbyists can offer them an enormous free reservoir of ideas and human resources for an R&D activity, source of an unceasing series of incremental innovations.

Following these evolutions, as Broca (2015) opportunely emphasises, both at an academic level and at a social one, an important new stream of the criticism of cognitive and digital capitalism is developing: the approach of digital free labour, inaugurated by the pioneering work of Tiziana Terranova (2000) who with the term free, emphasised the character at the same time free and voluntary of these activities creating value for businesses (Terranova, 2000; 2013; Moulier-Boutang, 2007; Pasquinelli, 2008; Fuchs, 2012). This new stream of criticism can converge with the criticism of ownership capitalism and the free software movement. It can even give rise to new forms of integration of this criticism into the dynamics of capitalism, according to a logic of which YouTube has supplied the first outline, installing the Partners Program which permits creators of the most

popular videos to receive a share of the advertising revenue (about 55%) that they generate (Carmody, 2013).

What will be the outcome of these metamorphoses of cognitive capitalism and, especially, their impact on the dynamics of the commons?

In our opinion, two main factors drive this process of integration of the commons into the spirit of new capitalism, even though, as we will see, it meets with numerous obstacles and significant countertendencies exist.

The first factor is tied to the inefficiencies of the ownership model, in terms of innovation, product quality and, specifically for Internet groups, the impasse of a strategy of commodification of their content. It is to get round these that an ever greater number of large IT and Internet oligopolies, have become convinced of the need to integrate the information commons or in any case try to reproduce for their own advantage decentralised forms of production of knowledge and innovation.

In particular, acknowledgement that innovation escapes more and more from the control inside large companies and calls for the experimentation of forms of so-called open organisation of innovation is by now a recognised principle of knowledge management. More generally, in an ever more explicit way, as Marazzi (2010) reminds us, in management theories one clearly talks of externalisation of the production processes based on crowdsourcing, that is to say on placing value on the crowd and their lifestyle. Turning to resources produced by regimes of open possession and external innovation, allows large businesses to considerably reduce investment in R&D as well, to the point that, as has been spoken of in the past like for the Alcatel case, the model of "a company without factories", today some economists, such as Gagnon (2015), conjure up the possible model of large High-Tech corporations without research laboratories. The new business and open innovation models thus seem to allow a certain number of corporations to face a dual challenge more efficiently: a) stand the pace of a "permanent innovation regime" (Foray, 2000; Paulré, 2008) regarding which, as Stallman had anticipated, the ownership model is inadequate, both in terms of circulation of knowledge and that of labour organisation; b) invent new profit strategies capable of adapting to an economic structure in which a growing number of knowledges, goods and services are exchanged and produced freely by prosumers, escaping from the rules of intellectual property rarefaction.

The diffusion and sustainability of this model as an alternative to the ownership model founded on the commodification, propertisation and corporatisation triptych, clashes however with greater contradictions tied to what Robert Boyer (1986) would call the Keynesian paradoxes of the shift from a microeconomic scale to macroeconomic scale.

At a micro level, in fact, it assures that a certain number of enterprises set up profit strategies less dependent on revenue from IPRs and/or from the sale of commodities, bartering the gratuitousness of the open source in exchange for know-how services (ICT businesses) and/or free access to content and services, in return for income tied to advertising (more than 95% of the business figures of Google, for example).

Theoretically therefore, a growing number of businesses should adopt this model, to compensate the lower proceeds tied to IPR (Intellectual Property Right) with those from advertising, from the reduction in R&D investments and from services providing assistance and marketing of the free software. Nonetheless, at a macroeconomic level, if all businesses were actually to adopt this model, the result would be a progressive expansion of the sphere of gratuitousness which would lead in turn to a proportional fall in the volume of profits.

In this sense, Rifkin (2014) is not mistaken when he suggests that the same process of camouflaged diffusion between businesses of the free and open source model properly of the commons to make a new source of profit out of it, would end up leading to the opposite result than that looked for. In other words, we would witness more the expansion of what Rifkin calls the marginal cost-zero society, founded on the logic of sharing and gratuitousness than, to the success of a new viable business model to give, on a macro-economic and social level, new impulse to capitalism. [162]

It is one of the key factors which explain why, in our opinion, the ownership model remains the insuperable horizon of cognitive capitalism. It will continue to remain dominant despite a series of amendments and partial and local sacrifices, more or less significant, of the triptych commodification, propertisation and corporatisation. Awareness of this fact feeds the reflections of distinguished economists besides, like J. Bradford DeLong and Lawrence H. Summers (2001)[163] who right on this basis formulate the justification for the need for further strengthening of the IPRs system.

The second factor in the advance of cognitive capitalism on the terrain of the knowledge and information commons depends on the weaknesses and contradictions inside the universe of free software and the hackers.

The principle one of these weaknesses is tied to the lack of financial resources. By their very nature commons are an alternative form as much to the public as the private sector and therefore cannot have at their disposal the conditions of financing activities that are in the realm of private enterprise and the State. In particular, in the original spirit of free software, the work of contributors is not a wage relation. It is voluntary work, or better a free-activity, in the two-fold sense of gratuitous and free, which consists in producing use values subordinated to a regime of non-appropriable property. Certainly, these characteristics, as we have seen, contribute to explaining the superior productive efficiency of this model compared to the ownership and bureaucratic one, favouring initiative taking, innovation and horizontal co-operation. But at the same time they make it highly vulnerable on the level of capacity of self-financing, seeing that the commoners cannot benefit from an income generated directly by their activity. This situation explains why one the main obstacles to the development and sustainability of the knowledge commons (from free software to makers) is found in the lack of time that cognitive workers suffer from (Agrain, 2005). They must, in fact, find their means of support elsewhere, in particular through wage relation, in activities that require a high-level of IT knowledge. Besides, the time at their disposal for the commons is all the more reduced that in cognitive capitalism we witness, for the highest qualified jobs, a stretching of the actual labour time that overflows into all the other times of their life. These economic and temporal constraints[164] also explain why in free software projects an overwhelming majority of people cannot devote more than a few hours a week to them, while the essentials of the lines of code are the work of a minority of professional programmers (Bonneuil and Joly, 2013). The result is that the partnership strategy of the large proprietary groups has been able to slip more easily into this crack. It is like this that in some large projects, as recalled, the majority of the code is now written by employees of large groups who work on it according to the interests of their companies. As far as the regime of ownership of the product continues to respect the principles of the four freedoms defined by the FSE, this situation cannot avoid conditioning both the concept of the software and the way to co-ordinate labour. This results in a loss of autonomy on the side of the free software commons, the importance of which, in our opinion, is undervalued by the leaders of the open source movement. Note, on this subject, that the rift between the FSE movement and the open source one is not in fact, as is often presented, the outcome of the opposition between the rigidity of the ethical principles of a Stallman and the lucid pragmatism of a Raymond or a Torvalds.[165] This division is

above all the expression of the converging economic forces that weaken the economy of the commons rendering them vulnerable to the integration strategy of the large IT groups.[166] Even if the commons come out of this unquestionably weakened, one should not however forget a series of elements giving evidence of their resistance and a lasting dynamism:

a) next to large projects like Firefox and Linux which depend more and more on financing from the large players of the IT industry, there exist tens of thousands of independent projects, conducted on a voluntary basis.[167] These preserve, as in the exemplary case of Debian,[168] which counts more than one thousand voluntary collaborators, the autonomy of the free software commons from the influence, consciously or unconsciously, that financial dependency of the large groups exercises over them;

b) free software's market share, in terms of business figures, in the software market remains reduced (cf. Figure 6). In 2011 it does not exceed 6.1%, even if its rate of growth is much higher than that of the overall market;

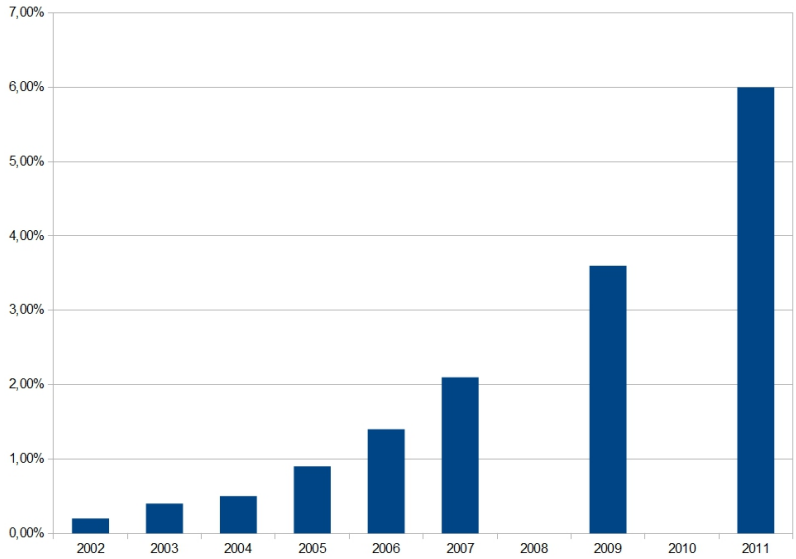

Figure 1: Market share of open source software in the software market Source: Ben Siesta, http://fr.wikipedia.org/wiki/Logiciel_libre

c) finally, the most important element is the extension of knowledge-based commons into new sectors of activity and in new productive combinations in which it seems to reconnect at times with the spirit of the dawn of the free software model, as is the case for very many experiences in the new universe of makers (Lallement, 2015).

4.2. The maker movement. A return to dawn in the logic of the commons?[169]

The free software movement combines with it and finds today a significant extension in the maker movement that associates the manufacture of material goods and the sharing of means of production: electronic and robotic apparatus, 3D printing, numbered machine tools, etc.

The vitality of the maker movement is proven by the growth on a world scale of the number of makerspaces, almost all of which have a non-profit-making memorandum of association. According to the data supplied by the site hackerspaces.org we apparently passed from twenty or so of these third places of production in 2000 to around 1700 in 2014. Their geographic distribution in 2012

was prevalently concentrated in Europe with 47% (in primis in Germany), followed by the USA with 38%, and ending with Asia with 8% (Lallement, 2015).

The term Maker, is used to indicate the culture and counterculture that is acknowledged with the motto, Do It Yourself (DIY) which designates all the activities of crafting and self-production.

The strength of the maker movement is found in the way in which it has managed to translate the potential of a bit, the elementary units in the digital world, i.e. the immateriality of the software, into the capacity to arrive at the atom, that is to the production of material goods. This capacity relies on the recovery of forms of co-operation of software commons extending the principles of copyleft to the advancement of technological knowledge tied to Open Source Hardware (OSH).[170] Each individual, as maker, can co-operate with thousands of individuals and spread his savoir faire through an ever denser network of makerspaces. In this way, collaborative work is becoming the drive of innovation in the manufacturing industry itself changing it from the bottom up.[171] Numerous supporters of the theory of the revolutionary significance of the technologies and the maker culture maintain that these shared processes would determine a paradigmatic break with the logic of integral production of the old industrial companies. We would witness the transition to wide-spread horizontal production based on what authors as different as Chris Anderson (2012) and André Gorz (2008) call the formation of a High-Tech craftsman or craftsman 2.0. An interpretation that, under many aspects, could refer back to and renew the theory of the second industrial bifurcation and the return to the craft model of flexible specialisation upheld by Sabel (1982) and Piore and Sabel (1984) at the beginning of the 1980s. In this model: Where Fordism calls for the separation of conception from execution, the substitution of unskilled for skilled labour and special-purpose for universal machines […] specialisation often demands the reverse: collaboration between skilled designers and skilled producers to make a variety of goods with general-purpose machines (Sabel, 1982, 194).

