



Peer-to-Peer Law: Further Reflections

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Further Reflections

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Abstract

In this paper, I infuse political and legal theory with peer-to-peer decentralized design features. This experiment studies how property and liability, two core legal institutions attached to individual persons, react and can be transformed (like chemical elements) when applied a peer-to-peer, distributed design, with an empirical and evolutionary approach of hacking the law, seen as a regulatory system. In this jurisprudential analysis unfolding the theory of distributed architecture, I study the effect of applying peer-to-peer to the liberal legal institutions of property, liability and democratic political participation. In that sense, beyond using technology as a tool of the law, I propose to use technology as a tool for exploring and modeling the law.

Peer to peer fragmentation is particularly disruptive for the law because the legal reasoning is used accustomed to operate on subjects which are characterized by and uniquely attached to some spatio-temporal existence. This ontological difference between the nature of distributed technology and positivist legal thinking is also reflected in the gap between the law, traditionally much more protective of the interests of capital with its identified owners, than of the commons, with a crowd of distributed peers.

INTRODUCTION: PEER TO PARTY. OCCUPY THE LAW.

Cyberspace renewed legal thinking (Lessig, 1999a&b, Elkin-Koren and Salzberger, 2004). More specifically, peer-to-peer is a disrupting technology (Oram, 2001) for copyright law and cultural industries (Litman; 2001; Vaidhyanathan, 2005), and for law enforcement in general. Peer-to-peer transformative power can also be applied to knowledge (commons-based peer production, Benkler, 2006), to society (Bauwens, 2005; Glorioso et al., 2010), and to the law, as I demonstrated in my 2014 working paper in this series (Dulong de Rosnay, 2014, published as Dulong de Rosnay, 2015), which this working paper proposes to expand in a more systematic manner. A challenge to neoliberalism, peer-to-peer can also be used for mere convenience (Cammaerts, 2011). Many applications have developed alternative communication paths around these protocols:

In recent years, governments around the world have turned off the internet or restricted internet access in moments of political unrest and during large-scale protests. But, what do you do if you are reporting on an event and can no longer communicate with others, send information back to editors, use twitter to follow live updates, or access Google Maps to navigate your way through city spaces? How do you transmit information when the internet is not accessible? [Hong Kong Protests Propel FireChat Phone-to-Phone App](#)

'Peer to party' in the title of this introduction refers to the rise of peer-to-peer, not only as a technical infrastructure on the networks, but also as a sustainable political economy model to develop knowledge, goods and services, and as a set of alternative values in society. Peer is used both in the technical sense (as node of a peer-to-peer infrastructure) and in the social meaning (person hosting a node, using a peer-to-peer application, contributing to decentralized peer production as defined in Dulong de Rosnay and Musiani, 2016).

In this paper, a jurisprudential analysis unfolding the theory of distributed architecture, I study the effect of applying peer-to-peer, defined as a technological design principle (Schollmeier, 2001; Reed and Sanders, 2008), to the liberal legal institutions of property, liability and democratic political participation. In that sense, beyond using technology as a tool of the law (Lessig, 1999b), I propose to use technology as a tool for exploration and modeling of the law¹. Property and liability have been chosen as the most important legal institutions in private law and internet law.

¹ following this methodology, see also Guadamuz (2011), using network science to analyze internet law

Peer-to-peer fragmentation is particularly disruptive for the law because the legal reasoning is used to operate on subjects which are characterized by and uniquely attached to some spatio-temporal existence. At the core of our argument, this ontological difference between the nature of distributed technology and positivist legal thinking is also reflected in the gap between on the one hand capitalism, relying on identified entities (firms, workers) and, on the other hand, commons-based peer production, organized around non-fixed and uneven contributions. And, to link both ontological differences: law is traditionally much more protective of the interest of capital (Capra and Mattei, 2015), with its identified owners, than of the commons, with a crowd of distributed peers, and future generations which may contribute and benefit from it. The contribution of this paper is first to apply peer-to-peer the theory of law, and also suggests its transformative potential to reduce inequalities caused by the extreme concentration of capital and political power.

As a technology to be regulated (another mode of interaction between peer-to-peer and the law), peer-to-peer challenges the law, which usually applies to individuals, both in its reasoning and in its enforcement, at first copyright, considered as intellectual 'property'², and intermediary liability, two central legal institutions selected in this paper (section 2 and 3). Peer-to-peer is a reshaping element for the law (Lessig, 1999a&b; Elkin-Koren and Salzberger, 2004; Elkin-Koren, 2006; Murray, 2006; Brown and Marsden, 2013), a force able to transform other sources of power (Mansell, 2012), which can be applied to fragment legal categories, and distribute property (section 2) and responsibility (section 3). The rhizomatic distribution of actions among actors, as operated in peer-to-peer architectures which can be observed in distributed storage (Musiani, 2014) and community wireless mesh networks ([Dulong de Rosnay, 2015](#)), is prompting a reconceptualization of legal categories and a transformation of legal thinking.

The 'Party' in the title of this introduction refers to this technical fragmentation into parts (*partir*, divide in latin). As for lawyers, a party designates the legal entity participating to a contract, a lawsuit or any kind of legal action. Generally speaking, a party is an informal gathering of peers, possibly involving potluck and unexpected outcomes. 'Peer to party' intends to give the tone to an admittedly rhetorical and idealist celebration of peer-to-peer, even if peer-to-peer does not always challenge capitalism (Cammaerts, 2011).

² Copyright differs from other forms of ownership or property of tangible items, nevertheless, I keep the controversial label of 'intellectual property' to justify the choice of the legal institution which is being challenged.

Academically, this paper stretches and applies the concept transversally, as a transformative element, and observes how the law reacts to it. The use of only pure peer-to-peer architectures at all communications levels (connectivity, encryption, applications, content, etc.) cannot necessarily be observed in “natural habitat” conditions. Some degrees of centralization can be observed at some level most of the time. However, for the purpose of the demonstration, I apply distributed architecture as an ideal type, mimicking experimental laboratory conditions for natural sciences, in the same way economists may rely on a supposed invisible hand of the market for some demonstrations.

'Occupy the law' proposes to sit on legal categories with the intention of changing the system outside of a traditional political 'party' by *hacking* the law, where hacking is understood as a social and cultural practice of resistance (Lin, 2004; Kelty, 2008; Berry, 2008; Barron, 2013; Coleman, 2013; Powell, 2016). A number of blogs are using the expression 'Occupy the law' to convey a contestation and an alternative nature. I intend to use the expression 'Occupy the law' in the same way as Wielsch (quoted in Steinbeis, 2012), explaining the transformative power of open licensing to achieve autonomy. Even if in that case the author-centric individualist conception of copyright law strongly remains (Elkin-Koren, 2005; Dusollier, 2006; Barron, 2014), the copyleft hack enables the use copyright law not to reserve, but to guarantee access to the public, reversing its original purpose.

