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Abstract

This paper addresses the current intellectual and legal status of the commons. Specifically, we explore the notion of the digital (or information) commons and its specificities with regard to the classic concept of the commons in economic theory. The digital commons concerns new ways of administering an information resource by a community, made possible by information and communications technology. It constitutes a means of sharing socially valued resources.

Economists agree on a classic conception of common goods, designating a rival and non-exclusive resource. Because the digital commons is immaterial, this definition is unsatisfactory. In addition, the work of Elinor Ostrom emphasizes the duality of the commons: both a resource used in common and a property-rights regime running counter to the paradigm of private property. Our paper thus examines this ambiguity in the digital age.

Careful study of examples of digital commons promoted by the state can clarify the contributory logic at work in these commons. We argue that this approach authorizes a new form of public action. Allied with the "multitude", the public authorities could, by nurturing and supervising the commons, arm themselves against the growing hegemony of big monopolistic platforms, whose logic is increasingly opposed to that of the state.

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Introduction

On 9 December 2015, the bill "for a digital republic" was submitted for deliberation to the Council of Ministers, following an original procedure for the online consultation of citizens, which ended on 18 October 2015. A major section of the bill[1] submitted for consultation, dedicated to the commons and the definition of "a common information domain", had been one of the most debated of this process.

Though the bill considered by the Cabinet failed to include the section on the commons, this notion still makes its presence felt in the project, which, inter alia, "extends the right of reuse of public information" (art. 6), or "creates a new public service mission under the State consisting of the provision and publication of reference data in order to facilitate their reuse" (art. 9). The public authorities are thereby seeking to develop new approaches to action based on the promotion of a digital "commons", with this fashionable term, if of uncertain contours, included in its agenda.

In general, the history of the commons is closely linked with that of the enclosures. As the economist Yann Moulier Boutang reminds us, there were two great enclosures movement. The first ("piecemeal enclosures"), in England in the eleventh and twelfth centuries, was endogenous to the social structure that gave rise to it.[2] Communal land abandoned as a result of the active and voluntary depopulation of the countryside, for example due to the lack of population pressure, the decreasing fertility of the land concerned or the downward trend of agricultural prices, was appropriated by emergent landowners. The second movement, "Parliamentary enclosures", beginning in the sixteenth century, saw the age-old division of the appropriation of land challenged by acts of Parliament, which intervened exogenously to challenge the open field system, that is agricultural commons.

In the current contemporary sense, the commons involves the administration by a community of a resource, which thus escapes market or state governance. Informational in nature, the digital commons for its part refers specifically to the uses related to the development of information and communications technology.

The dramatic spread of "the commons" in today's public debate suggests that a change, decisive for our era, is at work in the couple formed by the commons and digital technology. But it is as if

[1] Chapter II, Section 1. See: http://www.republique-numerique.fr/pages/projet-de-loi-pour-une-republique-numerique.
[2] Moulier-Boutang, 1998, Livre III, Chapitre 11.

by anchoring itself in a variety of political and militant discourses, the commons has been conceptually diluted. As the economists Charlotte Hess and Elinor Ostrom point out:

> "Frequently, within the intellectual arena, the concept of the commons is a battle cry for free speech, universal open access, and self-governance."[1]

David Bollier[2] in turn argues that the success of the "commons paradigm" lies in its capacity to subsume a wide variety of issues. Invoking the commons often involves proposing a model that claims to harmonize a set of economic, social and ethical concerns hitherto in quest of coherence.

In his 2014 book, the American essayist Jeremy Rifkin thus goes so far as to announce "the eclipse of capitalism" and its institutions, which gives way to "collaborative commons".[3] Information and communications technology is, in Rifkin's view, giving new life to the commons, that various historical forces, such as the Enclosure Movement in England, had sought to destroy.[4] Rifkin's enthusiasm for the commons, shared by many authors, is emblematic of this "militant" use of the concept.

One of the consequences of the digital revolution is the digitization of the world. An easy-to-handle mathematical representation now cloaks reality. Dematerialization, transparency, manageability, communication and cooperation characterize this new era. The digital representation of the world is also increasing its predictability, and thus provides new ways of acting on society. Algorithms and mathematical abstractions are spreading and now guide action – such as PredPol software, helping the police in Modesto, California to identify areas at risk. By what routes has this revolution revived the commons?