In continuity with Piore and Sabel, for some authors, like David Gauntlett (2011), the philosophy of the maker movement and High-Tech craftsmanship would in fact have very deep roots, distant in time, traceable in exegetes of the crafts culture of Victorian England like John Ruskin and William Morris. It reconnects to the spirit of mutual aid and of Owen just of the dawn of the labour movement in England that is to the aspiration to an economy founded on the association of co-operatives according to principles of organisation in alternative both to the State and to private enterprise.

The ideas of Ruskin and Morris which inspired the English Arts and Crafts Movement, later crossed the ocean and landed in the United States. Here they spread through the American Craftsman style or American Arts and Crafts Movement which we can consider as another precursor of the hacker and maker movement. These expressions are verifiable, as Gauntlett reminds us, through the journal The Craftsman (published between 1901 and 1916), in which exponents of this movement, like Gustav Stickley, released projects and designs relating to goods that could be produced without the need for big industry. As well as with these two personalities who placed the importance of craftsmanship and co-operation at the centre of their activity, the maker philosophy also presents strong affinities with the thinking of the economist Thorstein Veblen.

In fact, Veblen tied the instinct of workmanship, i.e. the intrinsic propensity of every man to fabricate, the idle curiosity, and parental bent to the need to share and cooperate for the welfare of the community and the incoming generation. [172]

Certainly, the new opportunities that 3D printers are opening, to what Yochai Benkler calls Commons-based peer production, are once again the result of a close overlap between a

technological trajectory and a socio-cultural movement. In fact, 3D technologies originated at the beginning of the eighties when Hideo Kodama of the Nagoya Municipal Industrial Research Institute, invented two fabrication methods through the technology of additivity production. [173] At that time the first costly, huge 3D printers on sale were used to produce prevalently architectural prototypes, and prototypes in the automobile and aeronautical sector. The difficulties met by the first printers in terms of diffusion were not only tied to their high cost and bulk but above all to the complexity of the software required to make them work. The spread of these machines happened thanks to the fundamental contribution of hackers who by interesting themselves in these instruments have permitted the passing from 3D prototypes to a series of machines where the software and hardware, developed in open source, are always easy to use even for those who do not have specific skills. Think that one of the most advanced projects in personal 3D printers is the Replicating Rapid Prototyper project (RepRap) which resolves to produce a 3D printer free/libre/open-source software (FLOSS) the complete characteristics of which are distributed under the GNU-GPL license, and is capable of printing a copy of itself. Even the first RepRap printers have been developed under the impetus of design work shared between hackers and exponents of the university world starting from the printing of simple pieces in plastic. At the moment the movement is developing software and hardware capable of printing electric circuits and pieces in metal even. It is no coincidence that we are witnessing a high proliferation of sites that make available for free different designs that are ready to be printed or possibly modified following hacking principles.

The possibility of being able to print in 3D is one of the "extreme productivity" examples of sharing over the Internet. It allows directly accessing means of production which makes it a powerful instrument of democratisation in production in continuity with the ethical hacker (Gauntlett, 2011). This does not mean that traditional industry will fall into insignificance, but the process tied to the spread of the 3D printers is changing the production world (cf. Box 4). It will become banal, just as it did for the development of laser printers that we use daily to print documents on paper. [174]

Box 4. Fields of application of 3D Printers

- 3D Printers for domestic use: Thanks to its spread and the RepRap project it allows the production of a variety of objects going from plates to toys.
- 3D Printers for food use: it is possible to print different types of pasta and other fresh products.
- 3D Printers for building use: One of the most advanced projects like that drawn up by D-Shape, which intends to build buildings through the use of this technology (http://www.d-shape.com/). Contour crafting technology makes it possible to produce all the parts of a building on site and above all is directed at being used in extreme cases such as earthquakes and other environmental catastrophes.
- 3D Printers for automobile use: Amongst the first automobiles produced thanks to 3D technology and devised in a community manner we recall the Strati (because of one of the production techniques used by the 3D printer which releases the raw material in layers) by the business Local Motor in partnership with the Association for Manufacturing Technology (AMT). The car was presented at the International Manufactoring Technology Show (IMTS) in Chicago in December 2014 (http://dprintedcar.webflow.io/).
- 3D Printers in the field of medicine: The field of medicine is making use of 3D Printers

especially because of the importance they have in the production of prosthesis, medical implants and in the sector of printing human tissue (bioprinting). One of the most interesting fields due to its social value is tied to Project Daniel, an initiative carried out by Mick Ebeling, co-founder of the research centre called Not Impossible Labs, which permits the creation of free artificial limbs for victims of the war in South Sudan. The project avails itself of the collaboration of an ever more important community of creative makers and hackers. (http://notimpossible.com/).

- 3D printers to use in space: NASA is developing projects to use a 3D printer without needing continuous help from earth to carry out its projects in space.

The field of application of 3D printers is becoming more and more important thanks also to their flexibility and production efficiency.

A change that has many observers thinking of a new industrial revolution, this time founded not on the dispossession of craftsmen's knowledge and the standardisation of labour and products, but on the exploitation of the knowledge of a High-Tech craftsman and limited production adapted to local needs and the ecological transition. Authors like André Gorz even made it the prototype of a new social way of production based on the possibility to interconnect craft workshops founded on the common throughout the whole world, to treat software like a common good of humanity, like the free software movement does, to replace the market with what it is necessary to produce, how and to what purpose, to fabricate all that is necessary locally and also to make large complex facilities through collaboration with many local workshops. Transport, warehousing, marketing and factory assembly, which represent two thirds of current costs, would be eliminated. An economy beyond wage relation, money and commodities founded on the pooling of the results of an activity conceived of from the beginning as common, is heralded to be possible: an economy of gratuitousness. (Gorz, 2008, 118-119).[175]

This utopian vision of Gorz's has many affinities with the experience of the Transition Town Movement promoted by Rob Hopkins. The Transition Movement, as Gauntlett (2011) emphasises, is formed of community initiatives that try to transform society into resilient communities organised according to the maker logic in order to face the environmental challenges tied to climate change, limited resources and alterations in the world of work brought on by the economic crisis. One of the main characteristics of the Transition Movement is that of believing that all these problems can be faced through co-production and community collaboration. It is no coincidence that the two fundamental principles of the movement are:

a) individuals have immense quantities of creativity, talent and ability;

b) if individuals acted as a community they would be capable of creating a way of life that is significatively more connected, more vibrant and more fulfilling than the one we live in. [176]

Even though it is more recent even the maker movement seems to be in turn crossed, like the free software movement, by divergent tendencies on an economic level and on that of political philosophy. The model of resilience and autonomy incarnated by the radical makers community in California of whom Gorz and Lallement are spokesmen, is opposed in this way by a logic of integration in the large circuits of industrial production and commerce (Landeau, 2014) or again approaches according to which the decentralised production of the makers could come close to the realisation of a market of perfect competition (cf. Anderson, 2012).

5. Conclusion[177]

The dynamics of the commons express the vital force of a knowledge economy originating from the meeting of collective intelligence, the development of welfare institutions and the ICT revolution. This dynamics often enters into contradiction with the logic of cognitive capitalism founded on the triptych commodification, propertisation and corporatisation. This contradiction brings into the light the alternative between two divergent models of society and regulation of a Knowledge-Based Economy (KBE) from which depends crucially the same sustainability and the future of the commons.

The first model is based on the investigation of the neo-liberal way of regulation that leads to weakening of the welfare state institutions and the tragedy of the anticommons of knowledge. At the same time, although essentially maintaining the supremacy of the ownership logic, the large oligopolies of IT and Internet set new business models running that arrive at internalising part of the free software and open source movement. A small number of large –scale American corporations, has furthermore succeeded in controlling a large part of the material and intangible infrastructure of Internet, appropriating this common space and transforming the digital creations and identities of users into commodities.

This strategy plays on the economic and financial vulnerability intrinsic to the non-mercantile model of the commons, highlighting its main weakness. We refer, as we have seen, to the lack of resources independent from wage relation of which the majority of commoners suffer. This determines a situation of precariousness all the greater that it goes hand in hand with the levy that land rent burdens on cognitive labourers. The key role that the logic of economic rent (financial, property and IPR-linked) performs in cognitive capitalism risks curbing more and more not only the dynamics and autonomy of the commons, but the very conditions most essential for the reproduction of a KBE.

This evolution is expressed through a growing divorce between the logic of the mercantile worth and that of wealth. To better comprehend the meaning of this statement it is necessary to remember how for the founding fathers of political economy, Smith and Ricardo, the worth of commodities depends of the production difficulties and therefore the labour time. The concept of worth is thus completely different from the concept of wealth, which instead depends on abundance, the value of use and lastly gratuitousness. So, the capitalistic logic of mercantile production had found, as we have seen, in industrial capitalism, a sort of historic legitimacy in its capacity to develop wealth, producing ever more material commodities with less labour, so with ever lower unit prices, making it possible to satisfy a growing mass of needs. Instead, in cognitive capitalism, this positive bond between worth and wealth, between mercantile production and satisfaction of needs, is ever more flawed. Different trends of contemporary economy illustrate, as we have seen, this disjointedness between value and wealth. They refer back to the incoherence between the logic of valorization of cognitive capitalism and the intrinsically non-mercantile logic of a KBE and the production of man for and by man. In this framework, the decisive stakes for the capital become, in fact, a strategy of commodification and of propertisation which, thanks to the tightening of the IPRs (Intellectual Property Rights) and the mercantile subordination of welfare state services, leads to artificially constructing a scarcity of resources. This logic is one of the main expressions of what has been defined by economic theory becoming-rent of profit (Vercellone, 2013). The result is a situation that contradicts the very principles on which the founding fathers of political economy

justify ownership as an instrument of the fight against scarcity. Now in fact it is the creation of ownership that makes scarcity to appear.

In this context, it becomes ever more essential and urgent to define the terms of an alternative model of regulation of a society and of a KBE at the centre of which the logic of the commons would perform an essential role.

The analysis conducted in this report brings to the surface three main axes that could constitute the framework of such a mode of alternative development.

The first axis is centred on a policy of reinforcement and democratisation of the welfare institutions capable of favouring the transition from a system of a bureaucratic welfare state towards what we have called a system of commonfare.

The possibility of this transition rests on the key role that should be assigned to investment in non-mercantile collective services and productions of man for and by man which guarantee at the same time, the satisfaction of essential needs, the reproduction of a KBE and socially and ecologically sustainable development.

As we have had occasion to observe more than once throughout this report, man for man productions constitute, moreover, a reservoir of highly qualified jobs in activities in which the cognitive and relational dimension of labour is dominant. Productions of man for and by man correspond by definition to a co-production of services. This outline would thus favour experimentation of fresh forms of self-government of production, according to modalities that closely involve users in an authentic dynamics of participative democracy.

Implementation of this model evidently implies bringing back up for discussion the dominating economic paradigm today, a paradigm according to which the expenses and collective services of welfare state would represent exclusively a cost, financing which would depend on a withdrawal made on the value created by the private mercantile sector (mistakenly thought of as the only producer of wealth). The expenses and collective services of welfare, on the contrary, should be considered as driving factors of a knowledge-intensive economy and social investments which through their own production activity, generate a monetary and not mercantile wealth which is not levied on the private sector but produced directly (Harribey, 2004).

This perspective of transition towards a model of commonfare ties up again with other essential issues faced in the course of this report.

-The issue of the development and legal recognition of a charter of common goods, at a European, National, and local level according to the route that has been opened, for example by the Rodotà Commission and the LabSus laboratory, the culminating point of which is the Municipality of Chieri's regulations on common goods.

-The issue of inclusion in this charter of common goods of the home and more generally of what in France they call tiers lieux, the third places of production, such as hackers and makerspaces, alternatives to administrative places and to the spaces of private enterprise.