PEER-TO-PEER AS AN ALTERNATIVE DESIGN PRINCIPLE, AND THE LAW

In this first section, I present peer-to-peer as a design principle and the challenges fragmentation can pose to the law. Replying on the examples of community mesh networks and distributed storage, I explain the difficulties to assign liability. I then explain the conflict is due to the ontological difference between the peer-to-peer model, and the legal and the liberal reasoning, both depending on the concept on individual for its own existence. After making this legal philosophical point, I consider legal precedents of peer-to-peer regulation in the field of internet liability, and how inadequate they have been.

Privacy and political activists are developing and using applications based on alternative technologies to protect their communication from governments and corporations, for instance with [Tor](#) anonymity software to browse the internet, or [Firechat](#), a local mesh messaging service which has been used during protests in the absence of a connection.

Distributed architectures provide alternatives to centralized services which can be tapped, controlled or shut down by central authorities. Used in conjunction with encryption, these tools are helping demonstrators, activists, journalists and dissidents to circumvent surveillance. These alternative peer-to-peer communications technologies intend to address asymmetries of power with repressive regimes or law enforcement and intelligence agencies.

Distributed services are also used for practical reasons. Community wireless networks based on mesh protocols offer an alternative communication infrastructure ensuring more or less resilient and performant access (Neumann, et al., 2015) to the internet. They can be implemented in rural areas (Yarali, et al., 2009), at festivals, after disasters, or in emergency situations (Dilmaghani, 2008). Besides, these grassroots initiatives are providing an alternative to expensive or unavailable commercial ISPs. In that sense, they constitute infrastructure commons (Baig, et al., 2015), with a locally governed commons-based peer production of connectivity.

In another paper ([Dulong de Rosnay, 2015](#)), I started to explore how peer-to-peer and its design principle of distribution (Schollmeier, 2001; Reed and Sanders, 2008) reconfigures legal concepts and categories. In order to do so, I analyzed the techno-legal architecture of mesh networks and distributed storage (in the first version of Wuala, the service renamed Drizzle, see Musiani, 2014) to explain the impact of the fragmentation of files and computing events on legal qualification, the intellectual operation performed by legal scholars, lawyers and judges of assigning a fact to a legal category and necessary to perform interpretation and apply the law.

Decentralization at various technical levels challenges legal enforcement because liability cannot be assigned to a single person, since files and actions are distributed among peers (see Marsden, 2013; Larsson, 2013):

Mesh networks are an especially resilient tool because there's no easy way for a government to shut them down. They can't just block cell reception or a site address. Mesh networks are like Voldemort after he split his soul into horcruxes (only not evil). Destroying one part won't kill it unless you destroy each point of access; someone would have to turn off Bluetooth on every phone using FireChat to completely break the connection. This hard-to-break connection isn't super important for casual chats, but during tense political showdowns, it could be a lifeline. (See: [How Hong Kong Protesters Are Connecting, Without Cell Or Wi-Fi Networks](#))

In a democratic and fair justice process, individuals can be held liable for infringing the law, directly or indirectly by facilitating cybercrime, only if they can be identified and proved

guilty. Law enforcement is accustomed to allocate tort to individual persons designated as liable or responsible for the action, not to unstable groups of peers (Dulong de Rosnay, 2015). Otherwise, law will try to target intermediaries (Elkin-Koren, 2006; Zittrain, 2006). Individual peers whose devices are part of an alternative network providing hosting, connection or browsing do not know what content they are incidentally facilitating the communication. In the case of community mesh or distributed wireless infrastructure, peers neither monitor nor store connection metadata or content exchanged. And in the case of distributed storage (in the first architecture of Wuala, analyzed as Drizzle in Musiani, 2014), an alternative to cloud storage, data is first fragmented, subsequently locally encrypted, only to be distributed among other users' hard drives as encrypted fragments which are not perceptible to the senses. Data is then duplicated. Redundancy enables that retrieval will be possible at any time desired by the user without all peers hosting encrypted fragments being connected. Users who are peers in the distributed hosting architecture are not identified by any central authority, in that case the service developers. Only the original user who had encrypted her file for back-up purposes will be able to reconstruct and decrypt the file. No other user, developer or enforcement authority is able to control or see the files.

Fragmentation of data and actions jeopardizes the location-, time- and subject-based legal reasoning “where each object or right can be assigned to one actor”. The legal method of attributing rights and responsibilities to identifiable persons does not apply well to “technically insignificant fragments” distributed among peers. And private international law strongly relies on the location of actions to choose both jurisdiction and applicable legislation. Concepts of “the author of an action, action and content or object are no longer tangible units, but aggregated, open-ended and evolving fragments” ([Dulong de Rosnay, 2015](#)). Peer-to-peer has the same effect on the law than algorithmic governance, as analyzed by Rouvroy (2012), “bypassing” the notion of subject and focusing on “temporary aggregations”, also in contrast with liberal, tangible conceptions of persons.

The ontological difference between peer-to-peer fragmentation and legal reasoning unicity can be challenging for the (positivist legal) mind used to subjects of law enjoying a state of permanence and unicity. Law is struggling with peer-to-peer because law usually requires the “actual existence of singular individuals” which are grounded in space and time and this existence conditions the enforcement of law (Karskens, 1997: 40-1, analyzing Derrida's *Force of Law*, p. 996).

By extension, peers using and constructing peer-to-peer are injecting its ideology into a non hierarchical, decentralized society corresponding to the holistic model (Dumont, 1983). This

anthropologist and political theorist, student of Mauss, analyzed individualistic and holistic modern societies, the latter designates “an ideology which gives more value to the social totality as a whole and neglects or subordinates the individual as an independent given” (Dumont, 1983: 304). According to him, the Political as a fact and a category does not emerge from interactions between individuals, but rather from a collective will of the society as a whole. At this point it should be noted, or recalled, that the modern liberal philosophical conception of law (Hobbes, Rousseau, Locke, etc.) poses that legal principles “reflect the order of nature and are to be deduced or extracted from properties which are inherent to the human person considered as an autonomous, independent being” (Dumont, 1983: 97). Institutions of Property, Liability, and State derive from natural laws as foundation of the social contract. Both utilitarian (cf. Bentham) and positivist (cf. Kelsen) schools of legal thought criticize the justification and supremacy of a natural law order over a positive law as a system of rules. Still, they are relying on the premises of subjects as they criticize other source of law (morality and normativity) and its application to subjects. Marx's critique of modern law and liberal ideology grounded in individualism (Fuchs, 2015) expresses the origin of rights in community rather than in isolation: “Society does not consist of individuals, but expresses the sum of interrelations, the relations within which these individuals stand.” (Marx, 1857: 176).

In legal philosophy, legal personhood is a “legal fiction” (Bentham, 1997), a fact of the mind allowing the law to apply to non-human entities, such as organizations, corporations, states, and preserve their rights and responsibilities. The law has been able to deal with crowds, and with software agents; the law will be able to address Decentralized Autonomous Organizations even if they are not an established legal entity. Regulatory difficulties of applications hosted on the blockchain arise from the technical distribution of the architecture (Mallard, et al., 2014), neither from the lack of personhood, nor from the automation of legal activities, which has nothing new (Guadamuz and Marsden, 2015).

