Intellectual Property and the Internet: The Share of Sharing

Ejan Mackaay[1]

Just when we thought we knew everything we always wanted to know about intellectual property and had it properly organised, it explodes again. We thought we had answered the call that information wants to be free and shown that intellectual property is not the divine right of thugs.[2] We agreed on an international convention for adapting copyright to the Internet.[3] The Americans worked it into a piece of political compromise pompously called the Digital Millennium Copyright Act and blissfully unreadable. Yet now there is a call for the "right to read",[4] for limiting copyright in order to preserve an "information-rich environment",[5] for music to be exchanged freely in MP3 format. Further *contestataires* are putting video decryption software (DeCSS) at multiple spots on

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[2] Barlow, John Perry, "The Economy of Ideas – A framework for rethinking patents and copyrights in the Digital Age (Everything you know about intellectual property is wrong)", (1994) 2.03 *Wired* 84–90, 126–129.

[3] WIPO Copyright Convention, Geneva, 20 Dec. 1996. (Convention on Certain Copyright and Neighbouring Rights Questions).

[4] Jessica Litman, The Exclusive Right to Read, (1994) 13 *Cardozo Arts & Ent. L.J.* 29; Cohen, Julie, A Right to Read Anonymously: A Closer Look at "Copyright Management" In Cyberspace, (1996) 28 *Conn. L. Rev* 981.

[5] Yochai Benkler, for instance, in various recent articles defends the idea of limiting the reach of copyright to preserve an information rich environment: Benkler, Yochai, "Constitutional Bounds of Database Protection: The Role of Judicial Review in the Creation and Definition of Private Rights in Information", (2000) 15 *Berkeley Technology Law Journal* 535–603; Benkler, Yochai, "From Consumers to Users: Shifting the Deeper Structures of Regulation toward Sustainable Commons and User Access", (2000) 52 *Federal Communications Law Journal* 561–579; Benkler, Yochai, "Internet Regulation: A Case Study in the Problem of Unilateralism", (2000) 11 *European Journal of International Law* 171–185; Benkler, Yochai, "Net Regulation: Taking Stock and Looking Forward", (2000) 71 *University of Colorado Law Review* 1203–1261.

N. Elkin-Koren and N.W. Netanel (eds.), The Commodification of Information, 133–146.

he Internet, leading American officials to seek extraterritorial reach for their law n a frustrating effort to stop it. GNU/Linux is rapidly eating market share from ommercial players in the operating system market, ostensibly demonstrating that he share economy can work and is even more creative, its proponents claim, than he developers of Windows. Scholarship accounts for such phenomena with the dea of the anti-commons: too much property right concentrated in a single object s counterproductive.[6] Respectable scholars lend their voice to the idea that folk rt should not be open to appropriation and subsequent exclusive exploitation by ny comer.[7] Must we yet resign ourselves to dance on the grave of copyright?[8]

To answer that question, we do well to return to the core ideas of copyright and intellectual property rights generally) (A). This should allow us to discuss the uggestion of abandoning intellectual property rights altogether. The main critical oices, however, do not call for total abandonment, but rather for forms of haring, sometimes called limited common property. We must look at the ircumstances in which such a formula is viable as well as desirable (B).

A. The classical picture of intellectual property

. INTELLECTUAL PROPERTY AS A SPECIES OF PROPERTY

n the classical picture, intellectual property is a species of property right, albeit a eculiar one. Property rights are a standard answer to scarcity; it is hardly worth stablishing them on what is abundant. Scarcity arises with multiple competing ses for a single object. Emergent scarcity may be signalled by conflict amongst ersons pursuing different uses for the same object.[9] Property rights reserve the

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[5] Heller, Michael A., "The Tragedy of the Anticommons: Property in the Transition from Marx to Markets", (1998) 111 *Harvard Law Review* 621–688; Heller, Michael A., "The Boundaries of Private Property", (1999) 108 *Yale Law Review* 1163–1223; Heller, Michael A. and Rebecca S. Eisenberg, "Can Patents Deter Innovation? The Anticommons in Biomedical Research", (1998) 280 *Science* 698. In an as yet unpublished paper, Parisi et al. propose a formal model for this concept: Parisi, Francesco, B. Norbert Schulz and B. Ben Depoorter, *Duality in Property:Commons and Anticommons*, rapport, George Mason University, 2000.