Digital technology is profoundly affecting the production system and the legal rules inherent in industrial capitalism. In the opinion of many authors, capitalism is entering a new age. Moulier Boutang speaks of "cognitive capitalism", in which the knowledge economy is deployed, characterized in particular by a new, largely immaterial form of property.[5] Philippe Aigrain[6], a French computer scientist and co-founder of La Quadrature du Net, in turn analyzes

[1] Hess and Ostrom, 2007, p. 14.
[2] Bollier, 2007.
[3] Rifkin, 2014.
[4] Polanyi, 1944, chapters 7 and 8.
[5] Moulier-Boutang, 2007.
[6] Aigrain, 2005, p. 81.

"information capitalism", which is based on the appropriation of the *re*production function at a very low cost of information. The information industries are also distinguished from traditional physical industries by their increasing returns. This capitalism with a digital face therefore sees "two worlds" co-existing[1]: "the first", in which new forms of solidarity prevail and compete based on free and disinterested technical innovation; "the second", a new version of pre-digital industrial capitalism, in which large corporations seek to preserve their monopolistic rents through mechanisms for protecting private property. The commons then arise within the relation of forces, fostered by the first world, threatened by the second world.

This paper proposes revisiting the concept of the commons and its history, and then thinking about the characteristics of the digital commons, with a view to clarifying the contours and drawing out the policy implications of this phenomenon. To this end, it first seems necessary to trace the history of the commons (**1**), that catch-all word so often mobilized by politics. Investigating the upheavals it has been subject to, in the digital age, in terms of specific cases (**2**) then provides an understanding of the consequences of this new order in terms of public action (**3**).

1. Is the digital commons the same as others?

Before turning to the specifics of the digital commons, the classic concept of the commons should be carefully specified. Economic analysis has long been concerned with collective goods, and their production and consumption. The category of collective goods covers both the commons and public goods.

1.1. Public goods, common goods and private goods

The commons has long been neglected by economic theory, although thinking about public goods emerged relatively early. Adam Smith thus wondered about the existence of goods, whose high production and maintenance costs necessitated public funding.[2] With regard to production of non-private property, other authors such as John Stuart Mill, Henry Sidgwick and Arthur Pigou considered the example of the lighthouse, the light from which aids everyone requiring it, without their individual benefit causing any harm to

[1] *ibid*, p. 24.
[2] Smith, 1776, book V.

others.[1] Indeed its light has the characteristic of non-exclusion: no vessel can be excluded from making use of it. It was this that twentieth century economists studying the phenomenon termed an externality,[2] namely "some interactions that ought to be internalized but which the market forces left to themselves cannot cope with."[3]

In a seminal paper, Paul Samuelson continues this theoretical thinking about the kind of good to which the lighthouse belongs, namely a public good.[4] According to Samuelson, there are goods whose production cannot rationally be provided by private agents, because these goods are not subject to exclusion: it is impossible to prevent them being consumed. From this observation there follows an initial typology, which could be described as one-dimensional, of goods: the private good is one that cannot be freely accessed, the public good is one whose consumption is not exclusive. Samuelson also alluded to the role the state is called on to play in the production of public goods.

We should emphasize the extent to which the history of the distinction between public and private goods seems to be marked by an unconscious bias: the implicit assumption that the value of a good depends on its sale (and access to it and use) and therefore usually calls for the capacity to control its use. Enclosure, by instituting private property, would thus be the main way though which a good could enter the market. In the era of the economy of platforms and APIs,[5] in the era of the economy of contribution, with the exploitation of usage data collected by digital technology, this assumption seems surprisingly one-dimensional. We will return later to this question.

Vincent and Elinor Ostrom[6] then augmented the economic classification of goods with a further dimension, by taking into account the rival or non-rival character of a good. They propose that a good is rival when its use by one agent prevents its use by other agents. As summarized in Table 1, a public good, for example, is non-rival and non-exclusive. On the other hand a common good – in the traditional sense – is a rival and non-exclusive good. These characteristics have consequences over and beyond the classification process.

Imagine a communal meadow to which access is free, in the absence of a system of private property rights. Each farmer has an

[1] See Coase (1974) for a critical analysis of this literature on the "lighthouse problem" in economics.
[2] See in particular Meade (1952).
[3] Dahlman, 1979, p 141.
[4] Samuelson, 1954.
[5] *Application Programming Interface*. See Colin and Verdier, 2015.
[6] Ostrom and Ostrom, 1977.

incentive to maximize the number of cows he takes to graze there, whereas the grazing area is limited. In other words the individual marginal cost, for the farmer, of grazing a cow is less than its marginal social cost, borne by the community. This divergence long tormented economists, and it was to Pigou that we owe a rigorous analysis of the problem of social cost. He also proposed a possible solution by means of taxation[1] – the celebrated "Pigovian tax", by which the public authorities force economic agents to internalize the externalities they generate. This state solution was criticized by Ronald Coase, who viewed the social cost as an opportunity cost, which should be taken into account by granting ownership rights on the goods subject to the externality.[2]