Putting into question the persistence and the adequacy of “individual legal entities (as) the basis of legal reasoning and the subjects of rights”, I recognize that, even if the distribution phenomenon seems challenging technically, the concept of collectiveness and collective action is not, and has been addressed by the law. Indeed, several precedents in law have been allocating responsibility and agency to persons for others' crimes performed by others³. There is no need to be a person to be recognized agency in political philosophy and network science:

³ On murders committed within crowds, see the doctrine of common purpose, see Unterhalter (1988), and on vicarious criminal liability, see Kreit (2007)

it has been the case for collectives in networked social movements (Smiley, 2011; Bailey and Mattei 2013; Toret and Calleja, 2014) and for non-human agents (Teubner, 2006; Sartor, 2009). Therefore, the main theoretical obstacle for a legal grabbing of peer-to-peer is caused even more by the absence of an individual agent than by the distribution or fragmentation of the action. Individual liability and shared liability have been seen in the law, unlike to distributed liability.

Predictive social sciences, at the crossing of social movements and complex system science, are proving empirically social influence and reinforcement, “interdependence between individuals”, and “enabling the emergence of new types of self-organised collective behaviour”, following early cybernetists (Chavalarias, 2016). Detecting future possible crime blindly (Mohler, et al., 2011) and acting upon it, as it will be studied in the third section on distributed liability, appears dystopian, and as unfair as the doctrine of common purposes making “One Person Liable for the Acts of Another” (Unterhalter, 1988).

Several legal hacks of peer-to-peer law already succeeded to embed collectiveness into the law, as alternatives to neoliberalism, or at least to traditional market/state models: commoners' bundle of rights shared property (Ostrom, 1990), water held as commons in Italy (Mattei, 2013; Carrozza and Fantini, 2016), Creative Commons rights under copyright segmentation (Elkin-Koren, 2005), which will be analyzed in the subsequent section.

However, despite the existence of peer-to-peer law precedents demonstrating the ability of law to address collectives beyond individuals, regulatory answers to data fragmentation and encryption have not been very effective. Anonymization technologies are used by both activists and cybercriminals. Tor, for instance, helps privacy-seeking dissidents and journalists, but also criminals to facilitate the dissimulation of activities taking place in the *Dark Net* (Bartlett, 2015; Minárik and Osula, 2016). The Silkroad was [taken down](#) by the FBI and [resurrected](#) just a few days later.

Targeting intermediaries is difficult for law enforcers because of intermediaries limited liability regulation enacted in the early 2000s. Thanks to Internet Service Providers' intermediaries liability safe harbor, mesh networks providers cannot be held liable for their users' infringement (Hatcher, 2007) if they promptly take down infringing content when notified. In the specific use case of distributed storage, this would become irrelevant since the content is never published.

Regulators can try to outlaw peer-to-peer technologies, slow their development, or impair their implementation or use, which will lead to a chilling effect on innovative, legitimate usages.

[Vivendi Universal](#), a concentrated rightsholder, proposed in 2006 during the transposition in France of the European Union Copyright Directive to outlaw peer-to-peer file-sharing software, by introducing criminal liability for authors of software which could be used for copyright infringement purposes. These proposed amendments were invalidated as unconstitutional⁴ since peer-to-peer can also be used for legal purposes.

Legislators can make it illegal to share a connection without identifying, securing or otherwise retaining metadata. Three strikes law in France and police operations in the US targeted users accused of negligence to secure their Wifi. Such policies of graduated responses are not respecting principle of proportionality and harming freedom of expression (Guadamuz, 2014). Since IP-identification is not fixed, and can be spoofed, such data could not be held as a sufficient information to trace an individual and identify her with certainty. The French Hadopi measure⁵ was revoked in 2013, after only one suspension of connection.

Legislators can impose heavy monitoring and storage duties to internet access providers, for instance require them to keep a copy of both the identification and the connection traces of the users. It was the case in Italy between 2005 and 2011. An antiterrorism decree⁶ was requiring owners or managers of internet access points using wireless technology to collect an identity document of persons using public unsupervised workstations for computerized communications. The process was extremely cumbersome, preventing open Wifi, and anyway inadequate to regulate those community mesh networks which don't have a central manager, or a contract which could indicate a legal relationship. When users are not registered or identified, and when their presence is unstable and not necessary to the making available of packages which content they have no knowledge about, it is difficult to assign liability.

⁴ France, Conseil Constitutionnel, Loi relative au droit d'auteur et aux droits voisins dans la société de l'information, Décision n° 2006-540 DC du 27 juillet 2006, Recitals 54-57. <http://www.conseil-constitutionnel.fr/conseil-con..cision-n-2006-540-dc-du-27-juillet-2006.1011.html>

⁵ France, loi n° 2009-669 du 12 juin 2009 favorisant la diffusion et la protection de la création sur internet, dite loi Hadopi 1. This law was aiming at revoking internet access of holders of connections suspected to have been used for illegal download purposes

⁶ Italy, Legge 31 luglio 2005, n. 155 "Conversione in legge, con modificazioni, del decreto-legge 27 luglio 2005, n. 144, recante misure urgenti per il contrasto del terrorismo internazionale" pubblicata nella Gazzetta Ufficiale n. 177 del 1 agosto 2005. <http://www.camera.it/parlam/leggi/05155l.htm>

After having identified consequences, options and challenges of peer-to-peer for the law, and the notion of legal person in legal theory and in internet regulation, the next sections will consider more successful attempts to hack, or introduce distribution into the law and the concept of individual person as subject of rights (of property, section 2) and of duties (or social responsibilities, engaging one's legal liability section 3).

DISTRIBUTED PROPERTY

This section analyzes three precedents of peer-to-peer, fragmented, distributed, or collective property among unidentified, evolving group of peers in legal history: the bundle of rights in common-pool resources; copyright and the public domain, Creative Commons licensing; and collective property in environmental law. As a methodology for this section, I apply the classical framework of *usus*, *abusus* and *fructus* as components of property rights, in order to better understand how property on goods can be fragmentation, or said otherwise, distributed.

Property right traditionally structures and limits access to and enjoyment of a good, including the right to exclude others, to alienate, or to sell it. Roman law recognizes three categories: *usus*, the right to use the good, *fructus*, the right to grow or rent it, and *abusus*, the right to dispose exclusively, destroy or resell the good. These rights can be concentrated in the hand of a single owner, but various mechanisms allow to fragment property among different users, identified or unidentified, actual or potential

Property, as a bundle of rights, has been conceptualized in the early 20th century by John Commons and the legal realism movement in the United States. Goods are not considered as the source of an absolute and monolithic natural right protected by State law, but rather as a set of social relations with various responsibilities, rights and duties.