Rose, Carol M., Evolution of Property Rights, *in: The New Palgrave Dictionary of Economics and the Law, Vol. 2*, Peter Newman (ed.), London, MacMillan, 1998, pp. 93–98; Rose, Carol M., "The Several Futures of Property: Of Cyberspace and Folk Tales, Emission Trades and Ecosystems", (1998) 83 *Minnesota Law Review* 129–181.

Barlow, *op. cit.*

Demsetz, Harold, "Towards a Theory of Property Rights", (1967) 57 *American Economic Review* 347–373; Demsetz, Harold, Property Rights, *in: The New Palgrave Dictionary of Economics and the Law, Vol. 3*, Peter Newman (ed.), London, MacMillan, 1998, pp. 144–155; Mackaay, Ejan, The Economics of Emergent Property Rights on the Internet, in : *The Future of*

power to decide what is to be done with an object to a single person or group of persons, to the exclusion of all others, preferably with the right to transfer that power to someone else. They are expected to have the effect of creating incentives for carefully husbanding known resources and for inventing better ways of using them or discovering new ones. Granting the creator the spoils of an invention or creation, but also the losses if it flops, is a decentralised system for encouraging creation.

Intellectual rights, being a species of property rights, inherit this logic, but with a twist, because of the special nature of information. In many instances, information is costly to produce, but cheap to reproduce. This would mean, by standard economic reasoning, that it should be distributed at very low cost, making it difficult to recover the cost of creation. Often it is difficult to exclude people from using information once available; use by one person does not preclude use by another. The two features characterise a public good, with notorious difficulties for creating property rights and markets. Moreover, information embodied in one person's creation or invention is often used by someone else in developing a further creation or invention. This gives information a cumulative character which ill comports with the exclusivity a property right requires. All of these characteristics lead to the conclusion that property rights in information must be limited. They reflect a trade-off between incentives necessary for creating information and the monopolising effect, i.e. the cost of restricting access for other creators and the public in general.[10]

There is a substantial literature examining intellectual property rules with a view to determining whether they reflect an optimal trade-off and are in that sense "efficient". Enlightening though this analysis may be for rationalising rules, it does not show how rules reflecting such a trade-off come about. The origin of intellectual property rules is worth looking into, considering that legislatures can scarcely be expected to develop a balanced view in relying on groups making themselves heard in front of them, that is, as the public choice literature has shown, organised interests seeking firmer protection for their products. Nor is it the role of the courts to create novel rights from scratch.

2. EXTENSION OF INTELLECTUAL PROPERTY TO NEW OBJECTS

When new objects are invented or discovered for hitherto unprofitable objects, how do property rights come to govern these new objects? They are rarely created

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Copyright in a Digital Environment, P. Bernt Hugenholtz (ed.), The Hague, Kluwer Law International, 1996, pp. 13–25, at p. 16 s.

[10] Landes, William M. and Richard A. Posner, "An Economic Analysis of Copyright Law", (1989) 18 *Journal of Legal Studies* 325–363.

ex nihilo by legislation or judicial decision. Preferably legislation or judicial decision would acknowledge and codify institutions developed by interested persons themselves. In such a process of recognition the initiative falls to persons who stand to gain from using or commercialising the new object. Marie-Angèle Hermitte has described such a development for plant-breeder rights in France.[11] I would expect that a similar process has been at work leading up to the enactment of property rights in apartments. Enactment of individual property rights in apartments facilitates such operations as establishing mortgages (hypothecs) on them.