In the late 1960s, if the commons were discussed, it was often with regard to the famous "tragedy" that was their fate, and from which this mismatch between social and individual marginal costs proceeded. According to the American ecologist Garrett Hardin, over-exploitative individual behavior led the commons to ruin. Only private property, with enclosure of the agricultural commons, can avoid chaos and free-riding.[3] Note, however, that Hardin's thesis ignores centuries of rational exploitation of fish from the Hudson Bay or of the Amazonian forests by so-called "primitive" peoples. In retrospect, this thesis also illustrates the ambivalence of the concept of the commons in the literature, designating both a material resource that is non-exclusive and rival, because present to a finite extent, and a property rights regime[4] deemed to be devastating.

1.2. Commons and property rights

The individualistic premises of the branch of contemporary economics concerned in particular with property rights have probably oriented economists of this persuasion towards private property to solve the social problems arising from resource scarcity.[5] The concept concept of property is then defined as "a system of rules governing access to and control of material resources."[6] The commons would thus also be governed by specific rules, though differing from those of private property.

[1] Pigou, 1920.
[2] Coase, 1960.
[3] Hardin, 1968, p. 1245.
[4] Hess and Ostrom, 2003, p. 118.
[5] So-called property rights economics. See, for example, Alchian and Demsetz (1973).
[6] Jeremy Waldron's definition (Waldron, 1985, p. 7).

Table 1. Two-dimensional classification of goods[1]

		Rivalry	
		Yes	**No**
Exclusivity	**No**	*Commons*	Public good
	Yes	Private good	Club good

Moulier-Boutang explains that the privatization of the commons by the enclosures of the eighteenth century stemmed from a concentration of the attributes of property rights.[2] Use (*usus*), control (*fructus*) and alienation (*abusus*) were henceforth solely in the hands of the private owner, whereas age-old usage had been based on respect for a system of rules governing the distribution of these attributes among individuals or the institutions of a community. Following this break with the traditional usage rules, the West began denying the property status of anything that did not possess these various attributes – such as the sacred paths of the Australian aboriginals, as recounted by Bruce Chatwin[3] –, calling it "res nullius" and appropriating it without hesitation.

Note in passing – we will return to this later – that this concatenation of ownership did not take place for intellectual property, which, on the contrary, gradually acquired a whole set of rights: possession, reproduction, distribution, citation, etc., through to recognition of a moral right, inalienable and non-transferable, that is in fact heir to the conception of an unlimited property right over time.

The contribution of Ostrom, which earned her the 2009 Nobel prize in economics, is firstly concerned with common property rights regimes. In a 1992 paper[4], Edella Schlager and Elinor Ostrom investigated how the lobster fishery was organized in the US state of Maine. Their analysis conceptually distinguishes operational-level property rights, allowing access to and removal of the resource, from collective-choice property rights, concerning the management, exclusion and alienation of the common resource. The distribution of these property rights is heterogeneous among the members of the community: private property, in that it unifies these attributes, is absent from this empirical commons.

[1] Adapted from Ostrom and Ostrom (1977).
[2] Moulier-Boutang, 2001, p.21.
[3] Chatwin, 1990.
[4] Schlager and Ostrom, 1992.

In *Governing the Commons: The Evolution of Institutions for Collective Action*[1], Ostrom then provides a normative analysis of commons that argues that it can constitute an effective solution for administering a rival and free-access resource. In these studies, the performance of the institutions set up is, however, dependent on the existence of clear boundaries and conditions for belonging to the commons; having a consistent set of rules, discussion of collective choices, effective supervision, a system of sanctions, conflict resolution mechanisms, and finally organization rights recognized by all the members of the commons are the keys to its success in practice.[2]

Returning now to the concept of the digital commons, we can ask what characteristics of the digital revolution would allow the development of a new type of commons. How would Rifkin's "collaborative commons" differ from the concept of the commons we have just elaborated? While Rifkin in fact distinguishes "feudal commons", emblematic of the pre-digital era (or more accurately the pre-industrial era) from contemporary "social commons",[3] his analysis, because based on a vague conception of the commons, ignores crucial properties of the digital commons. In general, application of the concept of the commons to an immaterial resource is far from straightforward.

1.3. Is the digital commons an intangible "classic" commons?

The dematerialization of the resource used by the community, made possible by the advent of digital technology, gives birth to new types of goods, namely the knowledge commons[4] or commons of the mind.[5]

What is striking about the digital commons is firstly that it is not common property as defined by economists. Some might argue that open data, for example, is more like a public good.[6] The peculiarity of information and knowledge commons is in fact their non-rivalry,[7] which stems directly from their immateriality.