Tangible and intangible commons operate a segmentation of access and use rights on shared resources. Common-pool resources (Ostrom, 1990) and common goods (*res communis*) are an alternative to exclusive individual property and to open-access unregulated tangible resources subjected to exhaustion (what Hardin meant in 1968, when tragedy of the commons may occur), or *res nullius* (for instance the space, Milun, 2011) which can be used and enclosed by anyone.

Before the movement of land enclosure, natural resources were considered as common property, with a bundle of rights (access, exploitation, management, governance, exclusion, alienation) distributed according to different uses by the community: harvest, gleaning, pasture, grazing (De Moor, 2011). In her analysis of the bundle of rights and collective or shared property, Ostrom distinguishes the rights of access to the common resource, removal (wood in a forest), management (of the rights to remove), exclusion (decide who will have access rights) and alienation (right to sell or transfer the other rights).

Intangible, non-rival goods are also subjected to non-exclusive segmented property. As a second example, copyright organizes a limited monopoly of exploitation (itself fragmented among the rights of reproduction, making available and transformation) while maintaining a series of limitations or exceptions: in time, with the public domain granting the use of rights to everybody, and according to different activities, some remaining free for all (depending of jurisdictions: parody, citation, fair use, education, text and data mining, preservation and archiving by libraries, news reporting, etc). The public domain has a different status, since it is possible to alienate (*abusus*) it when performing *copyfraud*, the private appropriation of public domain works, the equivalent of counterfeiting for copyright.

This legal hack (Dusollier, 2010; [Communia Positive Agenda for the Public Domain](#) and [Communia WIPO Statement](#), 2012; amendment to French bill, 2015⁷ to preserve the public domain from exclusive appropriation is legally very innovative. It protects the rights not of right holders, but the potential rights of possible future users to equally access and use the resource. The only sanction for misappropriation of the public domain in positive law can be found in Chilean law⁸:

- a) anyone who knowingly reproduces, distributes, makes available or communicates to the public a work belonging to the public domain [...] under a name which is not that of the true author
- b) anyone who claims or demands economic rights in works in the public domain” shall be “deemed to have committed an intellectual property violation.

⁷ France, article 8 of the Digital Republic bill, 2015 (not adopted). <https://www.republique-numerique.fr/consultations/projet-de-loi-numerique/consultation/consultation/opinions/section-1-les-communs/article-8-definition-du-domaine-commun-informatique>

⁸ Chile, Law No. 17.336 on Intellectual Property, article 80 as enacted by the Law 20,435, Article 1, No 10, D.O May, 4, 2010. <http://www.wipo.int/wipolex/en/details.jsp?id=797>

The French Minister for digital affairs proposed in 2015 to protect the public domain from individual appropriation practices which would lead to remove collective rights to the public (for instance, digitization of public domain works re-introducing exclusive rights) by allowing associations to sue on behalf of the public domain and stop the exclusive appropriation. The proposal was not accepted.

This second example illustrates the problem arising from the absence of damage to an actual person (the author's rights expired and there are no right holders to sue), as opposed to potential persons in the public which could suffer from the enclosure of the work and be prevented to exercise rights which no longer belong to the right holders. The Chilean solution clearly and elegantly circumvents the issue by equaling violation of the public domain to copyright infringement. However, the law does not indicate who is entitled to sue, the State or any party.

As a third example, Creative Commons (inspired by FLOSS licenses model, GNU-GPL being the first) hacked copyright law by granting rights which fall under the limited monopoly of exploitation to the public. Licensees are a legal fiction, a group of potential non-identified people who may or may not decide to exercise the rights and make them effective in the future.

The different licensing options are segmenting attributes under copyright usage rights between reproduction or making available, and transformation or making of derivatives. The right of access corresponds to the *usus* Roman category. The right of reproduction, the right of making derivatives, and the right of commercial exploitation fall under *fructus*. The licensing scheme in its initial versions (1.0 until 3.0) was also distinguishing among the *usus* right to reuse without modification in a collection (not subjected to optional limitation) and the *fructus* right to reuse in a transformative manner. *Abusus*, the right to exclude, is neutralized by the copyleft clause, requiring derivatives under *fructus* to be distributed under the same *usus* and *abusus* (access and reuse) conditions. Copyleft is therefore distributing the *fructus* part of the property by protecting against *abusus* future, potential rights of the public, as a collective, after an individual would have exercised the right of making a derivative.

However, this fragmentation of rights, allocating some to the public while reserving some others, relies on copyright ownership and depends on the decision of the individual licensor (Elkin-Koren, 2005; Barron, 2014), who continues to enjoy *in fine* the rights of *usus*, *abusus* and *fructus* and may decide to grant some to the group.

They have the option to allocate fragments of rights under copyright under different conditions, granting to all some access (*usus*) rights. Licensors correspond, in the terminology of Ostrom, to providers who can impose conditions to authors, contributing editors and consumer-users and manage accordingly the various rights under the copyright bundle. They may reserve the *fructus* commercial rights and share with the public (or grant to the commons) only non-commercial, less valuable *fructus* rights. Exceptions under copyright ensure stronger and more stable collective rights to the extent they are removed by law from the bundle of rights the author may manage exclusively.

The ShareAlike option is “[Approved for Free Culture Work](#)” as granting the necessary freedoms required by the liberal *open data*, *open education* and *open science* movements. It also accepts the sole attribution (CC BY), and the voluntary, anticipated public domain (CCo), allowing commodification and proprietary enclosure with commercial *usus*, *fructus* and *abusus*. In the absence of a clause reserving commercial rights, the ShareAlike option (until the third version of the licenses) applies to the adaptation of the work, not to the unmodified work itself, which can thus be subjected to content aspiration by predatory commercial websites which business model is based on traffic and personal data exploitation rather than related to the resources which are made available.

This side effect prompted efforts to develop “copyfarleft” licenses, introducing more finely grained distinction so that commerce could be made by workers or cooperatives where profits are redistributed, but not by companies which would extract and concentrate the profits (Kleiner, 2007). Viera and De Filippi (2014: np) propose to develop a reciprocity clause “that restricts commercial usage according to how much the user has contributed to the common pool”, requiring an ex-ante actual contribution by identified peers, instead of the copyleft provision opening possibilities ex-post. The reciprocity model would be re-introducing metrics and identification of persons, unlike to peer-to-peer architectures in which peers and contributions are not identified (contributing to storage or wireless could be recognized as a valuable contribution to the commons, but that would require identification, defeat anonymity, and possibly trigger liability). Copyfarleft and reciprocity correctives to commercial predation made possible by some Creative Commons options are designed for identified persons, not for evolving, unstable peers contributing to a peer-to-peer application. They are closer to shared property (a well-established practice in real estate⁹) than to actual

⁹ Shared property between a limited number of identified peers is widespread in real estate law (for instance access one week a year with possibility to rent in a holidays resort, or shared occupation of a room between two persons working during the day or during the night in Mumbai). Co-property will distribute property but also duties or servitudes on a distinct space (the ground floor of a building).

collective property, in which peers are not identified, as described in the first section of this article.