-The issue of reflection on a common currency, without which financing of production and investments necessary for the development of the commonfare could not take place. Here we need to note and extend one of the key teachings left to us by Keynes. The Cambridge economist had demonstrated that investment does not depend on saving, but on the creation of money achieved through credit from commercial banks and regulated by a central bank. This teaching in a KBE,

where productions of man for and by man and the commons have a decisive role, must be stated from a dual point of view.

In the first place, it means considering that just as private sector credit does not depend on ex-ante savings, the same is true for non-mercantile productions by man for and by man. Taxes are not a pre-existing levy for their financing, but the collective price paid by companies ex post for these productions.

In second place, it means overturning the logic closely tying income to wage relation, making the second the pre-condition of the first. It means declaring that the social labour of the commoners creates real wealth therefore giving right to an income that permits fulfilment of these activities. Here we have a key condition to set a labour force free into the activity of the commons, a labour force which is today held, often in a less productive way, in the snare of the public or private sector.

The second axis of this alternative way of development, in fact, refers to reforms open to mitigate the elements of weakness of the commons, acting first of all on the precariousness of the labour force and the constraints that limit involvement of the commoners. Sustainability of the commons largely depends on the reinforcement of the logic of the socialised salary by means of the extension of forms of access to a guaranteed income based on citizenship rights opposed to the bonds of economic and subjective dependence moulded through debt.

Different proposals have been developed from this perspective: that of an income for collaboration (Stiegler, 2015), that of an extension of the model of unemployment benefit of the show business intermittent workers (Corsani and Lazzarato, 2008), that of a universal allocation of autonomy (Vanderborght and Van Parijs, 2005). All of them converge towards what we could call the institution of a Social Basic Income (SBI), unconditioned and independent from wage relation.

This basic income presents itself at the same time as an institution of the Common and a primary income for individuals, i.e. an income directly resulting from production and not from redistribution. Here we have a nullifying point that emerges from our analysis of the commons compared to the majority of formulations of basic income which remains anchored to a concept that makes it a secondary income related to redistribution and to the classic management of the welfare state.

Observe that these two dimensions, primary income and institution of the Common are moreover closely bound, as the analysis conducted in this report is able to demonstrate. [178]

So an institution of Common, because the SBI does not depend on the public sphere but after all corresponds to the pooling of part of what has been produced in common, deliberately or otherwise (Gorz, 1993) and this outside any logic based on a relationship of measurement and proportionality between individual effort and right to an income now made inconceivable by the same development of a KBE (Aglietta, 1997).

A primary income, in second place, because SBI's proposal, as an institution of the Common, also rests on a re-examination and an extension of the notion of productive labour that, as shown by this study, is to be taken into account in the light of two dimensions.

The first dimension refers back to the concept of productive labour, conceived according to the dominant tradition within economic theory, like labour that produces commodities and generates a profit. Here it is an observation according to which, in cognitive capitalism, we are witnessing an important extension of labour times, beyond the official working day, directly or indirectly implicated in the formation of value created by businesses. SBI, as it is a social salary, would correspond from this point of view to the collective remuneration of a part of this ever more collective dimension of

an activity creating value that is unfolding on the whole of social times, giving rise to a huge mass of unacknowledged and unpaid work today. It is moreover important to remember how this increase in unpaid labour results from the combination of two major trends. On one hand, it is tied to an intrinsic trait of cognitive labour: that of being an activity of production, reflection and exchange of learning that is carried out as much outside as during the contractual hours of work. On the other, it also comes from the growing role of the labour of the prosumer and especially from the private appropriation of free labour made by a multitude of individuals on the Web to the advantage of a small number of large international corporations, like the famous GAFA.

Against the tradition of economic theory on the other hand, the second dimension refers back to productive labour conceived as labour as a producer of use values, source of a wealth that slips out of the mercantile logic and that of wage relation other-directed. From this perspective, the SBI would correspond simultaneously to social validation and to a means of financing this dense network of non-mercantile activities that a society of widespread knowledge and the commons creates, beyond wage labour. In short, it is a matter of asking questions about the historical identification that capitalism has established between labour and wage labour and, with this, between wage labour and right to income. Put another way, it means affirming that work can be non-productive in terms of goods, but nevertheless productive of non-mercantile wealth and therefore find its compensation in an income.

In this viewpoint, the mitigation of the constraint of a wage relation permitted by the SBI, even more than a reduction of the legal time of work, would permit individuals to recover control over their time and the management of activities that are an end in themselves. Thus it would constitute a real social investment and a liberation of creative energies ensuring, for example, the reproduction of information and knowledge commons, the development of which is noticeably hampered by the lack of time that is a feature of cognitive labour (Agrain, 2008).

The mitigation of monetary dependence of the labour force and the increase of free time permitted by the SBI would constitute a key tool to allow cognitive labour to reappropriate itself of command of its own life time and use the time and psychic energy thus freed in the development of different forms of production of Common, as in the models of free software and non-profit social economy.

Finally, the SBI thus presents itself at the same time as an institution of the Common, a primary income for individuals and a collective investment in knowledge by the society. It would allow, together with the growth of collective welfare services, the establishment of a model of development based on the supremacy of what is non-mercantile and on forms of alternative co-operation, as much to the organisational principles of the public as to those of the market.

Lastly the third axis concerns the fight against the anticommons of knowledge.[179] We observe that without recourse to bringing the IPR system back up for radical discussion, it could right now rely, for example in the European Union, on two principal devices that would allow the creation of propitious conditions for the development of a KBE. In order to preserve a real KBE the sustainability of the information and knowledge commons is a prerequisite.

- The first device concerns institutional recognition and the spread of copyleft principles as a form of common ownership that establishes inappropriability and a protected public domain. Teachings drawn from this relationship both as far as the so-called natural commons are concerned, tied to the regulation of scarce resources, and the information commons based on the preservation of intrinsically abundant resources, lead us to give the following definition of it: common property needs legal devices and innovations that, just as for copyleft, must allow the establishment of an

inappropriable common-pool resource to which each individual can gain access and/or add something, both by contributing to the conservation of the resource (commons tied to non-renewable resources) and boosting it through shared use (intangible knowledge commons), but not take away any element from it to his/her advantage. Creativity treasures could develop around these principles to apply them to different types of resources taking their characteristics into account.

- The second, which is largely a corollary of it, would imply the ban on patenting informational goods and living organisms. Note well that these would be non-revolutionary changes as they would do no more than take us back to the structure of the IPRs which existed before the great reforms begun in the 1980s in the USA. Such reforms would allow the restoration of a relatively clear frontier between discovery and innovation and a way of regulation of the IPRs that from the actual point of view of the development of knowledge showed itself to be more efficient than the current system. The consequence would be without doubt the inevitable drop in the number of patents. Nonetheless, the explosion of the "speculative bubble" of the IPRs, growing from the eighties and nineties, would not go hand in hand with a reduction in the pace of innovation, but exclusively with that of the economic rent associated with them.

In conclusion, the three axes of this mode of alternative development expressed here, could constitute a powerful countertendency compared to the triptych commodification, propertisation and corporatisation contributing to free the KBE from the weight of the economic rent and from the principal snares of the neo-liberal regulation of cognitive capitalism.

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Annex 1. Intellectual property rights and private appropriation of traditional knowledge and seeds. The case of the land commons[180]

Commodification imposed by the capitalistic economic system, constitutes the first cause of the origin of IPR, and of patents in particular. Back in 1930 the United States passed the Plant Planet Act which allowed the registering of patents on some plants. This law was then extended in 1970, through the introduction of the Plant Variety Protection Act which applies to seeds and more than 350 species of edible vegetables. Since then the laws that have followed have reinforced the protection of the interests of large multinational companies.

At an International level a treaty that sets things out differently compared to others is the FAO's International Treaty on Plant Genetic Resources for Food and Agriculture approved on 2001 and entered into force on 2004, which sets itself amongst its aims

"the conservation and sustainable use of plant genetic resources for food and agriculture and the fair and equitable sharing of the benefits arising out of their use, in harmony with the Convention on Biological Diversity, for sustainable agriculture and food security.." [181]

In it the ancestral contribution of local and native communities and of farmers in all the regions of the world to the conservation and valorisation of phytogenetic resources are acknowledged. In that sense measures are established that must be adopted by every nation aimed at protecting and promoting the rights of farmers in order to guarantee the "protection of traditional knowledge" (art. 9(2)(a) of the Traty), "the right to equitably participate in sharing benefits", "the right to participate in making decisions, at the national level, on matters related to the conservation and sustainable use of plant genetic resources for food and agriculture." (Art. 9(2)(c) of the Treaty)

In this way the treaty recognises two fundamental characteristics of phytogenetic resources: that of being the common heritage of humanity and consequently based on free access. These peculiarities reveal their commons nature. Freedom of circulation and exchange is thus a fundamental aspect for social, economic and ecologic sustainability of the communities of reference.

A. When was it possible to patent seeds?

The agreements and International treaties, with the exception of the FAO's International Treaty on Plant Genetic Resources for Food and Agriculture are essentially based on a bilateral approach and on private appropriation of genetic resources that for thousands of years have been considered the common heritage of humanity.[182] In this way the principle of free access to resources, which had instead guaranteed its development in terms of new varieties and the preservation in the course of time, is called into question.

With the advent of genetic engineering the door is opened to the patenting of seeds. In 1994 the so-called TRIPS (The Agreement on Trade Related Aspects of Intellectual Property Rights) is signed, promoted by the World Trade Organisation (WTO). In article 27.3(b) the meeting between biodiversity and intellectual property rights is made possible. In fact, in this article the patentability of microorganisms and non-biological or microbiological procedures comes to be fixed and

patentability or a "sui generis" system or again a combination of the two, of plants and animals, is made possible. The ban placed on farmers regarding the exchange of seeds is the element that denies the very subsistence of the farmer as well as undermining at the base the foundations themselves of biodiversity.

One of the "sui generis" systems is that instituted by the UPOV convention (International Union for the Protection of New Varieties of Plants) signed in 1961 the latest amendment of which goes back to 1991. The initial objective is that of protecting the right of the breeder leaving free access to the varieties. To this aim UPOV shall issue Community plant variety right to protect the right of the breeder. In 1978 the first amendment is made on the basis of which it is established that a plant variety can be protected by a Community plant variety right if the three following conditions exist: it must be distinctive, homogeneous and stable. The holder of the certificate thus acquires the right to exclusive exploitation of his variety. Each user must therefore pay a royalty to the breeder except for two specific cases: utilisation for the purposes of research and the "farmer's privilege" according to which the farmer himself can use a part of the harvest to resow his own fields. With the 1991 amendment the farmer's privilege passes from mandatory to optional (the option remains in the hands of the countries signing the agreement) and this right must be exercised protecting "the legitimate interests of the breeder". Moreover, in the UPOV convention of 1991 a fourth condition is introduced: besides being distinct, homogenous and stable the variety must also be new. The last condition implies the obligation of remunerating the breeder even in the case in which it concerns an essentially derived plant variety. This system thus protects the large producers of seeds, penalising the small and medium selectors. The last feature of UPOV 1991 is that of allowing double protection, UPOV and patent, legitimising in this way the US practices. In essence with this the exchange of protected seeds and multiplication material between farmers is forbidden. In the same way reproduction by means of determinate multiplication materials (e.g. fruit trees, forest fruits, vegetables) is prohibited. Member states can exceptionally authorise the reproduction of seeds to a limited extent: this is applied however only to seeds reproduced on their own farm. We need to stress that the Community plant variety rights established by UPOV implicate free access nonetheless; to obtain new plant varieties the consent of the breeder is not necessary. This aspect, as is well highlighted by Chetaille[183] (2005) distinguishes them essentially from patents. Nevertheless we note that the character of novelty that the variety for which the certificate is requested must possess and the relative effect in terms of royalties, appear to be mechanisms that tend more and more to get closer to the view of the patent.