Although non-rival appropriation capabilities exist (for example due to an asymmetry of computing power or to holding other data), this does not affect their status as commons. Digital commons

[1] Ostrom, 1990.
[2] *Ibid*., p. 180.
[3] Rifkin, 2014, p. 34.
[4] Hess and Ostrom, 2007.
[5] Boyle, 2003.
[6] The Open Data Institute, 2015.
[7] Hess et Ostrom, 2007, p. 13.

are therefore not necessarily synonymous with free access, which they has tended to set up as an ideal. It should also be noted that the positive externalities of consumption frequently characterize these digital commons: when an individual consumes the good, this benefits other consumers without there being any monetary compensation.

Moreover one cannot reduce digital commons to spaces of consumption. Most of them are more like instances of contribution, halfway between consumption and production. This is another consequence of the digital revolution and of the distribution of labor power. Following Joël de Rosnay and his "consum'actors", Rifkin speaks of "prosumers": the communal sharing of immaterial resources and recent technological advances (in particular, the 3D printer) entail that the same individual simultaneously plays the role of producer and consumer.

These new non-rival but alienable common goods, usually co-constructed and enriched with usage data, might call for new legal definitions, particularly in terms of ownership rights. As pointed out by Moulier-Boutang,

> "the new commons of the contribution and network cooperation economy is a kind of transposition of the principle of *Terra nullius*."[1]

This concept of Terra nullius is of colonial origin and states that if the granting of the *usus*, *fructus* and *abusus* of a property to an individual has not been put in writing, the land does not belong to anyone. In other words, the emergence of digital technology is accompanied by legal uncertainty through which there arises the risk of "the enclosure of the intangible commons of the mind" – in the words of James Boyle[2] – a contemporary parallel to the privatization of communal pastures in the sixteenth century. Finally, note that if digital technology has revealed the limitations of the economic definition of the commons, the principle that makes the commons problematic persists. Indeed, in a digital world, shared or shareable resources, although immaterial, are subject to social dilemmas whose outcome is far from inconsequential.

The semantic evolution of the concept of the commons is therefore instructive. Designating an exhaustible and free access resource as well as an alternative to private property rights in the pre-digital era, the concept was first resurrected in academic circles. The

[1] Moulier-Boutang, 2010, p. 71. Our translation.
[2] Boyle, 2003.

work of Elinor Ostrom disinterred the commons from the cemetery of concepts buried by the intellectual hegemony of the dichotomy between state and market in the twentieth century. The advent of digital technology, concomitant with the search for a "third way", then encouraged a renaissance of the commons. For authors who participated in this renaissance, the foregrounding of the concept was often accompanied by militant commitment.

Yet it is as if the corollary of this re-appropriation of the commons in the political and militant realm has been its great plasticity. This definitional uncertainty is partly caused by digital technology, very much the gravedigger of the traditional concept of common goods, in that it invalidates the criterion of rivalry. The commons, the digital commons in particular, would then be only a residue, bringing together everything that eludes the market and state paradigms.

This negative – and imprecise – definition of the digital commons is, however, insufficient in practice. We will therefore try to refound it inductively, by extracting from the analysis of concrete cases a new definition capable of guiding public action in relation to commons.

2. Some examples of digital commons

The increasing digitization of contemporary society has placed data at the heart of the economy. As it becomes increasingly easy to manipulate and combine, many value-creation strategies are based on innovative uses of data. Examination of a few contemporary examples of these uses shows that its accessibility and the ownership regime that frames its distribution remain extremely heterogeneous.

2.1. Open data is a new form of the informational role played by the public authorities

Open data is accessible, available in a machine-readable format and provided with a license that universalizes its access, sharing and use – both for commercial and non-commercial ends.[1] In the case of shared data, by contrast, its distribution is restricted to a limited group, which can access it subject to their compliance with certain criteria. Finally, closed data can only be consulted by its subject, the holder or owner. This threefold empirical classification of data, to which we could add numerous distinctions according to its distribution technologies, clearly shows that such technologies cannot

[1] The Open Data Institute, 17 July 2015.

be reduced to an informational commons. It even seems that it is not necessarily in the interest of the state and the market to produce open and closed data respectively, as a too rapid analogy with the production of public goods and private goods might suggest.

Recent history shows that the emergence of a digital commons depends on choices made by the public authorities, as concluded by a recent report by the French Parliamentary Commission on digital rights and freedoms (*Commission de réflexion et de propositions sur le droit et les libertés à l'âge du numérique*).