Property rights presuppose control over an object, i.e. the possibility of reserving its use to one person, to the exclusion of others. So the first step in the process is to secure control over the object. This may be achieved through physical fences or ditches, through encryption and "watermarking", but also through other forms of barrier including legal ones and marketing techniques, such as regular updates and tying arrangements like on-line assistance for legitimate clients of software. Contractual arrangements may also act as fences: you agree to give someone access to your technological know-how, specifying in the contract what measures he or she must take to keep it secret. Fences need not be foolproof, but they must be secure enough for the owner to find it profitable to use the property. Where fences are ineffective or altogether absent, the good is left in open access and is likely to be overused. This is the "fencing" aspect of property.[12]

Fencing techniques are themselves scarce goods like the objects they fence in. They are subject to property rights. Advances in fencing techniques may make new objects of property or new forms of exploitation viable.[13] Through exchange, the inventor of a new fencing technique can cash in on part of the gains the fence makes possible for property owners. Hence the incentives the property system creates for owners extend to builders and inventors of fences. Technological innovation may not only lead to new fences, however, but also undo fences that were effective under older technology, as cheap photocopying did to copyright restrictions on printed works. On the Internet, technology plays yet another trick on copyright protection. Since any use on the Internet implies some form of

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[11] Hermitte, Marie-Angèle, Histoires juridiques extravagantes: La reproduction végétale, *in: L'homme, la nature et le droit*, Bernard Edelman and Marie-Angèle Hermitte (eds), Paris, Christian Bourgois éditeur, 1988, pp. 40–82, at 49, referred to in Mackaay, Ejan, "Economic incentives in markets for information and innovation", (1990) 13 *Harvard Journal of Law & Public Policy* 867–909, at 902–903.

[12] Mackaay, Ejan, The Economics of Emergent Property, *op. cit.*; Mackaay, Ejan, "L'économie des droits de propriété émergents sur l'Internet", (1997) 9 *Cahiers de propriété intellectuelle* 281–300.

[13] As barbed wire did for ranching in the American west. Ellickson, Robert C., "Property in Land", (1993) 102 *Yale Law Journal* 1315–1400. At p. 1330, Ellickson relates how the invention of barbed wire changed the economics of land use for cattle breeding by making smaller lots viable. Historical observation confirmed what economic theory predicted here.

copying, the balance between use (free) and copying (restricted) struck unde legislation reflecting older technology is no longer satisfactory.

The first step in the emergence of property rights is for prospective owners t erect their own fence. If you are able to fence something in, you lay the foundatio for your property right. This is a fundamental principle of civil and common la alike: possession is the root of title.[14] Conversely, without a fence you have n claim to a right. The legal system should not be on call to enforce rights owner cannot by and large make stick themselves. The contrary thesis would open th door to rent-seeking.

The "freedom to fence" has a limit. In fencing in new objects, you may no (substantially) interfere with existing rights of others. This principle explains wh the legal system disallows "mere fence-cutting" inventions such as unscramblin equipment (television signals), domain name squatting and encryption circumven tion technology. But this restriction on freedom to fence is bounded: you are fre to use inventions that serve legitimate purposes and incidentally allow fence cutting. The boundary should be defined by something like the test developed i the Sony-decision by the U.S. Supreme Court.[15]

If new technology results in old fences becoming more permeable, this proble falls to the owner. It is not the mission of state law enforcement to shore u outdated fences. Leaks in fences provide the spur for inventing new and bette fences. Does this open the door to wasteful technology races? Not quite, since, a we saw, mere fence-cutting will be disallowed.

Ownership without the possibility of openly using the object is not good fo business. So the next step is to ensure that the object can be used openly and give in use to other persons, without the owner permanently losing control over it. Fo most purposes contracts can do the job, provided one can fashion them as th context requires. Freedom of contract normally makes this possible. One ca specify in a contract what users may and may not do with what is being given i use and under what conditions: copying, reverse engineering, developin extensions and improvements, incorporating the object in novel ones, and so or

Contract also allows the object to be transferred. Contracts could provide fo usage restrictions to run with the main object when transferred to a third perso In competitive markets, these contractual conditions may be expected to strike reasonable balance between the parties on either side of the contract. In examinin contracts they are asked to enforce, courts can insist that even in standard for agreements customers are given all essential rights necessary to pursue the mai

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[14] For instance, Epstein, Richard A., "Possession as the Root of Title", (1979) 13 *Georgia La Review* 1221. It can be traced back to Locke (Locke, John, *Two Treatises of Governmen* Cambridge, Cambridge University Press (1690), 1960), 2nd treatise, § 25, who qualifies th principle by the proviso, that in appropriating things by "admixing' them with one's labou there is "at least [. . .] enough, and as good left in common for others'. (§ 27 in fine).