Collective groups of unidentified peers are addressed in environmental law legal hacks to property. Many States enable to purchase the right to build or limit possible usages (a fragment of rights) on a land only to preserve it for future generations. Voluntary servitudes, community land trust, conservation covenants or easements are among the various legal instruments available in civil and common law. Voluntary servitudes are designed to protect the environment, when a landowner transfers a fragment of her rights to the state or a non-profit intermediary for purposes of biological conservation.

Environmental law created many hacks to the right of private property (Fernández, 2004; Owley, 2014). This transfer of property to achieve higher objectives leads to an allocation of much more rights than the *fructus* right to build to unidentified collective group of peers which are not legal persons since they do not exist (an interesting example for unstable peer-to-peer distributed storage and mesh network lack of legal personhood), and it prevents *abusus* (which copyleft, copyfarleft and reciprocity copyright licenses have not achieved yet).

Also related to the protection of environmental as a commons, a legal hack under development challenging the fiction of actual persons is the project of recognizing “ecocide” as an environmental crime in international penal law (Cabanés, 2015). This legal fiction would hold liable a company which would potentially damage the environment and harm future generations by preventing them to exercise any right on the land, before the pollution would happen. In that sense, the crime of ecocide resembles copyfraud, the enclosure of public domain works, since they both conceptualize and recognize the potential rights of future unidentified group of peers.

As Capra and Mattei (2015) note, the ideological construction of property as an individual freedom did a lot of harm, as it has been used only to support extractive capitalist ideological hegemony, making it difficult to imagine other more generative purposes, such as the transmission of rights to next generations, a fuzzy group of unknown peers, and to write positivist legal hacks to support these alternatives.

This section identified existing cases of distributed property. The distribution of rights on an object, being tangible or intangible, is helpful to conceptualize commons-based collective property. The copyleft legal hack is a different allocation of the bundle of rights under copyright, as some of them are allocated in advance to future unidentified peers and the legally binding act of the license may be formed at the time the right granted will be

exercised. In that sense, both the legal hacks of the copyleft license and the environmental servitudes are transfer of rights with the expectation of the resource to grow and be used and fructified, but not abused (or enclosed), by future persons with whom it would be impossible to contract directly at the time of the intention of the initial right-owner. The discussion in the next part will move to responsibility, and studies the effects of distributing it among unidentified, unstable group of peers.

DISTRIBUTED LIABILITY

This section considers whether it is possible and desirable to allocate socio-legal responsibilities or liability directly to collectives constituted of peers, instead of identified individuals. It will examine a set of online, offline, small and large communities and discuss the actual meaning and the possible side effects of distributing liability, or responsibility, its equivalent in civil law, and its social translation. Distributed trust will then finally be studied as a possible form of distributing liability, since the literal distribution of torts and collective forms of liability are not an option.

Distributed responsibility can imply collective monitoring, reporting and sanctioning illegal uses, following Ostrom (1990) Institutional Design Principles #4 on effective monitoring and #5 on graduated sanctions for appropriators.

The ability of unstable groups of peers to endorse a duty of care and repair has been well identified and studied extensively in common-based peer production: Wikipedia editors and administrators are developing and maintaining the resource. Their work to protect the commons from pollution, by deleting copyright infringement, mistakes and vandalism, intends to avoid the Wikimedia foundation, a legal entity, to be held legally responsible for hosting problematic content. In this regard, Musiani (2015: 87) is quite right when she points out that:

the collective dimension of this responsibility is also emphasized, and the collective consequences of individual infractions highlighted – regardless of whether the infraction is the storage of inappropriate content, the introduction of unreliable information or spam in a distributed search index, or a ‘selfish’ management of the bandwidth shared by a P2P streaming system.

But this responsibility is social, not legal. The peer production of distributed storage or mesh connection contributes to improved quality of service. The role of each peer is not crucial

from a techno-legal point of view; individual peers can disappear without endangering the viability of the system. They only carry a social responsibility as part of a collective (or as a node), because it is their collaboration which guarantees that the system will effectively function.

Crowdsourced surveillance, justice and police can take place in services and communities which present a certain degree of centralisation: Diaspora, the semi-distributed social network, may for instance contact nodes or administrators [hosting ISIS propaganda](#). But if crime cannot be seen or allocated to a person due to encryption and fragmentation, it is unlikely that a collective sense of responsibility will develop. Besides, collaborative policing without checks and balances could lead to the exclusion or the [discrimination of users based on their IP address](#) or for other illegitimate, disproportionate reasons.

The analogy of pollution monitoring for Wikipedia does not apply to distributed storage or connection, in the absence of identified legal person or centralized technical architecture which would allow to detect an infringement. There is no procedure to deal with an infringement in a distributed service such as Wuala or a community mesh network. Community monitoring and self-regulation to ensure the legality of the content circulating cannot happen if no infraction can be detected (Dulong de Rosnay, 2015). Trying to distribute legal liability among peers as an answer to the legal challenge raised by distributed architecture is tainted by uncertainty and arbitrary unfairness, similarly to intermediaries targeting at the end of the first part of this paper.

Collective legal liability and distributed monitoring did not appear desirable or feasible to lawyers since it has not been implemented into licenses governing intangibles and inspired by the commons and applicable to digital works or internet access. Neither Creative Commons licenses in their current version 4.0, nor the Pico Agreement, a license for community wireless networks, offer any warranty on the content or the service provided. They even contain explicit disclaimers of liability. Should the content be infringing or the quality of service bad, they do not allocate responsibility to providers, peers providing the work or the service. Creative Commons licenses may be used to circulate (*usus*) and to build upon (*fructus*) infringing content, source of pollution of the commons, of fragilization of the license grant, and of risk for potential licensees. I claimed elsewhere that it would be preferable to allocate responsibility to identified licensors rather than to unidentified licensees, instead of transmitting potential problems along the chain (see Dulong de Rosnay, 2013). This would raise the value of works and services made otherwise available for free or at a smaller cost than commercial products.

What legal hacks may distribute liability in the same way than copyleft dedication and environmental entitlements as 'advanced donations' for property? Could collective mechanisms of trust and reputation permit on the one hand to avoid to damage? On the other hand, could insurance or *mutualization* allow us to share the risk in case of damage without the chilling effect of allocating liability to some or all peers, or a group of them? Would they be applicable and enforceable to unidentified, evolving group of distributed peers?