> "The recognition of digital commons proceeds primarily from a political option [chosen by the legislature], determined in particular by the choice among submitting the object to a private ownership mechanism, alternatively rejecting ownership, or deciding on a mixed model of cohabitation between exclusive uses and shared or inclusive uses."[1]

An illustration of this public voluntarism, in terms of open data, for example, was the launch of the Open Government Initiative on 20 January 2009 by the fledgling Obama administration in the United States. In line with this initiative, the US president signed his first decree, on 9 May 2013, which made public by default all new government data. This dramatic gesture did not come out of the blue, but on the contrary was situated within a long tradition. In France, for example, a report by Michel Rocard in 2007 on the theme of "Republique 2.0" had already called for the release of public data so as not to favor

> "pricing and Malthusian practices [which] restrain the development of new services by third parties and the emergence of new actors.[2]

Note also that this principle of promotion of open data is not new; it is rooted in a widely shared assumption that economic transparency of information optimizes individual decisions and creates an externality essential for modern economies.

In this regard, the establishment in 1812 of the Napoleonic land registry in France, enabling citizens to be fairly taxed in relation to property contributions, was a primitive form of production of public data, the introduction of which is of primary economic and social importance. More recently, the economists Gershon Feder and Akihiko Nishio[3] have empirically demonstrated the economic benefits

[1] National Assembly, 2015, p. 233. Our translation.
[2] Rocard, 2007, p. 30. Our translation.
[3] Feder and Nishio, 1999.

resulting from the introduction of a land registry in Thailand and Latin America. In particular, the existence of a cadastral map allows the state to collect taxes and farmers to sell their products through commercial routes. It also allows farmers to pledge their own land and therefore to invest, giving a legal "reality" to physical property.

It would be difficult today to imagine our economy suddenly deprived of geographical, meteorological, economic, statistical data, or indeed scientific knowledge, produced by government and long being available in more or less free forms.

The public authorities also play an informational role with crucial economic and social implications, which the digital revolution invites us to rethink. Examples abound showing that public data could play a considerable positive externality role and create more value in this way than by any attempt at direct exploitation. The Trojette report, published in 2013, thus lists several studies quantifying the benefits derived from the openness of public data, while showing the ineffectiveness of the charging system. For example, the *Institut national de l'information géographique et forestière* (IGN) gives an estimated value of €114 million for the social benefit stemming from the transition to a free large-scale public sector reference system for bodies with a public administration service mission.[1] The shortfall in terms of fees amounted, on the other hand, to just €6 million. Even in areas such as culture where open data gives rise to potentially high costs (for heritage digitization, etc.), the effectiveness of a fee system for usage is highly debatable.[2] This economic externality mechanism is also of advantage to the state, in terms of taxes and indirect benefits.

But openness of digital content may also be accompanied by a resurgence of predatory behavior, due to the lack of legal barriers, or lead to the formation of new monopolies – as suggested by a recent article in the *Harvard Business Review*.[3] In at least three situations, open data is a source of concern. The first is where the universality aimed at by the openness of data runs up against the technicality of big data. In other words, what is the point of open data if very few actors know how to benefit from it, that is to say, analyze it? In the second situation, the intersection of open data and closed data, – for example, if the former is entered into a system owned by Google – may constitute a form of re-enclosure contrary to the aims of open data. Finally – the third case – the indiscriminate openness of data could lead to serious invasions of privacy. Openness of digital content of personal origin is based on the presumption of anonymity; but this

[1] Trojette, 2013, p. 5.
[2] Maurel, 2015.
[3] Radinsky, 2015.

can fail. As a recent Senate information report on open data pointed out, the US company Netflix provides an example in this respect by posting online 500,000 recommendations by its anonymous customers, whom external IT experts managed to partially re-identify.[1]

2.2. The National Address Database and *le.taxi*: digital commons promoted by the state

Faced with these new forms of predation and the concerns they raise, the authorities may claim to have found answers to them. In France, examples are provided by the commissioning of the National Address Database (*Base Adresse Nationale* – BAN) (see Box 1) on 16 April 2015 and the launch of the programming interface "*le.taxi*" (see Box 2) to resolve the heated conflict between private hire cars (*Véhicules de Transport avec Chauffeurs* – VTCs) and traditional taxis.

Box 1. The example of the National Address Database (BAN)

The creation of the BAN was a response to the difficulty for the public authorities of listing only those postal addresses that were geolocated. Every year 400,000 new addresses are created and managed by over 36,000 communes. Yet the existence of this database is invaluable to actors such as the IGN, the National Institute of Statistics and Economic Studies (INSEE), the postal service (*La Poste*), the tax authority in charge of land registry, firefighters, the emergency medical service (SAMU), telecommunications operators, and so on.