B. From common good to appropriable good

The reflections on intellectual property rights set a series of problems relating on one side to bio-diversity and on the other the survival itself of millions of small farmers who get their sustenance from this traditional activity. The effects on developing countries are even more significant in the measure in which, in the bilateral trade agreements, States also ask for the signing of the acceptance of the regulations concerning phytogenetic resources, as the practices adopted in the United States bear witness. The way in which the union between the logics of the market and the State are united in this process of "knowledge theft" tied to life appears evident. This element provokes deeper reflection on the dynamics of power that becoming self-referential, arrives at exploiting every environment open to being commodified, commodifying it: it matters little if it is the living itself that suffers this process.

Amongst the characteristics that must be possessed by seeds to be patented or again able to be entered in the register of UPOV and thus marketable, those of homogeneity and stability raise

serious problems that pour over on one side onto biodiversity, the principle itself of the continuation of life, on the other on social and ethical sustainability of a system that thus brings into question the work itself of the farmers. The latter are expropriated of their knowledge and skills, which therefore lose any form of recognition either social or economic in the evolution of a contemporary capitalistic system. Out of this thus comes a key element: the role of appropriation of knowledge in the valorisation of capitals and the forms of organisation of production.[184]

In this sense the system of intellectual property rights and the norms that regulate seeds open the way clear to bio-piracy. According to this practice farmers are expropriated of their own knowledge and their traditional learning in favour of the large multinational corporations of the food industry. They thus lose their role as depositors of knowledge which had guaranteed the sustainability of development and agricultural selection as well as the increase of bio-diversity, for thousands of years. These dynamics implicate a break up of social ties, with the replacement of the farmer whose role ends up being taken over by the seed industry, agro-food multinationals and pesticide industries.

The characteristics of agriculture recognised and protected in international treaties and by systems protecting intellectual property rights, have repercussions on biodiversity strongly bringing into discussion the sustainability of these routes of development. The characteristics of homogeneity and stability are clearly in opposition to heterogeneity and the variability which characterise the seeds of traditional agriculture. In fact, the seeds of the latter are similar to each other, but not identical (which is what instead happens for genetically-modified seeds, in which each seed is the exact copy of the other). The diversity that characterises traditional seeds also represents their strong point, by virtue of which survival of the species itself is assured even in the face of natural calamities that could decimate the crop. Put extremely briefly, heterogeneity of seeds in agriculture is the element that guarantees at least a minimum crop for the survival not only of the farmer but also of the seed. The practises of exchanging seeds which have always characterised agriculture thus need to be read in this analytical framework. It makes the concept of sustainability – ecological, social and economic - plain in an exemplary way.

In final analysis it thus appears that the intellectual property rights and the systems "sui generis" aim to destroy this space of participative sharing and self-management that is represented by the selection, harvest and cultivation of seeds carried out by the farmer. From this perspective therefore seeds are transformed from common good to appropriable good.

C. Ties between free software and seeds freedom

Taking the characteristics of traditional agriculture into account, it appears relevant at this point to try to investigate directly what the peculiarities and elements are that, allowing an assimilation with the system of free software, permit the identification of new prospects of development, the result of propulsive dynamics that are prompting a common defence of a collective legacy from the bottom.

Ever since Neolithic times and over the course of centuries agricultural activity has developed through a process of selection of the plant species carried out by generations and generations of farmers. The result constitutes a process in continuous evolution, in which the varieties have grown in number and have become different from each other adapting to local pedoclimatic conditions. In this process, the role of farmers, both male and female (the role of women is considered essential in the passing on of knowledge, (V. J-M. Desfilhes and F. Dufour[185], 2005, p. 84)) takes on special significance because it has permitted the development of agriculture itself. The principle on which the process of selections was based saw, in the conservation of part of the seeds that each family

produced for the following year, the crux of agricultural evolution and reproduction, side by side likewise by numerous and indispensable exchanges with other families of farmers. So in the process of the spread of exogenous varieties, adaptation and development we can find several common, indispensable determinants which are fluidity, gratuitousness and the informality of communication between farmers. Agronomic research, selection of the species and their dispersion was therefore carried out following several rules that, as stressed by Desfilhes and Dufour (2005, p. 86) are very similar to those regulating the functioning of free software. They are:

- The possibility to plant a plant freely and to harvest its fruits (freedom 0).
- The freedom to study how the plant functions and to adapt it to ones own needs (freedom 1).
- The freedom to redistribute the seeds, or the cuttings and thus to participate in their geographical spread (freedom 2).
- The freedom to improve the plant and publish the improvements so as to cause them to profit the whole community (freedom 3).

As maintained by Vandana Shiva[186], the freedom of seeds is something that transcends the rights of single farmers, it is about the freedom of cultures compared to forms of centralised control. In fact Shiva says that through the symbol of the seed ecological problems are reunited with those of social nature. In fact, as highlightedby Guy Kastler in Réseau Semences Paysannes[187]it is possible to establish a parallel between free software and seeds. Actually a hybrid variety, or a genetically modified terminator seeds[188] or even a variety that has incorporated the patented genetic information, correspond to proprietary software. In that case the farmer does not enjoy neither the right to sow the seed crop, nor change it nor exchange it. In the case of a variety protected by a plant breeders' rights, it can be considered as a partially proprietary software since the source code is kept secret and the farmer can neither exchange, nor to evolve or adapt the seed crop. At the same time it is also a partially free software for the breeder, who can freely use it to create another variety, and for the farmer who can replant the grain crop from his crops. However the criteria (distinct, uniform, stable and new variety) seed must fulfil to obtain a plant breeders' right make it almost exclusively a property software.As said by Vandana Shiva[189] "participatory breeding of open source seeds, and participatory framing of open source rights are innovations that deepen seed freedom." (2012, 14)

"Following the lead of supporters of open-source software, the Open Source Seed Initiative hopes to promote an ethic of sharing among plant breeders" [190] in order to save biodiversity. Inspired by the free and open source software movement that has provided alternatives to proprietary software, the Open Source Seed Initiative[191] was created to free the seed to make sure that the genes in at least some seed can never be locked away from use by intellectual property rights. Operatinally the Open Source Seed Initiative created a Pledge that farmers and breeders may freely choose to employ in order to ensure the availability of their lines to other breeders of this and future generations. In return, farmers and breeders undertake not to restrict or prevent their use or their derivatives, through patents, licenses or other means and to "and to include this pledge with any transfer of these seeds or their derivatives". The open source is therefore a system that has the features to counter the knowledge and life commodification imposed by the current economic system. At the same time the open source also allows to develop those changes and those incremental innovations, which, as in the case of free software, even in the case of seeds, have formed for millennia the determinants of sustainable and participatory development and evolution. In a way it is, therefore, to prevent from a legal point of view the source code (our seed) to acquire a

property statute. It could be argued that it is a kind of equivalent to copyleft license GNU-GPL (GNU General Public License) or Creative Commons Public Licenses. In this sense some experiences are very important: the attention around the freedom in the exchange, sharing and modification of seeds is very strong, the Open Source Ecology is an initiative aimed at developing "open source industrial machines that can be made for a fraction of commercial costs, and sharing our designs online for free. The goal of Open Source Ecology is to create an open source economy – an efficient economy which increases innovation by open collaboration." [192]

To conclude therefore, as stated for Hardin in the first section of this report, trying to make enclosures for seeds, limiting their freedom which always marked them out, being the principle itself of life, implies mechanisms that by introducing the market system destroy the principle itself of life. Commodification of every good in fact aims at finding new areas of profit, but at the same time imposes auto-suicide of the living, in order to guarantee building revenue from this position. From an economical point of view there are studies demonstrating how in reality the use of seeds produced industrially and patented is, as well as harmful for the ecosystem and for guaranteeing biodiversity, also more burdensome than the traditional practices carried out by farmers.[193] Numerous studies are bringing into question the systems that justify intellectual property rights as capable of boosting innovations, demonstrating on the contrary their ideological role that is made explicit in the aim of justifying appropriation by the large enterprises of the North of the genetic resources and traditional learning of the South.[194] In reality it is a process that weakening the boundaries between the concept of discovery and that of invention allows enclosures of the living and knowledge. Nonetheless, in line with what has been stated by Berhan and Egziabher[195] (2005, pp.129-130) it seems inevitable to distinguish between what is unknown (for example in the modern world) and what is new. For example, many plants are known for their healing properties by native populations, but are not by the majority of the so-called developed world. Can knowledge of these characteristics therefore become grounds for patenting? The thesis that Berhan and Egziabher (2005, p. 129) support is based on an observation: no living thing has been obtained through human action, basing oneself solely on non-living elements of the world. They conclude that only the one who had made a similar thing could therefore have the right to patent it.

Vandana Shiva, the creator of Navdanya considers that "Life forms, plants and seeds are all evolving, self-organised, sovereign beings. They have intrinsic worth, value and standing." (2013, p. 5) 196 Morover, "patents on seeds are legally wrong because seeds are not an invention. Patents on seeds are ethically wrong because seeds are life forms, they are our kin members of our earth family. Owning life by claiming it to be a corporate invention is both ethically and legally wrong." (2013, p. 8) "The world view of Bio Nullius - empty life - unleashes violence and injustice to the earth, to farmers, and to all citizens. The violence of the Earth is rooted in both the denial of the creativity and the rights of the Earth as well as in the displacement of diversity." (2012, 12). [197]

Navdanya's creation that means "nine seeds" has been implemented for the purpose of safeguarding the diversity of seeds in agricultural cultivation. It is a programme aimed at protecting biodiversity. In fact ever since the '70s the first seed banks started to be built, but the purpose was not that of preserving the species and making them accessible to the farmer, but that of selling them to multinationals, who find themselves in the end making a profit, by selling the same seeds to the farmers who have been expropriated of their own knowledge. In fact it could also be affirmed that the seed industry also creates a conscious coding and centralisation of knowledge in order to strip the individual of what has been tacit and/or codified knowledge passed down and developed over the

course of centuries. This is manifest in such a way by bio-piracy that Suman Sahai defines as "a form of robbery of the intellectual property of local communities"[198] (2005, p. 105).

Navdanya's proposition on the other hand is to place herself on a level of equal collaboration between scientists and small farmers in this way making it possible to maintain a link between agricultural production and the preservation of biodiversity. In collaboration with the KRRS (Karnataka State Farmers' Association) [199] and making small-scale farmers aware of the importance of exchanges they launched the seed Satyagraha in honour of Gandhi. In the Indian language Satyagraha means "fight for the truth". On the day of the Indian National Holiday, on 15 August 1993, the farmers claimed their right to the intellectual property (samuhik gyan sanad) and on 2 October 1993 they celebrated the first anniversary of the seed Satyagraha. As we will see below a new dimension looms, that "of resistance to centralised control of every aspect of human life".

D. Episodes of resistance

Collective practises of bottom up resistance to the new enclosures of the seeds occur daily through the organisation of networks of dissidents who are expanding exponentially. In a masterly manner Vandana Shiva traces the characteristics of them identifying in the local dimension of bottom up resistance, the sole possibility of founding the future on a democratic and free world. In the resistance to the commodification of life and the privatisation of the living carried out by the lobbying interests of multinationals and supranational organisations which protect these same interests, what appear to be fundamental are the creativity, courage and intelligence "of millions of people who conceive the earth as a family, like a community that links all forms of life and all human beings without distinctions of race, social class, religion or nationality." [200] Shiva recalls that a first example of this resistance was heard in the words spoken by a Native American, Chief Seattle, from the tribe of Suquamish in 1848. On that occasion he said the following words:

"How can you buy or sell the sky,the warmth of the land? The idea is strange to us.

If we do not the freshness breeze of the air and the sparkle of the water, how can you buy them?