[15] *Sony Corp. v. Universal City Studios*, 464 U.S. 417 (1984).

purpose of the contract. In a contract for software, for instance, this would entail the right to make back-up copies, now codified as a fair use/fair dealing defence. Similarly one may presume that permission for private copying would generally be given – it does not preempt a sale – but under older technology (high transaction costs) would have been too costly to solicit. Hence that permission was granted by law as fair use/fair dealing.

As regards the cumulative nature of information, contracts, in the form of association rules, may also regulate the extent to which existing information may be used to develop further creations, designs or inventions. A most revealing context for such rules would be one in which the contracting parties would be now "borrowers" of new ideas, now "lenders". They would act under a sort of veil of ignorance, warranting the fairness of the rules so reached. Associations of persons active in the same trade might be taken as a reasonable approximation of such a situation, as they were in the case of the regional plant growers associations in France in Marie-Angèle Hermitte's study mentioned earlier.[16] Subject to field observation, it is plausible to think that such club rules would leave ideas, principles and laws of nature, as well as stock elements (scènes à faire) open for use by anyone, whilst reserving the spoils of specific inventions to the inventors. This could stand model for the way the public domain is defined in most legislation. By way of example, in microchip legislation, reverse engineering an invention for purposes of research is allowed.[17] Incorporating the fruits of such analysis into a new design is allowed and will lead to a right in this new design, provided it is original, i.e. makes a contribution beyond the older technology.[18]

The final institution we need for this process to work correctly is a technique to stop "leaks" to the outside world. These leaks are situations in which club goods are secretly sold by a club member to third persons, who can then "undersell" the club or otherwise free ride on the efforts of loyal club members. If the whole process is to be recognised as a legitimate way of discovering how the property order should be extended to new objects, the club arrangements should not be struck down as anticompetitive cartels nor leaks condoned for that reason. In practice liability rules and injunctions against the profiteurs of such leaks have been applied under legal doctrines such as unfair competition or parasitical behaviour. The courts intervene here only at the margin and as a temporary measure while the discovery process goes on and before it is codified into law.

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[16] MA Hermitte, *op. cit.*; also Merges, Peter, "Of Property Rules, Coase, and Intellectual Property", (1994) 94 *Columbia Law Review* 2655–2673, p. 2662 ff. There is a risk of conspiracy against the public, as Adam Smith already knew. The answer lies in the right to set up a competing association.

[17] Sct. 6(2)(a). *Canadian Integrated Circuit Topography Act*, R.S.C. 1985, c. I–14.6

[18] id., sct. 6(2)(b) read with 4(2) and 4(3).

3. THE FRAMEWORK OF DISCOVERY

The formula "control + contract + leak control = (prototype) property" sums up succinctly how we discover the way in which the property order can be extended progressively to new objects at the initiative of primarily interested persons.[19] It is an open-ended process, applicable in principle to an infinite variety of objects at the margin of the existing order. It is decentralised, which means that it can be set in motion by anyone who sees the possibility for gain from new property rights.

In the logic whereby the property order extends itself to new objects at the initiative of prospective owners, the quality of the fence available to secure property is the owner's responsibility. The state guards against outright fraud and violence; for the remainder you are on your own. You make your calculations of whether property is worthwhile based on the revenue you can draw from it given a foreseeable rate of slippage. This logic would imply that on the Internet, where slippage is substantial, having done your sums and put up your product in the expectation that there is enough in it for you, you live with the slippage that your choice implies. For any product you sell on the Internet (software, text, music, video) you have to allow far more by way of sharing or "pirating" amongst your users than you were used to under older technology. But the cost of producing an extra copy is next to zero and you also have more ways of capturing what users do and hence of price-discriminating. While we learn this new reality, the proper policy seems to be: don't listen too much to complaints, don't try to stamp out all piracy, but sweep the market clean enough for business and let actors decide how to maximise their revenue.[20]

As a broad generalisation, such a decentralised discovery process is to be preferred over legislative fiat or forms of regulation, which are open to capture by rent-seeking interests. It offers the best incentives we know for the main actors involved to take the initiative and get the solutions right, even as legislation or judicial decisions are later called upon to codify the results and to correct at the margin what are perceived to be flaws (severe information asymmetries, exploitation of local monopolies, hold-out situations, and so on).