The construction of the BAN is based on a logic of contribution, involving national actors such as IGN and *La Poste*, local actors such as communities, municipalities or Departmental Fire and Rescue Services, and citizens through the OpenStreetMap project. This last, supported by a foundation created in 2006, numbered more than a million contributors worldwide as of 2013.

A contributory logic underpins the BAN (see Box 1), the implementation and proper functioning of which may be at risk for three reasons. Firstly, because some contributors follow business models that prevent them from switching to full free and transparent usage. Secondly, because the distribution of value is guided by the winner-take-all principle, which constitutes a possible source of re-enclosure: if an address data-base is 98% correct, everyone uses that rather than one which is 95% correct. Third, updating it by 400,000

[1] The Senate, 2014.

addresses a year is a technical challenge that no centralized authority can meet by itself, and that requires local contributions on the part of the "multitude".[1]

The French state therefore decided, unprecedentedly, to use a dual licensing system for the operation of the BAN. On the one hand, potential users can choose a traditional commercial license, in which case they purchase the data sets from the BAN, and become their owner: they are in no way obliged to share the modifications and improvements they make to the data base.

Alternatively the user can opt for a contributory license, the ODbL (Open Database License) 1.0, used for data in the OpenStreetMap project. This license, oriented towards the dissemination of databases, is issued by the opendatacommons.org project of the Open Knowledge Foundation. It is a free license because its users have a right of reproduction, distribution, use, and data transformation as well as a right of creation. However, this license is termed share-alike because it requires users to mention the source of the data, and likewise to share derived databases and, more generally, to maintain this open data.[2] In other words, the ODbL introduces a common digital logic in that it prohibits the exclusive ownership of the resource. But its subtlety is to respect this logic, without necessarily prohibiting commercial uses. The BAN under ODbL can indeed be exploited for profit, as long as the contributory terms of the license are respected.

Finally, while the pre-digital business model stemmed from the customer's willingness to pay, the example of the BAN well illustrates this compatibility between being free of charge and open to making a profit. On the one hand, the BAN is a digital commons (created by ODbL 1.0), in which the quality and improvement of the resource are ensured by its users; and on the other, it may take the form of a private good, produced and consumed in a traditional way, that is to say, through ownership. The BAN is free for actors who do not derive a financial profit from it and for those willing to contribute to its improvement by sharing the improvements they make to its data; it is, however, subject to a charge for those desirous of making a profit without sharing.

A geographic database, along the lines of the BAN, has much in common with an infrastructure: its creation requires an initial investment, and its maintenance is expensive and presents real technical challenges that a centralized administration would have

[1] Colin and Verdier, 2015.
[2] http://openstreetmap.fr/ban.

difficulty overcoming alone. The promotion of a digital commons by the state can take advantage of logic of decentralized contribution to set up this soft infrastructure constituted by a database.

The creation of a digital commons can also be a strategic tool for regulating a competitive market. While the drivers authorized by Uber benefit from the platform set up by the American company, along with its geolocation system, these features are notably lacking among traditional taxi companies in France. It was for this reason, given that the taxi trade was already heavily regulated, the French government decided to set up "*le.taxi*" (see Box 2), a resource for geotagging taxis and placing orders with them, open to all innovators wishing to develop services using taxis, that the drivers help to improve and have access to free of charge.

Box 2. What is "*le.taxi*"?

The arrival in France of the US company Uber in 2011 significantly undermined traditional – and highly regulated – taxi companies. The supremacy of the new entrant stems from its mastery of digital technology, both technical and strategic, which its competitors lack. In addition, taxis suffer from the stringent regulation of their profession, historically inherited from the marauding monopoly, which the state granted them.

The "*le.taxi*" initiative sets out from fact of digital asymmetry between the actors, and responds to the public authorities' wish to give traditional taxi companies the means to compete strategically with VTCs. Specifically, "*le.taxi*" is a database (combined with a programming interface) that allows, on a voluntary basis, any taxi official to geolocate in real time and other actors (taxis operators, but also, for example, the Yellow Pages and AlloCiné,) to develop any service that involves calling a geolocated taxi. VTC drivers do not have access to "*le.taxi*".