Every part of this earth is sacred to my people. Every shining pine needle, every sandy shore, every mist in the dark woods, every clearing and humming insect is holy in the memory and experience of my people. The sap which courses through the trees carries the memories of the red man.

This we know; the earth does not belong to man; man belongs to the earth. This we know. All things are connected like the blood which unites our family. All things are connected."[201]

Since then many years have gone by, but in the collective action of millions of people, who starting from a local sphere arrive at contrasting the actions of the global powers, is found hope and the instrument of resistance against the evil policies of multinationals and national and supernational bodies. One example of non-violent civil disobedience against the institutions of the so-called "free market" and against patents on the living consists of the protest of half a million peasants in Bangalore in India in 1993. Drawing on the language of Mahatma Gandhi, they gave the start to "Satyagraha of the seeds". Actually it is a peasant protest against the intellectual property rights on living things exercised by multinationals in the industry: they oppose the classification of seeds as private property sanctioned by the TRIPS of the World Trade Organisation. This protest is also characterised by being self-managed by the peasants themselves who, furthermore, on that occasion announced their desire to set up an International Centre for Sustainable Development. It is on these bases that, thanks also to the work of Professor Nanjundaswamy, president of the association of peasants of the State of Karnataka (the KRRS), the International Centre for Sustainable

Development AMRITA BHOOMI (i.e. "immortal planet") was born. From this perspective, we identify in biological agriculture the foundations of self-sufficiency of the countries in the so-called "Third World". In fact, it is a matter of re-appropriating common resources that have arrived to us thanks to common, shared and participative management. The sustainability of the measures taken thus follows both ecological themes and those of development and/or the survival of men and women in developing countries.

The role of women in this context is essential, they are the depositaries and custodians of traditional knowledge, theirs is thus the double responsibility of passing on knowledge and the survival of their own family. It was the peasants, male and female, who have permitted the selection of plant species, enriching the same varieties and preserving and increasing bio-diversity, the founding element of life itself. Adaptation to the pedoclimatic conditions of the same varieties has further contributed to this objective. So expropriation of traditional learning by the powers of the seed multinationals , national and supernational institutions, not only determines a huge reduction of bio-diversity, bringing into question the fundamental principle of life itself, but likewise brings up for discussion the role of women within society.

As Vandana Shiva[202] highlights well, the globalisation imposed by multinationals conceives the planet in terms of private property. On the contrary, the new movements defend local and global resources of the territory because they see it as a common good. In effect, the communities that are springing up in every continent to resist the destruction of their biological and cultural diversity, their means of sustenance and their own lives constitute the democratic alternative to the transformation of the world into a giant supermarket, in which goods and services produced with extremely high ecological, economic and social costs are sold back at giveaway prices.

Two further examples of the success of the popular protests and connected to it the failure of the decisive model imposed by the WTO occurred in Seattle in 1999 and in Cancùn in 2003. In particular in Seattle thousands of people united to protest against the third meeting of the WTO on occasion of the Millennium Round. The Seattle protest was decided at Geneva in 1999 by 1,387 non-governmental organisations, associations of farmers, unions, Churches, environmentalists, etc. One anecdote is represented by the distribution of 250 kilos of Rocquefort by French farmers: this is a cheese that is subject in the USA to high excise duties imposed as a measure taken in retaliation against the European ban on marketing animals treated with hormones. In fact, the common criticism of the Seattle movement is addressed to the market logics of neo-liberalist globalisation. As far as this is concerned, even the failure of the WTO meeting in Cancun accomplished thanks to the active action of bottom up movements which tried to defend the common interests of society is in reality a success for the farmers in in developing countries.

All over the world bottom up initiatives aimed at protecting biodiversity and traditional knowledge are multiplying. In this way networks as guardians of seeds are born and proliferate, which through practices of self-management create new institutions founded on principles of the commons in a logic of openness, sharing and participation. This is a political practise of acting collectively that aims, as in the examples of the knowledge commons or legal commons, to create a new eco-sustainable socio-economic system, capable of opposing the dynamics of expropriation of knowledge. Practises that the alliance of the self-referential interests of the State and the market are trying to transform ever increasingly into "revenue of the position" [203]. In his experience, Javier Carrera has given life to the Seed Guardians Network in Ecuador the aims of which are to obtain freedom of the seeds in the continent, "to protect what already exists, redeem what is being lost, make the people aware of the problem of industrial seeds, drive back the invasion of transgenetic crops"[204]. In short, the Seed

Guardians intend "to fight the privatisation of seeds, which is already very advanced, thought at different rates, in all the countries in America"[205]. The custodians of the seeds are an integral part of communities, they work inside them and are operating for social transformation starting at a local level. They can be found in Ecuador and in the south of Colombia. The experiences completed are the basis upon which formations are created through means of communication. The re-appropriation of collective knowledge by the rightful owner, concerns disseminating the same knowledge and institutionalising it through the publication of the journal Allpha, extremely widespread amongst the farmers and which has become the mouthpiece of the agro-ecological Collective. The principles of an ecology applied to the living thus constitute the benchmark of a new proposal based on the common goods of the seeds. It involves the other commons that are tied to it: those of knowledge, ecology and sustainability.

The Seed Guardians in Ecuador federate horizontally and are independent of any form of external subsidy. They emancipate themselves in this way from state control and from the multinationals in the agro-food sector. They were only able to save two-hundred and fifty varieties of seed, and they have begun to use the instrument of the farmers market to distribute the profits form products born from these varieties. [206]

Although founded on a local footing, the action of the Seed Guardians in Ecuador like that of other similar experiences in the rest of the world, tend to take on a global character, through meetings and the setting up of links with networks in other countries. Adhesion to the worldwide campaign for the seeds of Navdanya enters this viewpoint. The collective aspect of the action of the seed Guardian in Ecuador thus merges with the global character of the political proposal of a common of the seeds, which unites millions of farmers all over the world. The principles supported by the seed Guardian in Ecuador find important support in the Constitution of Ecuador which protects and promotes the defence of the ground, expressively providing incentives for projects that avoid monocultivation and preferably use native species adapted to the area (Para. 409). In order to reach food sovereignty the Constitution also promotes, from a view of co-operation, coordinated strategies of sustainable management of the natural heritage; the conservation of bio-diversity, eco-systems and water (para. 423). In order to preserve traditional knowledge, from the view of eco-sustainability, the safeguard of the common memory and the cultural heritage come to be promoted.

Other examples of movements directed at sustaining biodiversity in different parts of the world are those that see thousands of farmers come together, like for example Kokopelli in France. This is a non-profit association, that devotes its action to the defence of food biodiversity and the production of seeds derived from agro-ecology. It groups together all those who wish to preserve the right to sow seeds, whether they are traditional varieties or new ones, free from intellectual property rights and reproducible. The conflictual dynamics of the action performed by its supporters have often contrasted with ordinary justice, due to the norms introduced by the agreements and International treaties that are directed, as seen above, at supporting the increase in production deriving from characteristics of homogeneity and stability which characterise patented seeds and those protected by the Community plant variety right issued by UPOV. For this reason it was sentenced by the European Union for unfair competition in 2012: it was judged guilty of exchanging and marketing traditional varieties of seeds that were not registered in the official European catalogue. The association was also condemned for unfair competition by the French courts in the process SAS Baumaux.

E. By way of conclusions

To conclude, it is clear that the reality of free seeds (which provide agro-environmental sustainability, ensure food protecting the future with biodiversity through seed that fit to changing environmental conditions without the support of the agro-chemical products), collides with the institutionalised powers that tend to preserve and protect particular interests of the big private companies in the agribusiness sector via a set of rules. Nevertheless, Kokopelli experience and the other analysed show also the scope of action of resistance and innovation that regain possession of traditional and tacit knowledge, making it available to those who need it (in developing and developed countries).

As shown by the experiences presented in the previous paragraph, it is actually a form of proactive resistance and opposition to the standardisation of cultures from the perspective of the obsessed productivity and the quest for maximum profits.

The bottom-up nature of all these experiences and their perspective of sharing, openness, and participation, make the experience of free seeds extremely similar to that of free software.

In this sense therefore emerge also the potential of transition from a system institutionalised in the public / private dichotomy, to a system based on the Common as a way to manage these resources and thus able to escape the mere mercantilist perspective of the current phase of capitalism . According with Shiva (2012, 38) "[t]o speak of seeds as a common good is important because seeds are information, skills, and culture."

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[1]

1 Author: Vercellone.

2 First of all, with the work carried out by Elinor Ostrom and her research group.

[3] For a really complete overview of these forms cf. Max Weber (1991).

[4] Collective property guarantees all members of a community access to land according to precise rules which relate to both use and distribution of the product amongst the members of the community.

[5] This breaking down and social distribution of the different parts of private property rights (*abusus, usus, fructus*) is always at the base, as Ostrom and Coriat also theorize, of forms of property associated with commons. This observation is true both for the more traditional and ancient forms of common such as those tied to land in Imperial China or the common lands in Europe at the end of the Middle Ages, as well as for more modern forms linked to the information revolution, such as the case of copyleft. We will return again and again to these aspects in the course of this report.

[6] Which developed in England through different stages between the beginning of the 16th Century and the 19th Century.

[7] *Fictitious commodities,* as intended by Karl Polanyi, in that land, like other natural resources, is not a product of man's labour, but nature's gift.

[8] In this connection, the same grave theoretical and terminological inaccuracies of Garret Hardin's article devoted to the so-called *tragedy of commons* bear witness to this which, as we will see, will nevertheless have the merit of reopening the scientific debate on the issue of common and common goods (cf. infra Section 1).

[9] See: http://www.asambleanacional.gov.ec/documentos/constitucion_de_bolsillo.pdf Last accessed 20 February 2015.

[10] Cf. Pierluigi Vattimo (2013).

[11] For more on this point see also René Ramirez Gallegos (2014).

[12] Author: Vercellone.

[13] According to Samuelson, in *Economics*, public goods represent 25% of the GDP and the remaining 75% is private goods. Note that Samuelson makes it clear that this subdivision between public and private goods corresponds much more than to intrinsic characteristics of goods to a legislative decision that fixes the proportion of public goods and equally decides the composition of collective costs (Samuelson, 1970, 233). While he makes no reference to the commons.

[14] Author: Vercellone.

[15] More precisely Samuelson insists on the concept of divisibility and indivisibility rather than on that of rivalrousness. Despite some shades of meaning the two notions are practically synonymous.

[16] The concept of externalities describes any situation in which the activities of one or more economic agents have consequences on the well-being of other agents without there being exchanges or contracts between them. The externalities may be negative, as in the case of pollution, or positive as in the case of the pollination of flowers by bees, according to a metaphor which is often used for knowledge.

[17] Author: Vercellone.

[18] The concept of public or collective good in Anglosaxon economic theory is not connected in any way to the fact that it is produced and offered by the State, its distinctiveness derives exclusively from the intrinsic characteristics of the good. In France authors such as Beitone A. (2011), insist instead on the necessity of distinguishing between *biens collectives* (collective goods) and *biens publics* (publics good) which can be produced by the State even if they are rival and excludable. Collective goods might be conceived as independent on the central state regulation.

[19] Remember that to define what standard economic theory calls pure public goods a further element has been introduced, the absence of effects of crowding and congestion and above all obligation of use, such as justice or defence for example.

[20] Authors: Gentilucci and Vercellone.

[21] Ostrom dwells greatly on this point, as we will see later.

[22] Author of Table 1: Gentilucci.

[23] A notable, but marginal exception to this dichotomous vision can be found in Arrow's 1962 article on information/knowledge as public goods in which he very rapidly raises the point that the production of knowledge could be guaranteed not only by the State but also by what is today identified as the non-profit sector, cf. Vercellone (2014).

[24] Author: Vercellone.

[25] Author: Vercellone.