A precedent implementation of distributed trust actually fragmenting the risks, the legal liability and the social responsibilities within a group of peers, can be found offline. An example of online peer-to-peer platform for an offline regulated activity is the development of peer-to-peer insurance policies for [cars](#). With [Guevara](#) in Brighton, UK, peers pay a pool contribution to cover claims, and an insurance fee in case of additional claims. Savings will lower the renewal insurance fee. Groups of friends can be constituted to adapt the insurance fee. Pooling among a group means the risk is distributed among members: the peers' financial contributions should be redistributed to the faulty peer who will be liable or suffer from a damage, or to everybody in case of safe and lucky driving. This model of distributed responsibility requires *voluntary* pooling and trust among a small group, closer to the original Ostrom model of small-scale commons. A detailed case study could confirm organizational patterns and factors of (un)sustainability.

Arbitrary pooling would bring back to unacceptable models of allocation of responsibility presented in section 1 for murders. A comparable commons-based peer production case study involving a local community organized through an online platform can be found among groups of consumers supporting a local farmer or cooperative or producers, providing bulk delivery after a subscription, and accepting smaller or less diverse weekly baskets in difficult times. AMAPs (Associations for the Preservation of Traditional Farming), have a charter, which follows Ostrom Institutional Analysis Design framework (Lamine and Rouchier, 2014), with arrangements demonstrating “mutual confidence and asymmetrical solidarity” (Mundler, 2007).

At a larger scale online, Trust Web tokens and rewards as instantiations of peer-to-peer trust remain mostly individualistic. Smart Contracts are recording the assignment of (individual) rights to (individual) parties. Crypto-currencies are similarly relying on distributed technology to perform legal acts such as authentication, but they ultimately embed individual control. Mining, the operation in which transactions on the blockchain are verified, is designed in a technically distributed manner, without a central trust intermediary, but this

computer operation is unrelated to honesty and the subsequent absence of damage, source of tort and liability. Trust in the code is a recording modality, and does not equal to trust in actions taking place after the authentication of the transaction, violating it or not. Violation of trust, as in any anonymous scheme, is not unseen, and actual distributed trust may require re-intermediation, involving some level of re-centralization (Mallard et al, 2014). This would facilitate regulation, but remove the theoretical question of the existence and the potential effect of distributed liability in the first place. It could also mean that responsibility cannot and should not be distributed, if it might have the effect of diluting the sense of accountability and moral responsibility. This is a genuine legal concern arising from psychology studies: enhanced perception and hyper-agency, which occur after human or cognitive enhancement, but can also be applied to the situation of peers enhanced by peer-to-peer applications, could change the perception of blame and responsibility and decrease social solidarity (Danaher, 2016).

Considering viable examples of distributed trust observed in peer-to-peer car insurance and food cooperatives, developing voluntary collective mechanisms of solidarity to cope with damages may be a financial and sustainability requirement for developers or visible nodes among collectives which may face arbitrary sentencing, depending on which peer or intermediary could be held liable. That would be a positive conception of distributed responsibility, a cooperative management of tort, a voluntary sharing of risks, not a denial of individual liability through the dilution of the personhood, but a reinforcement of trust through local groups, or community nodes.

CONCLUSION

This article presented another mode of interaction between law and technology by demonstrating how distributed architectures can be embedded into law as a design feature. Peer-to-peer distributed design has been applied as an experimental method to transform the legal institutions of property and liability. The examples of community wireless mesh networks and distributed storage demonstrated the challenges peer-to-peer pose for the law, especially in terms of assigning liability. The conflict manifests itself mainly due to the ontological difference between the peer-to-peer fragmentation, and legal as well as liberal reasoning unicity, which both depend on the concept of the individual for their own existence and are accustomed to the subjects of a law enjoying a state of permanence and unicity.

But even if the distribution phenomenon seems technically challenging, the concept of collectiveness and collective action is not, and has been addressed by the law. Furthermore, applying a peer-to-peer design to legal institutions has the potential of making them more apt for the commons.

There is no need to be a person in order to be recognized in political philosophy or network science as having agency: this has been the case for collectives in networked social movements and for non-human agents. Therefore, the main theoretical obstacle to a legal understanding of peer-to-peer is even more a matter of the absence of an individual agent than of the distribution or fragmentation of the action. In this regard, promising examples of legal hacks have been studied, both online and in environmental law.

The distribution of rights to an object, be it tangible or intangible, is helpful for the conceptualization of commons-based collective property. The copyleft legal hack is a different allocation of the bundle of rights under copyright, as some rights are allocated in advance to future unidentified peers and the action of the license may be legally binding only at the time the right granted is exercised. In this sense, both the legal hacks of a copyleft license and environmental servitudes are transfers of rights in expectation of the resource growing and being used, but not abused (or enclosed) by future persons whom it would be impossible to contract directly at the time of the initial rights-owner's intention.

Individual liability and shared liability have been recognized and implemented by law, but not distributed liability. Considering viable examples of distributed trust observed in peer-to-peer car insurance and food cooperatives, and developing voluntary collective mechanisms of solidarity to cope with damage may be a financial and sustainability requirement for developers or visible nodes among collectives which risk facing arbitrary sentencing, depending on which peer or intermediary could be held liable. It would constitute a positive conception of distributed responsibility, a cooperative management of tort, a voluntary sharing of risks – not a denial of individual liability through the dilution of personhood, but a reinforcement of trust through local groups or community nodes.

In this paper it is discussed how the peer-to-peer lens can help make legal institutions adapt to the commons, while also showing some of its limitations. Developing policy alternatives to individual property and liability in the form of the legal hacks presented along this paper is an effective way to challenge the dominant ontology of the law and of capital, both grounded in the concept of the liberal individual person which is challenged by peer-to-peer, and to distribute rights and responsibilities instead of concentrating wealth, liability and powers.

REFERENCES:

- Baig, Roger, Roca, Ramon, Navarro, Leandro and Freitag, Felix (2015) "Guifi.net: A Network Infrastructure Commons." In *Proceedings of the Seventh International Conference on Information and Communication Technologies and Development*, p. 1-4. ACM Press.
- Bailey, Saki and Mattei, Ugo (2013) "Social Movements as Constituent Power: The Italian Struggle for the Commons," *Indiana Journal of Global Legal Studies* 20(2): Article 14.
<http://www.repository.law.indiana.edu/ijgls/vol20/iss2/14>
- Barron, Anne (2013) "Free software production as critical social practice", *Economy and Society*, 42(4): 597-625.
- Barron, Anne (2014) "Intellectual property and the open (information) society", pp. 4-27 in Matthew David and Debra Halbert (eds) *The SAGE Handbook of Intellectual Property*. London: SAGE Publications.
- Bartlett, Jamie (2015) *The Dark Net*. London: Windmill Books.
- Benkler, Yochai (2006) *The Wealth of Networks: How Social Production Transforms Markets and Freedom*, New Haven, CT: Yale University Press.
- Bentham, Jeremy (1997) A Fragment on Ontology, Essay On Logic, and Essay On Language, dated 1813-14, with additions 1821, pp. 193-338 in *The Works of Jeremy Bentham* - 11 vols. Edinburgh: Henceforth Bowring.
- Bauwens, Michel (2005) The Political Economy of Peer Production. *CTheory* 1.
<http://www.ctheory.net/articles.aspx?id=499>.
- Berry, David (2008) *Copy, Rip, Burn: The politics of copyleft and open source*. London: Pluto.
- Brown, Ian and Marsden, Chris (2013) *Regulating Code: Good Governance and Better Regulation in the Information Age*, Cambridge, MA: MIT Press.
- Cabanes, Valérie (2005) *Proposal of Amendments to the International Criminal Court Rome Statute on the crime of Ecocide*. End Ecocide Europe. <https://www.endecocide.org/downloads/>
- Cammaerts, Bart (2011) Disruptive Sharing in a Digital Age: Rejecting Neoliberalism?, *Continuum: Journal of Media and Cultural Studies*, 25(1): 47-62.
- Capra, Fritjof and Mattei, Ugo (2015) *The Ecology of Law: Toward a Legal System in Tune with Nature and Community*, Oakland, CA: Berrett-Koehler Publishers.
- Carrozza, Chiara and Fantini, Emanuele (2016) The Italian Water Movement and the Politics of the Commons. *Water Alternatives* (9)1: 99-119. <http://www.water-alternatives.org/index.php/alldoc/articles/vol9/v9issue1/306-a9-1-5>
- Chavalarias, David (2016) The unlikely encounter between von Foerster and Snowden: When second-order cybernetics sheds light on societal impacts of Big Data. *Big Data & Society* 3(1).
- Coleman, Gabriela (2014) *Hacker, Hoaxer, Whistleblower, Spy: The Many Faces of Anonymous*. London; New York: Verso.
- Danaher, John (2016) Human Enhancement, Social Solidarity and the Distribution of Responsibility, *Ethical Theory and Moral Practice*, 19(2): 359-78.
- De Moor, Tine (2011) From Common Pastures to Global Commons: A Historical Perspective on Interdisciplinary Approaches to Commons. *Natures Sciences Sociétés* 19(4): 422-31.
- Dilmaghani, Raheleh B. and Rao Ramesh R. (2008) Hybrid Wireless Mesh Network with Application to Emergency Scenarios. *Journal of Software* 3(2): 52-60.
- Dulong de Rosnay, Melanie (2013) Open Content Licenses Without Representation: Can You Give Away More Rights Than You Have?, *European Journal of Law and Technology* 4(3): <http://ejlt.org/article/view/237>
- Dulong de Rosnay, Melanie (2015) Peer-to-Peer as a Design Principle for Law: Distribute the Law, *Journal of Peer Production*, issue 6, <http://peerproduction.net/issues/issue-6-disruption-and-the-law/peer-reviewed-articles/peer-to-peer-as-a-design-principle-for-law-distribute-the-law/>
- Dulong de Rosnay, Melanie and Musiani, Francesca (2016) Towards a (De)centralization-Based Typology of Peer Production, *TripleC: Communication, Capitalism & Critique* 4(1): 189-207. <http://www.triple-c.at/index.php/tripleC/article/view/728>
- Dusollier, Séverine (2006) The Master's Tools v. The Master's House: Creative Commons v. Copyright. *Columbia Journal of Law & Arts* 29(3): 271-93.

- Dusollier, Séverine (2011) Scoping Study on Copyright and Related Rights and the Public Domain, CDIP/7/INF/2, Committee on Development and Intellectual Property of the World Intellectual Property Organisation. http://www.wipo.int/meetings/en/doc_details.jsp?doc_id=161162
- Elkin-Koren, Niva and Salzberger, Eli (2004) *Law, Economics and Cyberspace: The Effects of Cyberspace on the Economic Analysis of Law*, Cheltenham and Northampton, MA: Edward Elgar.
- Elkin-Koren, Niva (2006) Making technology visible: liability of internet service providers for peer-to-peer traffic. *New York University Journal of Legislation & Public Policy* 9(15): 15–76.
- Elkin-Koren, Niva (2005) “What Contracts Cannot Do: The Limits of Private Ordering in facilitating a Creative Commons”, *Fordham Law Review* 74(2): 375-422.
- Fernández Fernández, Edgar (2004) Protection de l’environnement naturel et propriété privée, in Cedeño Bonilla, Marianela, Françoise Burhenne-Guilmin, and International Union for Conservation of Nature and Natural Resources, eds. *Environmental Law in Developing Countries: Selected Issues*. IUCN Environmental Policy and Law Paper, no. 43. Gland and Bonn: IUCN.
- Fuchs, Christian (2014) Social media and the public sphere. *tripleC: Open Access Journal for a Global Sustainable Information Society* 12(1): 57-101.
- Glorioso, Andrea, Pagallo, Ugo and Ruffo, Giancarlo (2010) The Social Impact of P2P Systems, pp. 47-70 in Xuemin Shen, Heather Yu, John Buford, and Mursalin Akon (eds) *Handbook of Peer-to-Peer Networking*. Boston, MA: Springer US.
- Guadamuz, Andrés (2011) *Networks, Complexity and Internet Regulation: Scale-Free Law*. Cheltenham, UK; Northampton, MA: Edward Elgar.
- Guadamuz, Andrés (2014) Developments in Intermediary Liability, pp. 312-336 in Andrej Savin and Jan Trzaskowski (eds) *Research Handbook On EU Internet Law*, Cheltenham, UK ; Northampton, MA, USA: Edward Elgar.
- Guadamuz, Andrés and Marsden, Chris (2015) Blockchains and Bitcoin: Regulatory Responses to Cryptocurrencies. *First Monday* 20(12): <http://firstmonday.org/ojs/index.php/fm/article/view/6198/5163>
- Hatcher, Jordan (2007) Mesh Networking: A look at the legal future. *Journal of Internet Law* 11(5): https://papers.ssrn.com/sol3/papers.cfm?abstract_id=814984.
- Machiel, Karskens (1997) Law and Ground, pp 35-43 in Marijan Pavcnik and Gianfrancesco Zanetti (eds), *Challenges to Law at the End of the 20th Century: Legal Systems and Legal Science*. Stuttgart: Franz Steiner Verlag.
- Kelty, Christopher M. (2008) *Two Bits: The Cultural Significance of Free Software*. Durham, NC: Duke University Press. <http://twobits.net/pub/Kelty-TwoBits.pdf>
- Kleiner, Dmitry (2007) Copyfarleft and Copyjustright, <http://www.metamute.org/editorial/articles/copyfarleft-and-copyjustright>
- Kreit, Alex (2008) Vicarious Criminal Liability and the Constitutional Dimensions of Pinkerton, *American University Law Review* 57(3): 585-639.
- Lamine, Claire and Rouchier, Juliette (2014) *D’une charte l’autre. Le processus de révision de la charte des AMAP comme indicateur d’une institution qui se renforce?* (No. 1425). Aix-Marseille School of Economics, Marseille, France. <http://econpapers.repec.org/paper/aimwpaimx/1425.htm>
- Lessig, Lawrence (1999a) ‘The Law of the Horse: What Cyberlaw Might Teach’, 113 *Harvard Law Review*: 501-546. <https://cyber.law.harvard.edu/works/lessig/finalhls.pdf>
- Lessig, Lawrence, (1999b) *Code and Other Laws of Cyberspace*, New York, NY: Basic books.
- Litman, Jessica (2001) *Digital Copyright*, Amherst, NY: Prometheus books.
- Mallard, Alexandre, Méadel, Cécile and Musiani, Francesca (2014) The paradoxes of distributed trust: Peer-to-peer architecture and user confidence in Bitcoin, *Journal of Peer Production* 4: <http://peerproduction.net/issues/issue-4-value-and-currency/peer-reviewed-articles/the-paradoxes-of-distributed-trust/>.
- Mansell, Robin (2012) *Imagining the Internet: Communication, Innovation, and Governance*, Oxford: Oxford University Press.
- Marsden, Chris (2014) Law and Technology, pp. 1-15 in Robin Mansell and Peng Hwa Ang (eds) *International Encyclopedia of Digital Communication and Society*, Hoboken, NJ: Wiley.