These two examples of digital commons, to which the public authorities actively contribute, elude conventional frameworks for analyzing commons and public goods: it is not a matter here of solving the tricky problem of pricing the benefit of the light from a lighthouse. These examples also illustrate the inadequacy of the traditional economic definition of the commons, stemming from the dominance of a business model in which the scarcity of resources – and hence their rivalry – is central to pricing strategies. Yet it is only by abandoning the logic of *commercial exploitation* that we can specify the digital commons, characterized by the *principles of non-payment and contribution*. In this regard, as the philosopher Pierre Dardot and the sociologist Christian Laval write:

> "a commons does not bring together market consumers or users of an administration external to production, but *co-producers* who work together and give themselves collective rules[1]."

If the digital commons is an instance of contribution, the state is nevertheless a contributor that differs from the rest. The levers provided by this phenomenon contributing to public power are integral to the characteristics of the digital commons, which we shall now discuss.

3. Towards a political economy of digital commons

In their book published in 2014, Dardot and Laval undertake a major recasting of the concept of the commons, that they propose "defining as co-belonging, co-ownership or co-possession,"[2] since it concerns a "political principle"[3]. This new definition, deep but abstract, is supported by an anti-capitalist commitment that underlies the book. On the other hand, the book directed by the economist Benjamin Coriat explores a "return of the commons", particularly as a critical alternative to mechanisms for the private appropriation of resources.[4] For our part, we seek to derive from specific observation of the digital commons (see section 2.) practical lessons that can guide public action in this new informational capitalism.

3.1. Defining the digital commons

The goods produced and consumed in the digital age are often underutilized in a traditional market configuration. Whether or not they are rivals, these goods tend to incorporate externalities, that are sources of market failure leading, for example, to underproduction of goods. This danger, for instance, haunts intellectual property and its predigital protection mechanisms,[5] that drastically restrict the free flow of knowledge.

Since the technical definition of the commons (see Table 1) is inadequate, and the recasting of the concept in aid of a comprehensive political project is not our intention, how is the commons to be defined? Theoretical reflection (see section 1.) on the commons in the digital era and its empirical observation (see section 2.) enables us formulate the following propositions.

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[1] Dardot and Laval, 2014, p. 151. Our translation.
[2] Ibid, p. 48.
[3] Ibid. p. 455.
[4] Coriat, 2015.
[5] Stiglitz, 2008, p. 1700.

– *A digital common good is "anti-rival"*[1] *and conditionally non-exclusive.*

In the traditional economic sense, a common good is non-exclusive and rival. While the digital commons unquestionably runs counter to this definition, the categories proposed by economic analysis still retain some utility and are worth revisiting. In particular, the use of a resource shared by members of a digital commons is *anti*-rival. *Non*-rivalry means that the use of the resource by an individual does not prevent someone else profiting from it, whereas *anti*-rivalry means that people will use the resource all the more in that it is already being used. This expanding relationship, explained by the network and contribution effects distinctive of the digital era, characterizes the digital commons. Finally, note that the latter is non-exclusive, subject to respect for the usage rules of the common resource; in this sense, it is not strictly free access like Hardin's pasture or other predigital commons.

– *Because digital commons are governed by a logic of contribution, the state and companies can be promoters.*

Ostrom's work shows that the commons is a potentially effective form of governance, separate from the state and the market. These three forms of governance, competing in the administration of material resources such as water, are now required to complement each other in working towards to the development of digital commons. Thus the public authorities set up the digital commons while contributing to its evolution (see the examples of the BAN and "*le.taxi*"). When the dissemination of a good can benefit everyone, like open data, state supervision may even give way to new, more collective forms of management by the multitude, on the basis of agreement on the usage rules of the co-produced good. This search for new principles is exemplified in the Anglo-Saxon world by the term "open government". Similarly, private companies may have an interest in the development of these commons; such is the case with the Michelin Group, which publishes some of its plans using the BAN.

– *The governance of digital commons is carried out on a large scale: that of the multitude.*

[1] This concept was developed by Weber (2004), in his analysis of open source.

The digital commons, along with its physical counterpart, is an institution whose structural stability derives from the rules it lays down. The digital commons is in fact specified by its scale, that is to say, the unprecedented the number of its contributors – the multitude. This community-based enlargement leads to the governance of the commons and the balance between self-regulation by the multitude and the existence of forms of centralized authority being conceived in a different way. The OpenStreetMap Foundation, for example, differs from Wikipedia through the absence of any form of moderation, although, under exceptional circumstances, its "Data Working Group" will arbitrate disputes between users.

3.2. Traceability of usage, sophistication of common rules

The "tragedy of the commons" obscures the operating rules, highlighted by Ostrom, governing predigital commons, rules that survive even in the digital era. Indeed they acquire new relevance with the ongoing networking of a growing number of activities: for all use is now traceable, with growing precision, thereby allowing unlimited sophistication of forms of transaction, pricing and control. This is what the distinction between open source and free software, for example, teaches us. On the one hand, free software, advocated by Richard Stallman, proclaims its total freedom of use and transformation. On the other, open source (of which Linux and Apache are notable successes) obeys a logic of non-viral contribution[1], which has combined the logic of openness with numerous attempts to supervise its uses. Box 3 gives an example of the usage rules governing the digital commons, namely the different licenses provided by the Creative Commons.