For this system to work, the law needs a set of background or meta-rules to circumscribe the process. These could be summarised as follows:

1. Freedom to fence in unowned objects.
2. Subject to prohibition of mere fence-cutting (attack on other persons' ownership)

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[19] On this general logic: Libecap, Gary D., *Contracting for Property Rights*, Cambridge, Cambridge University Press, 1989 JDGD L694c 1989.

[20] Shapiro, Carl and Hal R. Varian, *Information Rules: A Strategic Guide to the Network Economy*, Cambridge, MA, Harvard Business School Press, 1998, p. 102.

3. But permission to use technology with useful applications and incidental fence-cutting properties.
4. What you control may become your property (possession as the root of title).
5. No fence, no right.
6. Leaks in older fences are the owner's responsibility (subject to protection against outright violence and fraud).
7. Freedom of contract.
8. Contract clauses must be interpreted so as not to prevent the accomplishment of the essential purpose of the contract.
9. Freedom to form associations and adopt internal rules.
10. Association rules may restrict output only as a means of preserving a jointly used or produced scarce resource.
11. Deliberately creating and exploiting "leaks" in the fence, by a club member's secretly transferring club goods to outsiders, should be curtailed by the courts. This may be accomplished through doctrines such as unfair competition or parasitical acts.

The point I wish to make is that these principles are sufficient for interested persons to set up the arrangements with their restrictions and limitations and to demonstrate their viability. They can account for most rules we find codified in copyright law and other intellectual property legislation. The justification for such rules does not stem from mere theoretical argument, but relies on being demonstrated by actors in the field or being amenable to such demonstration. This should be a proper safeguard against rent-seeking legislation. The rules for such a decentralised discovery process can be part of civil law codified law systems as much as of common law based legal systems.

The question we must now ask is whether such a test can be applied to the sharing arrangements proposed in the literature as a means to cure supposed forms of "market failure", which would develop as a result of excessive privatisation.

B. Sharing

Why should owners live with slippage if they have the technical means to curtail it? If all slippage is illegitimate within an otherwise legitimate property order, one cannot blame owners for looking for better fences: encryption, watermarking and the like, and insisting on having fence-cutting techniques outlawed, as they are in the American Digital Millennium Copyright Act. It is the very logic of property rights that the order extends that way. If slippage reflects a limiting principle of the property order, whose effect is magnified on the Internet, we may yet want to

legitimise that slippage (as fair use/fair dealing for instance) and tell owners to live with it, not as a matter of good business practice, as Shapiro and Varian do, but as a matter of law.[21]

How to decide? Parisi and others make a theoretical argument for limiting private rights and, in the domain of copyright, for allowing fair use, on the basis of the anti-commons idea put forth by Heller.[22] An anti-commons is thought to arise when too many decision rights (property rights) on the same object lead to abuse of veto and hold-out situations, which in turn entail suboptimal use of the object. It is the opposite of the commons, where open access – the absence of sufficient property rights – leads to overuse of a resource. In a later paper, Depoorter and Parisi amplify this idea, stating that the anti-commons idea provides a justification for fair use in American copyright legislation independently of that provided by technical transactions costs.[23] The transactions costs defence of fair use has been most forcefully put forth by Gordon, but it would tend to evaporate as the cost of reaching copyright holders or their clearinghouse representative dwindles on the Internet.[24] Parisi and Depoorter in essence argue that the transactions costs stemming from opportunistic behaviour are not at all likely to vanish in the Internet environment. Strategic hold-out can, in their view, still be a problem. It might interfere with adequate access to information and this in turn, given the cumulative nature of much knowledge, might lead to welfare losses, justifying compulsory access to copyright information through the institution of fair use.