[26] Author: Vercellone.

[27] Cf. on this point also D3.4 Field Research and User Requirements Digital social currency pilots, http://dcentproject.eu/wp-content/uploads/2014/06/D3.4-Field-research-currency_FINAL-v2.pdf

[28] It is possible to stretch this explanation to the advancing ecological crisis provoked by deforestation and the shortage of charcoal from which the English economy suffered from the 17th century .This would not have been possible without the enclosure of common lands and the intensive exploitation of forests over which the peasants formerly exercised their collective rights of picking or collecting. In short, it is through the transition from a state of common property managed by the collective practices of the peasant communities to that of a private property placed at the service of profitable ownership that "*woods are socially rare*" (Dockès and Rosier, 1983, 311).

[29] Author: Giuliani.

[30] Author: Vercellone and Gentilucci.

[31] Or also for certain patented digital information property, for example, but for which access to the source code is left free.

[32] Authors: Gentilucci, Giuliani and Vercellone.

[33] Author Box 1: Giuliani.

[34] *Intellectual Property Right* or *IntellectualMonopoly Privilege*. Hereinafter referred also as the IPR.

[35] Authors: Vercellone, Gentilucci and Giuliani.

[36] Authors: Vercellone, Gentilucci and Giuliani.

[37] In this vision, Ostrom uses the game theory in numerous studies, however bringing back into discussion the postulates of selfish, non-cooperative economic rationality that served as ad hoc theory to demonstrate the impossibility of forms of property and management other than the public and private norms.

[38] Authors Box 2: Genilucci and Giuliani.

[39] Author: Vercellone.

[40] Extremely important work on this was conducted during the seminar "*Du public au commun*"(From public to common) organized by the *University of Paris 1* and the *Collège de France* in 2012 and 2013 by Pierre Dardot, Christian Laval, Antonio Negri, Judith Revel and Carlo Vercellone.

[41] Even work and money, like the earth, are *fictitious commodities* for Polanyi. Work because it is a human activity inseparable from the subjectivity of the worker and which accompanies life itself, life which in turn is not produced to be sold. Finally money is only a symbol of purchasing power, which as a rule is not produced at all but grows through the banking system and the finances of the state. None of these elements is produced to be sold.

[42] Author of Section 2: Vercellone.

[43]The approach of the *Common in the singular* was developed in the framework of the theory of cognitive capitalism by different American, Italian, French, and Latin American researchers belonging to different disciplinary fields of economics, philosophy, law and sociology. The founding works of this approach are without doubt those by Hardt and Negri who were the first to articulate the issues of common to that of cognitive and bio-political work. Following on from this first impulse numerous other research has been developed by authors such as G. Amendola, L. Baronian, M. Bauwens, N. Brette, A. Curcio, P. Dieuaide, A. Fumagalli, S. Lucarelli, C. Marazzi, U. Mattei, S. Mezzadra, M. Pasquinelli, R. Ramirez, J. Revel, G. Ruggero,

C. Vercellone, etc. We note that other researchers, such as Dardot and Laval (2014) in particular, develop the theory of *Common in the singular* starting from an original analysis which is critical from many viewpoints, compared with that devised by theorists of cognitive capitalism. Apropos this an important moment for the drawing up and comparison took place in the framework of the seminar *Du Public au Commun* organized by the *Collège de France* and the *Centre d'économie de la Sorbonne of the University of Paris 1* between 2010 and 2013.

[44] This notion was invented by Fumagalli Andrea (2008).

[45] This notion was invented by Fumagalli Andrea (2008).

[46]A theory which is, in reality, more linked to the vulgarisation of standard economic theory than to Ostrom's approach which, as we have seen, had a more complex and irresolute opinion on this subject.

[47] On these aspects, cf. also the contribution of Harribey (2011).

[48] Promoted by the *Forum italiano dei movimenti dell'acqua* (Italian Forum for Water Movements).

[49]Gambetta (1992).

[50] As we will see better in point 2.2.3. analysing Kennet Arrow's approach, who is considered the founder of the knowledge-based economic theory.

[51]On this point refer to report D31.

[52]As an example, the management of a non-renewable natural resource implies constraints and management objectives which are totally different from those of a resource such as knowledge which instead enters the logic of an economy of abundance. The same is true, as we will see, for the difference between the production of a reproducible and standardised physical merchandise, subject to quantitative criteria of efficiency of productivity in terms of output-volume and the *production of man for and by man* where efficiency is above all qualitative and the concept itself of productivity loses much of its meaning.

[53]Which correspond to what Bell (1973) calls the "*superior services*".

[54]The concept of the development of the *commons* proposed by Rifkin (2014) rests almost entirely on this type of technological determinism which would pass an ever wider range of goods and services, including energy, into the field of non-rival and non-excludable goods.

[55] A very similar definition is given by Anton Pannekoek (1947): "*Common ownership demands common management of the work as well as common productive activity; it can only be realized if all the workers take part in this self-management of what is the basis and content of social life; and if they go to create the organs that unite their separate wills into one common action*."

[56] This is a theory that takes the form of a real prophecy in the latest essays by Rifkin (2012; 2014).

[57] This perspective, as we will see, does not however eliminate another possibility, that which some theorists qualify as corruption of the Common (Hardt and Negri, 2012). The development of the commons in this case would become the support of a regeneration of the dynamics of cognitive capitalism that would incorporate subordinately the forms of production of the sharing economy. It is a logic in which the dynamics of the knowledge commons is, for example, re-absorbed within a new so-called *open dynamics of innovation* governed by the strategies of the large corporations of cognitive capitalism.

[58] Author: Vercellone.

[59]For a detailed presentation of the origins and contents of the neo-liberalist doctrine cf. Dardot and Laval (2009).

[60] Author: Vercellone.

[61] The meeting between this raising of the part of intangible capital and the ICT revolution is in fact considered to be the nullifying element of the genesis of a knowledge-based economy (David and Foray, 2002).

[62] Author: Vercellone.

[63]Bernard Friot (2010; 2012).

[64] A similar conclusion is also reached by Robert Castel and Claudine Haroche when they demonstrate how the principles of the system of social protection established by the councils of the resistance immediately post-war constitute a form of "*social property*"(social property). See:Castel and Haroche (2001); Castel (1995).

[65] The table is from the 2000 enquiry of the *European Foundation for the improvement of living and working conditions* (EUROFOUND). In fact, it shows the existence of a strong correlation between countries in which the Welfare system is more advanced and the development of forms of organization based on a cognitive division of labour (Discretionary learning) which ensure a lower level of exposure to the competition from emerging countries (exposure index). Despite important spatial differences, we can note that, in a more general way, in Europe, the prevailing model of labour organization is a cognitive one, called *discretionary organization* (39.1% of wage labourers), followed by the Toyotist model of *Lean Production* and *controlled autonomy* (28.2%) which we could define as a hybrid between a technical and a cognitive division of labour. In final position we find the Taylorist model (which does not represent more than 14% of the labour force). Moreover it should be observed that the results of the enquiry strongly underestimate the real impact of cognitive labour for three reasons: *i*) the exclusion from the analysis sample of the sector of public services and the third sector; *ii*) the exclusion of businesses with fewer than 10 employees amongst which, nonetheless, numerous start-ups and other knowledge-intense producers of goods and services are concentrated; *iii*) lastly, not taking account of the breadth of the voluntary cognitive work of the "producer-consumer" (*prosumer*) in *information and knowledge commons*, in the picture of the free software model**.** In the last case, non-evaluation does not depend on a choice, but on difficulties linked to the absence of statistics, taking account of the informal nature of this activity.

[66] For example: Aglietta and Brand (2013); Batifoulier (2014); Boyer (2004); Harvey (2010); Stiglitz (2006).

[67] Author: Vercellone.

[68] The concept of co-production nevertheless remains defined by Ostrom in essentially technical terms, like a broadening of the function of production, without taking into account the historic transformations in the nature of work and the goods produced which make this evolution possible in contemporary capitalism. That is, the formation of a collective intelligence and the driving role that the collective services of the welfare state perform in a knowledge-based economy.

[69] Authors: Vercellone, Gentilucci and Giuliani.

[70]Rotelli F., De Leonardis O., Mauri D. (1986).

[71] Our translation.

[72] Riccato R. (2013). Our translation.

[73]Le Doaré H.(1994).

[74] Author: Vercellone.

[75] It is interesting to remember how the term appears from the 17th century to designate the occupation of lands organised by peasants who, during the English revolution, through the *Diggers Movement,* opposed the movement for the enclosure of the commons.

[76] From this point of view, the approach of the CIC of which we have already spoken, is particularly lucid. One of its objectives is just that "*to recover the collective and community character of the housing that is found in an urban or rural environment* [...] to [...] *go beyond private property* [...] *and establish* [...] *a model that guarantees the right of use before speculation and commodification of the housing*". http://cooperativa.cat/it/che-cose-la-cic. Our translation. Last accessed 6 Mars 2015.

[77] The concept of creative class in Florida (2002) is extremely debatable and has been subjected to an in-depth criticism by De Nicola and Roggero (2007) in the framework of the approach of cognitive capitalism. Here we use this term due to its evocative nature in order to indicate a heterogeneous group of professions at the heart of cultural productions.

[78] Author of *Legenda*: Gentilucci.

[79] The presentation of the experience of *Kunsthaus Tacheleshas* been written from a summary note of Giorgio Griziotti.

[80] On a more political and institutional level, very significant in France have been the mobilisations led by the association *Les enfants de Don Quichotte* for the recognition of housing as a citizen's right. They guided the

French government, under the Nicolas Sarkozy presidency, to the law of 5 March 2007 which established the "*Droit Au Logement Opposable or Lois Dalo*" ([enforceable right to housing] DALO Law) imposing an obligation on the State of results and not only means.

[81] The presentation of the experience of the social centre *Cantiere* has been written from a summary note of Andrea Fumagalli.

[82] Author: Gentilucci.

[83] The Strategy of the Snail. Teatro Valle, some notes, http://quaderni.sanprecario.info/2014/08/la-strategia-della-lumaca-teatro-valle-alcuni-appunti-di-cristina-morini/ . Last accessed 18 March 2015. Our translation.

[84]http://www.radiocittafujiko.it/news/sfuma-per-ora-il-sogno-del-teatro-valle . Last accessed 19 March 2015.

[85] http://www.teatrovalleoccupato.it/chi-siamo . Accessed 19 March 2015. Our translation.

[86]Stefano Rodotà, Law Professor and President of the Ministerial Commission for Common Goods; Ugo Mattei, Professor in Civil and International Law, in 2011 he published the essay *Beni Comuni. Un manifesto* , which received the Benedetto Croce Prize for Non-Fiction in 2012.

[87] See the Statuto of the Fondazione Teatro Valle Bene Comune. http://www.teatrovalleoccupato.it/wontent/uploads/2013/10/STATUTO-FONDAZIONE-TEATRO-VALLE-BENE-COMUNE.pdf . Accessed 19 March 2015. Our translation.

[88] http://www.teatrovalleoccupato.it/wp-content/uploads/2013/10/STATUTO-FONDAZIONE-TEATRO-VALLE-BENE-COMUNE.pdf accessed March 19, 2015. Our translation.

[89]Our translation. See: http://www.teatrovalleoccupato.it/category/fondazione Last accessed 19 March 2015.

[90] http://www.teatrovalleoccupato.it/comunicato-stampa-in-scena-nuova-fase-teatro-valle-roma-11-agosto-h-11 . Last accessed 16 March 2015. Our translation.

[91] The presentation of the *Rodotà Commission* been written from a summary note of Pierluigi Vattimo.