- Marx, Karl (1857, 1973) *Grundrisse: Foundations of the Critique of Political Economy*, Chapter 5 on Capital, Penguin Books in association with *New Left Review*, pp. 239-50.
<https://www.marxists.org/archive/marx/works/1857/grundrisse/cho5.htm>
- Mattei, Ugo (2013) Protecting the Commons: Water, Culture, and Nature: The Commons Movement in the Italian Struggle against Neoliberal Governance. *South Atlantic Quarterly* 112(2): 366-76.
- Mazzone, Jason (2011) *Copyfraud and Other Abuses of Intellectual Property Law*. Stanford, California: Stanford Law Books, an imprint of Stanford University Press.
- Minárik, Tomáš and Osula, Anna-Maria (2016) Tor Does Not Stink: Use and Abuse of the Tor Anonymity Network from the Perspective of Law. *Computer Law & Security Review* 32(1): 111-27.
- Milun, Kathryn (2011) *The Political Uncommons: The Cross-Cultural Logic of the Global Commons*. Farnham: Ashgate.
- Mohler, George O., Short, Martin B., Brantingham, P. Jeffrey, Schoenberg, Frederic Paik, & Tita, George E. (2011) Self-Exciting Point Process Modeling of Crime. *Journal of the American Statistical Association* 106(493): 100-8.
- Mundler, Patrick (2007) Les Associations pour le maintien de l'agriculture paysanne (AMAP) en Rhône-Alpes, entre marché et solidarité, *Ruralia* 20: <http://ruralia.revues.org/1702>
- Murray, Andrew (2006) *The Regulation of Cyberspace: Control in the Online Environment*, Routledge-Cavendish.
- Musiani, Francesca (2014) Decentralised internet governance: the case of a 'peer-to-peer cloud'. *Internet Policy Review*, 3(1). <http://policyreview.info/articles/analysis/decentralised-internet-governance-case-peer-peer-cloud>
- Musiani, Francesca (2015) Giants, Dwarfs and Decentralized Alternatives to Internet-based Services: An Issue of Internet Governance. *Westminster Papers in Communication and Culture* 10(1): 81-94.
<http://www.westminsterpapers.org/articles/10.16997/wpcc.214/>
- Neumann, Axel, López, Ester, and Navarro, Leandro (2015) Evaluation of Mesh Routing Protocols for Wireless Community Networks. *Computer Networks* 93: 308-23.
- Oram, Aral (Ed.) (2001) *Peer-to-peer: Harnessing the Power of Disruptive Technologies*. Sebastopol, CA: O'Reilly.
- Ostrom, Elinor (1990) *Governing the Commons. The Evolution of Institutions for Collective Action*, Cambridge University Press: Cambridge.
- Owley, Jessica (2014) Property Constructs and Nature's Challenge to Perpetuity, in Hirokawa, Keith H. (Ed.) *Environmental Law and Contrasting Ideas of Nature: A Constructivist Approach*. New York, NY: Cambridge University Press.
- Powell, Alison (2016a) Hacking in the public interest: authority, legitimacy, means and ends. *New Media and Society*. 18 (4): 600-616.
- Rouvroy, Antoinette (2012) The end(s) of critique : data-behaviourism vs. due-process, pp 143-63 in Mireille Hildebrandt and Ekatarina De Vries (eds) *Privacy, Due Process and the Computational Turn*, London: Routledge.
- Sartor, Giovanni (2009) Cognitive automata and the law: electronic contracting and the intentionality of software agents, *Artificial intelligence and law* 17(4): 253-90.
- Schollmeier, Rüdiger (2001) A definition of peer-to-peer networking for the classification of peer-to-peer architectures and applications, *Proceedings of the First International Conference on Peer-to-Peer Computing*, IEEE: 27-29. <http://www.computer.org/csdl/proceedings/p2p/2001/1503/00/15030101.pdf>
- Smiley, Marion (2011) Collective Responsibility, in Edward N. Zalta (ed) *The Stanford Encyclopedia of Philosophy*. <http://plato.stanford.edu/archives/fall2011/entries/collective-responsibility/>
- Steinbeis, Maximilian (2012) 'Occupy the Law!', report of the Conference on Transnational Societal Constitutionalism, *Frankfurter Allgemeine Zeitung* and *VerfBlog*.
<http://www.verfassungsblog.de/occupy-law>
- Teubner, Günther (2006) Rights of Non-Humans? Electronic Agents and Animals as New Actors in Politics and Law, *Journal of Law and Society* 33(4): 497-521.
- Toret, Javier and Calleja, Antonio (2014) *Collective Intelligence Framework*. Deliverable D2.1, D-Cent European project, 81 pages. http://dcentproject.eu/wp-content/uploads/2015/10/collective_intelligence_framework.pdf

- Unterhalter, David (1988) Doctrine of Common Purpose: What Makes One Person Liable for the Acts of Another, *South African Law Journal* 105: 671.
- Vaidhyanathan, Siva (2005) *The Anarchist in the Library*. New York, NY: Basic Books.
- Viera, Miguel and De Filippi, Primavera (2014) Between Copyleft and Copyfarleft: Advance Reciprocity for the Commons. *Journal of Peer Production*, 4: <http://peerproduction.net/issues/issue-4-value-and-currency/invited-comments/between-copyleft-and-copyfarleft-advance-reciprocity-for-the-commons/>
- Yarali, Abdulrahman, Ahsant, Babak and Rahman, Saifur (2009) Wireless mesh networking: A key solution for emergency & rural applications, *MESH 2009. Proceedings of the Second International Conference on Advances in Mesh Networks*, IEEE: 143-49. <http://doi.ieeecomputersociety.org/10.1109/MESH.2009.33>
- Zittrain, Jonathan (2006) A History of Online Gatekeeping. *Harvard Journal of Law & Technology* 19(2): 253-98.

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