While the papers show an elegant symmetry with the commons and associated dangers, I am not persuaded that the theoretical argument alone is sufficient to justify fair use. Should not the empirical refutation of the public goods/externality arguments for lighthouses and bees give us pause?[25] Instead I propose to look for a justification in line with the argument developed in the first section of the paper. In

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[21] Lessig, Lawrence, "Constitution and Code", (1997) 27 *Cumberland Law Review* 1–15, at 9–10: "The point is this: code could in principle make intellectual property unstealable—meaning unusable except in the ways the owner wants. But as it is understood just now, intellectual property is not supposed to be perfectly unstealable; it's not supposed to be perfectly protected. For the right that intellectual property grants is a compromised right: the holders of the right to intellectual property do so subject to a public use exception, called fair use."

[22] Parisi, Francesco, B. Norbert Schulz et B. Ben Depoorter, *Duality in Property: Commons and Anticommons*, rapport, George Mason University, unpublished paper, 2000; Heller, Michael A., "The Tragedy of the Anticommons: Property in the Transition from Marx to Markets", (1998) 111 *Harvard Law Review* 621–688; Heller, Michael A. et Rebecca S. Eisenberg, "Can Patents Deter Innovation? The Anticommons in Biomedical Research", (1998) 280 *Science* 698.

[23] Depoorter, Ben and Francesco Parisi, The Price Theory of Copyright Protection (The Doctrine of Fair Use and the Tragedy of the Anticommons), unpublished paper presented at the EALE Conference in Ghent 14–16 September 2000.

[24] Gordon, Wendy J., "Fair Use as Market Failure: A Structural and Economic Analysis of the *Betamax* Case and Its Predecessors", (1982) 82 *Columbia Law Review* 1600–1657.

[25] Cheung, Steven N.S., "The Fable of the Bees: An Economic Investigation", (1973) 16 *Journal of Law and Economics* 11–33; Coase, Ronald H., "The Lighthouse in Economics", (1974) 17 *Journal of Law and Economics* 357–376; and for a furthe debunking story: Liebowitz, Stan J. et Stephen E. Margolis, "The Fable of the Keys", (1990) 33 *Journal of Law and Economics* 1–25

the discovery logic set out there, the initiative for extending the order falls to interested persons. They would have to demonstrate the viability of the arrangement they favour before it would be put into law. This principle is a precaution against rent-seeking through which some groups' preferences are legislated into law at the expense of other groups or the public at large. Can we find examples of interested persons demonstrating the viability of sharing arrangements?

1. RECORDED EXPERIENCES WITH TANGIBLE COMMON PROPERTY

In the tangible world, sharing arrangements may stem from difficulties in fencing. In the case of fishing communities for instance, as Ostrom has demonstrated,[26] it is difficult to reserve free-swimming fish to individual members, but one can reserve it to the community as a whole as against the outside and evolve within the community the rules regulating how much each member is allowed to catch, while maintaining the fish stock. The general thesis here is that where fencing is insufficient for establishing individual property rights, resources will not be left in open access. Limited common property regimes avoid the dangers of overuse and underproduction. These sharing arrangements are set up not primarily for the pleasure of sharing, but for want of better property rights because of fencing problems, while one must yet manage scarcity. They fulfil a useful function and must not be dismissed as merely anti-competitive cartels, as appears to have been the view of the Canadian government with respect to the fishery community arrangements on the Eastern seaboard.[27]

2. OPEN ACCESS GOODS IN THE NEW ECONOMY

The Java programming language

Let us look for similar arrangements in the new economy. A first example is the Java language. Sun has developed it as a platform independent tool. Program anything in Java and it can be run on any computer that accepts the language.

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[26] Ostrom, Elinor, *Governing the Commons – The evolution of institutions for collective action*, Cambridge, Cambridge University Press, 1990; Yandle, Bruce, "Antitrust and the Commons – Cooperation or Collusion", (1998) 3 *Independent Review* 37–52. Carol Rose gives a scala of forms of common property with increasingly severe restrictions on what members can use the property for: Rose, Carol M., Evolution of Property Rights, dans : *The New Palgrave Dictionary of Economics and the Law, Vol.'2*, Peter Newman (dir.), London, MacMillan, 1998, pp. 93–98, at 96.

[27] Ostrom, *op.cit.*, p. 177; Yandle, *op. cit.*, p. 45.