[92]http://www.giustizia.it/giustizia/it/mg_1_12_1.wp?facetNode_1=0_10&facetNode_2=0_10_21&previsiousPage=mg_1_12&contentId=SPS47617 . Our translation. Last accessed 28 March 2015.
[93]http://www.giustizia.it/giustizia/it/mg_1_12_1.wp?facetNode_1=0_10&facetNode_2=0_10_21&previsiousPage=mg_1_12&contentId=SPS47617 . Our translation. Last accessed 28 March 2015.

[94] Nonetheless this draft of a law enacted under delegate power never reached Parliamentary discussion. Our translation.

[95] Author: Giuliani.

[96]See: http://www.labsus.org/2013/02/la-prima-mappa-dei-tesori-condivisi/ . Our translation. Last accessed 23 March 2015.

[97]See: http://www.comune.chieri.to.it/beni-comuni/regolamento-beni. Last accessed 25 March 2015.

[98] Our translation.

[99]The model of *community land trust* emerged since the late 1960s in the USA. A *community land trust* is a non-profit and community-based organisation run by volunteers that develop housing, workspaces, community gardens, civic buildings, and other community assets that meet the needs of the community. It is owned and controlled by the community and is made available at permanently affordable levels.

[100]See: http://storiedikatia.blogspot.fr/2014/07/ugo-mattei-ecco-come-si-puo-costruire.html. Our translation. Last accessed 25 March 2015.

[101]See: http://storiedikatia.blogspot.fr/2014/07/ugo-mattei-ecco-come-si-puo-costruire.html . Our translation. Last accessed 25 March 2015.

[102] The anticommons concept indicates here the potential underuse of scarce scientific resources caused by excessive IPR and overpatenting in research.

[103] Author: Vercellone.

[104] Certainly, as well as research centres, Arrow (1962a) recognizes the existence of other non-deliberate mechanisms of knowledge creation. These are tied to learning-by-doing processes. The latter were considered

to perform, however, a secondary role and the nature of these economies of learning by doing were for the most part associated with Smithian mechanisms of learning by repetition, like in the Taylorist logic of labour organization.

[105] Arrow (1962) uses the terms information and knowledge as synonyms, this represents one of the most serious theoretical defects of his approach. For a discussion of the reasons and theoretical consequences of this assimilation of the two concepts, knowledge and information cf. Vercellone (2014).

[106] Authors: Vercellone and Giuliani.

[107] Let us remember, as M. Bucchi (1981, 11) underlines, that: "*In pronouncing these principles, Merton underlines again and again how they are to be considered valid from the institutional point of view and not from the point of view of the individual motivations of each scientist. He is not so ingenuous as to maintain, in other words, that scientists, just by being scientists, have a superior moral stature to that of other professionals*". Our translation.

[108] Author: Vercellone, Giuliani and Gentilucci.

[109] Although the latter insisted on the way in which the universality of the science implied as a corollary democratization of the mechanisms of access to knowledge that would allow "*the progressive elimination of restraints upon the exercise and development of socially valued capacities*", that is, in first place, access to training and careers in the sphere of the research world (Merton, 1973, 273).

[110] Vercellone (2013).

[111] Authors: Vercellone and Giuliani.

[112] About this cf. Gibbons (1994). For a critical presentation of this approach Laval *et al* (2011).

[113] Cf. on this point Mirowski (2011).

[114] Authors: Vercellone and Giuliani.

[115] In fact, on 12 September 1997 *Amazon*, the e-commerce multinational, filed and registered the patent known as "*1-Click Shopping*" at the USPTO for the recognition of the exclusive of the technology, which allows you to carry out a purchase online with a simple, single click using data already entered, making the purchase of any good, not only books, simpler and faster for consumers. The patent was recognised by the USPTO in September 1999 with the number US 5.960.411 (the " "*411 patent*"). From that moment a whole series of disputes over the patent started, seeing the broad range of its concession, which concerns not only the software, but also the commercial method. In Europe the history of the "*1-Clik*"patent is different and more complex. In fact, the *European Patent Office* (EPO) granted the patent in 2003 only to withdraw it in 2007. The legal battle over this concession revolved around the fact that the e-commerce system patented by *Amazon* was already in the public domain and therefore lacked the characteristics required for recognition.

[116] Like that obtained by the US *Centre of Disease Control* (CDC) on a particular strain of Ebola known as "*EboBun*".

[117] Note that a similar argument has been developed by Eric S. Raymond (2003), the open source theorist, to assert the pointlessness of copyleft in his dispute against the Free Software Foundation and the GNU GPL license. According to Raymond, having taken into account the fact that the development of free software is more efficient than owned software, the market economy would already carry out all the work of copyleft without discouraging new entrants on the market. In fact it is a position that distorts the spirit of the commons of free software and proposes to back their absorption inside a new business model of the large enterprises in the IT sector: https://docs.google.com/document/pub?id=1vgyfZhsQLXBXZWx8hn6u99mA9UP92Js5OCdab_nMCAg

[118] In Europe, applications presented to the European Patent Register, passed from about 5000 in 1978 to around 120,000 in 2003.

[119] Which allows patent protection for plants reproduced by sexual means.

[120] The case model most often quoted for sleeping patents is that filed in 1895 by Georges Selden on the idea of a "*street motor*". When Henry Ford began to produce the *Ford T* he was thus forced to pay heavy royalties on every car produced until he came to demonstrate through several petitions in court that Selden was totally

incapable of manufacturing an automobile that could work. In this way he obtained annulment of the patent in 1911. For more details cf. Stiglitz (2006).

[121] Acquired by *Google* precisely to protect the legal future of *Android*.

[122] Table drawn up by: Giuliani.

[123] An observation that already at the end of the 1950s leads the great economist of industrial economics and innovation Fritz Machlup to conclude in a rather disconsolate way: "*If we did not have a patent system, it would be irresponsible, on the basis of our present knowledge of its economic consequences, to recommend instituting one. But since we have had a patent system for a long time, it would be irresponsible, on the basis of our present knowledge, to recommend abolishing it*" (Machlup, 1958, 80).

[124] On these cases cf. Stiglitz (2006); Boldrin and Levine (2008); Vercellone (2003; 2014).

[125] Author: Vercellone.

[126] According to Steven Levy (1984) the term *hacker* takes on exactly this meaning at the *Tech Model Railroad Club* at the end of the 1950s, an association founded after the Second World War reuniting students with a passion for model trains.

[127] In this sense, the development of a technological trajectory is also always an open process which proceeds through conflicts and bifurcations. As Piore M. and Sabel C. F. (1984) have shown this was for example the case of the alternative between the craftmade paradigm of flexible specialisations and that of mass production at the dawn of the industrial revolution.

[128] In Delfanti's opinion, the bond between counterculture and technological development is also found in the history of biotechnologies. There is evidence of this also in the relationship between social movements and the development in the seventies of the biotechnological embryonic industry in the Bay area of San Francisco. See also Vettel Eric J. (2006) on this point.

[129] Our translation.

[130] For the whole of the Seventies ARPANet continued to develop in university and government circles, but from 1974, with the advent of the TCP/IP transmission standard (Transmission Control Protocol/Internet Protocol), the project of the net started to be called Internet. It is in the Eighties, thanks to the advent of personal computers, that the first large impetus for the diffusion of the net outside more institutional and academic spheres began, making in fact hundreds of thousands of users potentially connectable. In this way e-mail and the first newsgroups were born spontaneously, as was in fact a net: Internet.

[131] It precedes *Mosaic* and is also the first HTLM web Editor. Without it the subsequent navigators, in the first place, *Mosaic*, could not have been created. The license terms for *National Center for Supercomputing Applications* (NCSA) Mosaic were still broad for the software owner. For all the versions for non-commercial use it was generally free. In addition, the *X Window* system by *Unix* provided the sources (the sources for the other versions were available after contract). Nonetheless *Mosaic* was never made as an open source software during its brief supremacy as the main browser; there were always reductions of permitted use without payment.

[132] Our translation.

[133] Our translation.

[134] A similar theory was developed by Hardt and Negri (2000).

[135] Increasing the volume and velocity of circulation of information at the same time up to the point that certain economists are led to harbour opposing utopian ideas on the subject of Internet. For some ultraliberals, Internet could accomplish the myth of the market perfectly self-regulated by pure and perfect competition. For others, of traditional Marxist inspiration, with Internet we would instead have found the technological instrument that enables us to resolve the difficulties of the old social systems of planning. Both these approaches forget that both the market and planning are first of all a social construction.

[136] Our translation.

[137] The term *spirit* is utilized in the sense proposed by Boltanski and Chiapello (1999).

[138] Authors: Vercellone and Giuliani.

[139] The ideal-types are, as intended by Max Weber, constructions of thought that the researcher in social sciences uses to interpret the empirical phenomena analysed. They are abstractions through which it is possible to retrace the infinite variety of reality to a group of conceptual categories. Examples of the ideal-types used by Weber are concepts such as bureaucracy, charisma, and modern western capitalism. The difference between the ideal-type model and reality is often highly instructional and allows us, if necessary, to elaborate new ideal-type models, as we have tried to do for what we have called the *common spirit of the information revolution*.

[140] In her elaboration, Pekka Himanen continually positions herself with the pioneering essay by Steven Levy (1984) which had already characterized the *hacker ethic* through five principal elements: information is by essence free; anti-authoritarianism; hackers judge themselves on the basis of their technical ability and not in accordance with other social hierarchies; art and beauty can be created with a computer; computers can change and improve life. It differs from it however on two main points: the first stresses the breaking elements between the hacker ethic and the protestant ethic. The second, the most important, consists in giving a broader definition of the *hacker ethic* that encompasses, beyond the IT sector, all the subjects of widespread intellectuality that "*wish to accomplish their passion with others and create something positive for society*" (Pekka Himanen, 2001, 138). Moreover, Himanen is precise about the meaning of the term hackers, individuals moved by a creative passion, contrasting it to that of crackers whose aim is to create viruses and infiltrate themselves into the systems of others.

[141] Two different cases, but both emblematic of the spread of this common spirit based on the meeting of the Mertonian ethics and that of the hackers are those of Salvatore Iaconesi and Ilaria Capua. Salvatore Iaconesi, engineer, artist and university lecturer at Turin, discovered, in September 2012, he was suffering from a brain tumour. Being in possession of his own digital medical records (received from the health service, but filled in a closed and proprietary way) he acted in a way so as to go round its protection mechanisms, "*cracking it*", in order to share his data and make them available on the net. The objective was, at the same time, to search for effective care and that of sharing knowledge considered the most efficient way to improve the conditions of life of human beings. In particular, Salvatore Iaconesi refers to the term "*care*" not only from the point of view of "*remedy*" of his illness, but also in the meaning of "*concern*", urging users of the net to use his clinical data in any way they could be a source of inspiration for the concrete expression of man's intellectual labour (Delfanti, 2013). Ilaria Capua was an Italian virologist employed in a research centre of the *World Health Organization* (WHO) when the epidemic of Avian flu spreads. Though defending non-hostile positions to privatisation of research on other matters, in 2006 she rebelled against the policies of the WHO based on a restricted access database. She encouraged her colleagues not to respect the restrictive practices of the WHO and through GISAID (Sharing Avian Influenza Data) promoted the creation of a new open access database with licenses inspired by those of *Creative Commons*. This initiative played an important role in opening a wider International debate on the transparency of data until convincing the WHO itself to change its policy and adopt an open access model that has changed international regulation of pre-pandemic plans.

[142] Authors: Giuliani and Vercellone.

[143] We defined the concept of cognitive division in D3.1, *Theoretical Framework on future knowledge-based economy*. http://dcentproject.eu/wp-content/uploads/2014/04/D3.1.pdf. Last accessed 5 April 2015.

[144] Jollivet P. (2002). Our translation.

[145] Authors: Vercellone and Giuliani.