Box 3. Creative Commons licenses[2]

The non-profit organization Creative Commons offers seven licenses as alternatives to traditional intellectual property rights (copyright).

- **CC-Zero** license: maximal renunciation of copyright with the limit of the applicable laws;
- **CC-BY** license: free use of the work, on condition that its authorship is acknowledge and cited and
  - that derivative uses that are made subject to the same principle of sharing as the original work (**CC-BY-SA** license, or share-alike);
  - (or) that no changes are made without permission of the author

[1] Lerner and Tirole, 2005.
[2] Source: Wikipedia. https://fr.wikipedia.org/wiki/Licence_Creative_Commons.

(**CC-BY-ND** license);
  - (or) that no commercial use is allowed without permission of the author (**CC-BY-NC** license).
- **CC-BY-NC-SA** license: recognition of the authorship of the work, whose reproduction is prohibited for commercial purposes, and whose derivatives must meet the same conditions for free distribution.
- **CC-BY-NC-ND** license: recognition of the authorship of the work, whose reproduction is prohibited for commercial purposes and to which no changes may be made without permission of the original author.

Digital technology can therefore make visible the uses of the resource, similarly to the pre-digital system of intellectual property rights. Indeed this (immaterial) right could have maintained the separation of *usus*, *abusus* and *fructus*, since the work remained fundamentally identifiable, unique, and defended by the copyright holders. This sophisticated right was based on a strict monitoring of uses (hence its relative tolerance regarding usage and private copying, which are relatively non-traceable). However, prior to digital, this control of usage, involving thousands of employees, was difficult to adapt to the value creation strategies developed by the digital economy (such as the value of usage data, for example).

User behavior is now known because digital technology engenders a relationship whose terms can be identified by their IP addresses. This lack of opacity regarding usage opens up a whole vista of possibilities: from more sophisticated pricing strategies through to forms of value creation other than billing for usage (for example, collection of user data, targeted advertising, openness to contribution, calling for donations, etc.). Note, finally, that these new behaviors and strategies are in turn based on new logics of public action.

3.3. A new philosophy of public action

The example of "*le.taxi*" (see Box 2) provides a glimpse of the contours of a new form of public power, establishing itself with the aid of a regulation strategy, empowerment of society and large-scale fabrication of externalities, largely derived from the windfall of data and its exploitation.

The example of GitHub, a hosting and software development management service that promotes an original form of open source, is instructive in this regard. Whereas traditional open source requires contributors to download the project's source code and then to propose amendments to the project team, GitHub is based on the

principle of "fork"[1] by default: everyone "forking" the project publicly becomes a de facto leader, retaining his original name. It is therefore a community of producers equipped with rules, tools and resources to produce shared software. As suggested by the French National Action Plan for transparent and collaborative public action, developed by the Etalab mission, GitHub ought to be applicable, for example, to the legislative process in France. The objective would be to keep track of bills: each amendment would be represented by a "commit", whose author would be a parliamentary deputy; citizens could participate by submitting "pull-requests" (contributions to be validated) that the Parliament would debate.[2]

Finally the state, through the timely promotion of the commons, is called on to stop directly (i.e. centrally) managing certain resources that digital technology and its leading players (Google, Apple, Facebook, Amazon) have completely reinvented. Because, as François Taddei points out:

> "The only instances where multinationals have been checked are when the community has been able to organize. This can bring about a collective intelligence, the only real counter-power."[3]

The difficulties states have establishing themselves, if only with regard to taxation, as safeguards against the power of GAFA (Google, Apple, Facebook, Amazon) is obvious. The future of public action involves seeking a new alliance with the multitude. For digital commons, which are mostly produced within logics of contribution, are backed up by communities, which can be a resource, or even a defense, of unsurpassed effectiveness. In this regard, it is perhaps significant that the major powers of the digital economy are currently adopting openness strategies, whether it be Elon Musk which has opened all of its specifications of its Hyperloop to speed up construction, Elon Musk and Y Combinator's OpenIA project, or the recent open-sourcing by Google of its artificial intelligence engine.

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[1] The fork is a new program created from the source code of an existing program.
[2] See online Contribution #1221, cited in the National Action Plan (p. 32).
[3] Cited in Belot, 2015, p. 297. Our translation.

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