There are economies of scale to be had from such initiatives, as there are from any norm or standard. Once the particular product has become an accepted standard, one might fear monopolistic practices, but the very possibility of entry of a competing standard would seem to limit the danger, and experience seems to confirm this.

A common standard runs counter, however, to implicit fences which Microsoft creates around its operating system. So Microsoft implemented in its operating systems a version of Java which created incompatibilities with the general version. This in fact counteracts the effect of the common norm. In litigation, Sun invoked its copyright in order to prevent the implementation of incompatible versions of Java. Copyright is used here in order to preserve an open-access good. Presumably, Sun would control any changes or improvements proposed for Java by third persons in order to maintain common access. An exclusive right (copyright) is used here deliberately to keep a good non-exclusive.

The GNU/LINUX operating system

A second case within the new economy to consider is the GNU/LINUX operating system. Here too software is deliberately kept non-exclusive by means of copyright. Marketing the GNU/LINUX operating system by third persons is allowed, provided the price be set to recover only the cost of marketing, whilst the software itself is free and left in open access. The arrangement here appears to be a direct reaction to Windows' virtual monopoly position. The promoters of this solution, for instance Richard Stallman's Free Software Foundation,[28] maintain that a network of independent programmers working together are more creative than a behemoth like Microsoft. Bugs found in the software will be more quickly corrected, new possibilities more quickly exploited.

This argument flies directly in the face of received wisdom in matters of property rights. Open access is generally resisted on the grounds that it will lead to overuse and underproduction along the lines of Hardin's tragedy of the commons. Overfishing as well as air and water pollution are given as evidence.[29] Common property is thought undesirable because of the cost of reaching decisions (hold-out problem). Civil codes have numerous examples showing caution with respect to common property. Generally institutions such as partnerships must be set up by explicit agreement; there are rules for overcoming lack of consensus by majority vote or other techniques; partnerships may be dissolved, if all else fails, by the court.

Private property is commonly expected to create stronger incentives for good management and for innovation and to outperform common property and open

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[28] See Benkler papers quoted above.

[29] Hardin, Garrett, "The Tragedy of the Commons – The population problem has no technical solution; it requires a fundamental extension in morality", (1968) 162 *Science* 1243–1248.

access property. The GNU/Linux experience is illuminating in that it is currently gaining market share quickly, apparently contradicting this alleged all-round superiority of private property. The proponents of the GNU/Linux experience point to overriding benefit of sharing the discovery burden amongst a worldwide community of hackers. The open source code movement capitalises on this advantage. But, one may object, how do the proponents of GNU/Linux earn their keep? They do it in particular through offering paid services for implementing the system or particular programs compatible with it, or for programming altogether new applications. The arrangement is reminiscent of the practice of the Grateful Dead, as related by John Perry Barlow: let "dead" information be freely copied, but charge for "live" information.[30]

6. SHARING OF SCIENTIFIC KNOWLEDGE

Just why this sharing should be decisive is intriguing. Perhaps the experience of scientists sharing scientific discoveries through working papers and other informal techniques is illuminating.[31] Scientists working in the same field are in a relationship somewhat like a veil of ignorance. They do not know who will make the big discoveries, but know that they will do better with easy access to one another's results. Scientific research has historically been a community affair, in that scientists networked by working physically together (monasteries, institutes, laboratories) and through letter writing and conferences. Over the past century, especially since the Second World War, scientific publication has been transferred to commercial book publishers, operating on the basis of exclusive rights and requiring payment for the right to read. Recently, patenting scientific inventions, in biotechnology for example, has become accepted practice, indeed mandatory for research financing. So in the world of scientific research the two models are now available for use.

Have scientists turned their back to the share economy in favour of a trade economy? The answer is clearly no. Sharing is still standard practice, even though scientists rely on exclusive rights, contracts and other aspects of the trade economy when dealing with commercial outsiders.[32] Of course, incentives for scientists come in the form of reward for reputation (invitations to prestigious posts, prizes,

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[30] Barlow, op. cit.