[146] For a detailed analysis of the causes and the consequences of the breakup of the *Unix Community*, cf. Mangolte (2013). The author particularly stresses the role of the separation of *Bell Labs* from the rest of the *AT&T* group. Before the separation, obtaining a source copy of the operating system was simple and uncostly. This permitted the formation of a worldwide university community centred on the development of new components and applications for *Unix*, following a method of co-operative labour similar to that of modern open source. Thanks to this process, during the seventies the first seven versions of the operating system saw the light. Everything changed following the break-up due to the dominating position of *AT&T*. *Bell Labs* acquired the right, recognised by a sentence in June 1984, to develop commercial activities in information technology, both in the field of hardware and in that of software. This resulted in a radical change in the license policy of *Bell Labs*: a considerable price increase went hand in hand with a restrictive redefinition of the conditions of use of the code. The users of the code produced at the *University of Berkeley*, associated with a very permissive license, however always have to obtain an *AT&T* license for the codes that come from *Bell Labs*. Faced with an

increase of the license costs, some users therefore request a separation between the code produced at Berkeley and the code under *AT&T* license. This leads in June 1989 to the first distribution of the freely redistributable *Berkeley code*, the *Networking Release 1*.

[147] Stallman (1999).

[148] Our translation.

[149] Our translation.

[150] For more details on these aspects cf. http://it.wikipedia.org/wiki/Copyleft. Last accessed 7 April 2015.

[151] Cf. also: http://en.wikipedia.org/wiki/Craig_Venter. Last accessed 8 April 2015.

[152] Designed to collect and sequence the genomes of marine bacteria and find genetic sequences useful for artificial biology projects.

[153] Author: Vercellone.

[154] By *spirit of capitalism* Boltanski and Chiappello mean, extending Weber's thinking, the representations and implicit and explicit norms put together introjected by the social players that justify the social order of capitalism at a defined time of history.

[155] Our translation.

[156] Our translation.

[157] Author: Vercellone.

[158] Linux Kernel Patch Statistics 2014: http://www.remword.com/kps_result/. See also Broca (2015).

[159] To better understand this profit strategy, it is necessary to remember that the four fundamental freedoms of GPL licenses for free software do not prevent the sale of a free software. They merely stipulate that the first to buy a free software has the right to redistribute it gratis.

[160]Since 1999, *IBM* has "set free" in open source a significant quantity of the lines of code of its programs and charged a certain number of its employees with the task of collaborating in the *Apach*e and *Linux* projects. Cf. Tapscott and Williams (2007).

[161] A datum which in any case needs to be seen in proportion if you take into account that in only 2004, for example, *IBM* had registered 3,248 patents.

[162] We would get closer and closer to a situation in which the multitude of Internet users would benefit from free services financed by growing advertising for a declining number of material and intangible goods. In this way, the attempt of capitalism to make the commons the new support of its logic of accumulation would lead endogenously to the reduction of the sphere in which profit and commodities exercise their hegemony on needs and on labour.

[163] Both have held important responsibilities in the *Treasury Department* of the USA under the Clinton administration.

[164] As we will see better in the conclusions to this report, the proposal of a basic income could be one of the instruments to mitigate these factors of economic vulnerability of the commons.

[165] In fact, we could state that Stallman is more pragmatic and lucid than many spokesmen of open source when he indicates the unquestionable risks that co-operation with large groups involves for the independence of the software commons. It is not surprisingly that he insists on the fact that the term *Free* means especially *Freedom.*

[166] Certain ambivalences of the hacker culture have also had a role in this rift. Particularly for a spokesman of the open source movement like Raymond, technical efficiency ends up being considered a value in itself up to inducing him to say that copyleft would be a useless device, seeing that the market itself chooses software and innovations give a competitive advance to open source.

[167] Let us also remember that, apart from the important exception of the BSD licenses, the majority of software characterised as open source are recognised as free software in the sense of FSF and reciprocally. Out of this, the widespread diffusion of the acronym *Free and Open Source Software* (FOSS).

[168] For a more detailed analysis of the Debian experience cf. https://www.debian.org/social_contract and Lallement (2015).

[169] Author: Giuliani.

[170] About this think of the importance that Arduino hardware has had in the production of prototypes and do-it-yourself products. *Arduino* is produced with a GNU – GPL license.

[171] This explains why in November 2009 Obama launched the *Educate to Innovate* programme which saw the commitment of 700 million dollars through a public/private partnership involving 100,000 teachers and has the slogan "all-hands-on-deck". The Obama Administration has pledged to offer students at all levels fundamental abilities and skills in different fields of science: technology, engineering and mathematics and depending on this project, the aim is for them to find work and adequate pay easily. This programme provides that American schools will be furnished with laboratories equipped with 3D Printers and laser shaping machines (cf. http://www.whitehouse.gov/issues/education/k-12/educate-innovate). Last accessed 10 April 2015.

[172] Cf. Giuliani (2011).

[173] In general, standard technology of *additive printing* (also called production in layers or *additive manufacturing*, AM) describes the different techniques used releasing different materials during the production of the object in alternative to *subtractive printing*. Subtractive technology is the traditional one used in the mechanical industry where starting from an initial block using tools like the cutter you remove the material until you obtain the finished object. Through the 3D printer it is possible obtain different objects with a precision that it is unachievable with subtractive technology.

[174]Let us remember that another key turning point towards democratisation of the production of material goods thanks to digital loved by the *maker movement*, was in 2005. In fact, in that year the *Fabrication Laboratory* (Fab Lab) was opened, conceived by Neil Gershenfeld, US physicist and computer scientist and professor at MIT. To become a member of the *Fab Lab Mit* worldwide network, as well as having spent a period of practical training, you must respect the principles of knowledge sharing and free access to all the tools necessary to create products through High-Tech technologies and the 3D printer. This is a project that has already been copied in at least seventy *Fab Lab* centres. Most of them have sprung from public initiative and are managed by universities or non-profit organisations. *Fab Lab* permit innovation, according to their ideators, laterally and split over the territory, following dynamics based on bottom-up production, breaking with the vertical and linear paradigm of innovation of the old R&D centres of big companies.

[175] Our translation.

[176] http://transitionus.org/transition-town-movement. Last accessed 22 April 2015.

[177] Authors: Vercellone and Giuliani.

[178] For a detailed analysis of this concept cf: Monnier and Vercellone (2014); Baronian and Vercellone (2015).

[179] The issue of safeguarding the neutrality of the net would deserve particular analysis on this subject that, due to its complexity, we are unable to develop in this framework. For a picture of the debate and the controversies that it provokes cf., amongst others, Bria *et al.* (2013) and for a more optimistic point of view, Grazzini (2008).

[180] Author : Gentilucci.

[181]International Treaty on Plant Genetic Resources for Food and Agriculture, Art. 1.1, 2009. ftp://ftp.fao.org/docrep/fao/011/i0510e/i0510e.pdf accessed April 22, 2015.

[182]International Treaty on Plant Genetic Resources for Food and Agriculture, Art. 1.1, 2009. ftp://ftp.fao.org/docrep/fao/011/i0510e/i0510e.pdf accessed April 22, 2015.

[183] Chetaille, A. (2005), *Ressources phytogénétiques: la fin du libre accès?* In Pouvoir savoir. Le développement face aux biens communs de l'information et à la propriété intellectuelle. C&F éditions, Caen.

[184] Vercellone, C. (2004), « Division internationale du travail, propriété intellectuelle et développement à l'heure du Capitalisme cognitive », *Géographie, économie, société*, Vol. 6, N. 4, pp. 359-381.

[185] V. J-M. Desfilhes e F. Dufour, (2005), « Semences paysannes en danger », In Pouvoir savoir. Le développement face aux biens communs de l'information et à la propriété intellectuelle. C&F éditions, Caen.

[186] Shiva V., Il bene comune della terra, Feltrinelli Edizioni, Milan, 2006-2011.

[187] See http://www.semencespaysannes.org/le_logiciel_libre_au_profit_de_tous_94.php. Accessed April 22, 2015.

[188] Are called in this way the seeds that, besides being generated through genetic manipulation, are also sterile. Farmers are forced to buy new seeds every year for planting.

[189] Shiva V. Ruchi S. and Lockhart C., Seed Freedom. A global citizens report, Navdanya, Octobre 2012. http://www.cnph.embrapa.br/organica/pdf/seed_freedom_revisited.pdf accessed April 24, 2015.

[190] See http://www.isthmus.com/news/news/the-open-source-seed-movement-in-wisconsin/ accessed Avril 23, 2015.

[191] On this subject see http://osseeds.org/ accessed April 24, 2015.

[192] http://opensourceecology.org/ accessed April 24, 2015.

[193] On this subject see Altieri M. A. (1995) Agroecology: the science of sustainable agriculture. Westview Press, Boulder; Santeramo F. G. (2007), "Alcune riflessioni su possibili strumenti di valorizzazione della biodiversità animale: cenni alla situazione pugliese", *Agriregionieuropa* 3(11). http://agriregionieuropa.univpm.it/content/article/31/11/alcune-riflessioni-su-possibilistrumenti-di-valorizzazione-della-biodiversita ; Miguel A. Altieri, Fernando R. Funes-Monzote & Paulo Petersen, Agronomy for Sustainable Development, Official journal of the Institut National de la Recherche Agronomique (INRA), 2011. http://agroeco.org/wp-content/uploads/2009/11/Altieri-Funes-Petersen-Palencia.pdf

[194] Vercellone, C. (2004), « Division internationale du travail, propriété intellectuelle et développement à l'heure du Capitalisme cognitive », *Géographie, économie, société*, Vol. 6, N. 4, pp. 359-381.

[195] Vercellone, C. (2004), « Division internationale du travail, propriété intellectuelle et développement à l'heure du Capitalisme cognitive », *Géographie, économie, société*, Vol. 6, N. 4, pp. 359-381.

[196] Shiva, V. (2013), The law of the seed, PDF. http://www.navdanya.org/attachments/lawofseed.pdf

[197] Shiva V. Ruchi S. and Lockhart C., Seed Freedom. A global citizens report, Navdanya, Octobre 2012. http://www.cnph.embrapa.br/organica/pdf/seed_freedom_revisited.pdf accessed April 24, 2015.

[198] Sahai, S. (2005), « L'Accord sur les aspects des droits de propriété intellectuelle qui touchent au commerce et la biodiversité », in Pouvoir savoir. Le développement face aux biens communs de l'information et à la propriété intellectuelle. C&F éditions, Caen. Our translation.

[199] http://home.iae.nl/users/lightnet/world/indianfarmer.html accessed March 2, 2015.

[200] Shiva, V., *Il bene commune della terra. Estratto.*, 16/11/2006 Available on the website http://www.ariannaeditrice.it/articolo.php?id_articolo=6685 accessed March 23, 2015. Our translation.

[201] Shiva, V., *Earth Democracy. Justice, sustainability, and peace*. South End Press, 2005, p.1.

[202] Shiva, V., *Il bene commune della terra. Estratto.*, 16/11/2006 Available on the website http://www.ariannaeditrice.it/articolo.php?id_articolo=6685 accessed March 23, 2015.

[203] Vercellone, (2004).

[204] http://www.salonedelgusto.com/edizioni/2012/dettaglioStampabe80.html?tipo=UltimaOra&id=80601954b532ec6c05eae07ab59c5460it accessed March24, 2015. Our translation.

[205] http://www.salonedelgusto.com/edizioni/2012/dettaglioStampabe80.html?tipo=UltimaOra&id=80601954b532ec6c05eae07ab59c5460it accessed March 24, 2015. Our translation.

[206] http://www.slowfood.com/sloweb/b7e6d4d68a50fa67e744eb445918e622/piantiamo-i-semi-di-un-cambiamento-globale-la-vita-non-si-brevetta?-session=sf_soci:42F942B61b46025307jx67DB6785 accessed March 24, 2015.