[31] Merges, Robert P., "Property Rights Theory and the Commons: The Case of Scientific Research", (1996) 13 *Social Philosophy & Policy* 145–167; Mackaay, Ejan, Scientific publishing without publishers, *in: Universiteit en auteursrecht – Wetenschappelijke informatievoorziening in een digitale omgeving (University and copyright – The circulation of scientific information in a digital environment)*, P.B. Hugenholtz, J.J.C. Kabel and G.A.I. Schuijt (eds), Amsterdam, Otto Cramwinckel, 1999, pp. 21–40; Mackaay, Ejan, "L'édition électronique par et pour la communauté scientifique", (1999) 12 *Cahiers de propriété intellectuelle* 159–184.

[32] Merges 1996, *op. cit.*

research grants etc.). Where reputations are established through recognition by one's colleagues, sharing one's papers is a form of early advertising on which one hopes to cash in later. Within the sharing economy, acknowledging one's colleagues' contributions (i.e. respecting their reputation) is very much *de rigueur*. Community norms are designed, here as elsewhere, to allow use of the common resource by all members, while preserving what is scarce, here the reputation of the members. The trade economy, leading to costly borrowing, is a costlier set-up for scientific exchange. Of course, those who have established reputations may well decide they do best through the trade economy and require payment for all of their publications and public appearances.

Conclusion

The calls for a sharing economy and against a trade economy based on intellectual property rights invite us to re-examine the basis for different forms of property rights. One approach is to study the efficiency characteristics of various rules. This leaves in the dark the process through which we discover such rules and then recognise them in law. The approach taken in this paper is that understanding the discovery process is essential and indeed that the nature of that process provides a legitimation for the rights so discovered.

The process relies on interested persons securing control over an object and contracting with others about its use or to transfer it. Control presupposes reasonably effective fences. Basic principles involved are: Build your own fence; no fence, no right; technology solely to cut fences is not allowed. State enforcement is available to prevent outright fraud and violence, not to maintain ineffective fences.

The arrangements worked out in this process of control + contract + stopping leaks can serve to model how the new property right is to be codified in law. The reason for relying on such a process is that it guards us against recognising rights as a result of mere rent seeking. It provides for a decentralised and open-ended way of discovering how the "property rights order" should be extended.

If the discovery process works as suggested here, why codify rights in law at all? For the prospective rights holder, there is a gain in enforcement costs. Legally recognised rights can be enforced, drawing on state judicial and police services. Part of the burden of making one's rights "stick" is shifted to the population at large. This makes such rights more readily knowable and more secure than mere claims based on physical control and contract.

What can be the justification for such a shift, short of abuse of power, arbitrariness or rent-seeking? It must be that the rights to be codified promise viable, long term gains to the population at large beyond the enforcement costs. The promise of gains for all corresponds to the idea of a Pareto gain, which is the

intuition behind the economist's notion of "efficiency". The legitimacy of rights stems from this feature. How to ensure such legitimacy? Public choice should make one wary of mere legislative fiat as a measure of it, given the risk of capture by interest groups. The discovery procedure highlighted in the previous pages not merely reveals the form in which rights should be codified, but at the same time serves to establish their legitimacy. Only legitimate rights should be codified and benefit from public justice and enforcement services. To recognise a sharing or (limited) open access order, a similar safeguard would be apposite. It will not do to recognise an open access order simply because some people have come up with a new "fence cutting" technology. We would like to see the viability of open access orders demonstrated. For some features of existing intellectual property rights, such a test seems plausible enough. Open access to ideas, principles and other elements of the public domain could plausibly result from standard contracts amongst interested persons, preferring easy sharing. Some forms of fair use can be similarly justified by high transaction costs or as necessary implications of contracts. The current trend in the U.S. to grant patents on business methods and software should make us wary of the limits of this argument.

To push the investigation further, we examined several instances of broad-based open-access arrangements for forms of information, such as Java, Linux and sharing amongst scientists. In each case, the sharing arrangement is maintained in the face of options to privatise (i.e. establish individual property rights). In the examples open access arrangements were set up either to establish uniform standards, entailing economies of scale, or amongst people who are now borrowers, now lenders of ideas and for whom easy sharing facilitates creation. Sharing is then an element of establishing one's reputation, a phenomenon akin to advertising. These sharing arrangements are viable side by side with private property arrangements (trade economies). It may be helpful to facilitate their establishment (create standard contracts, provide standard sharing clauses under copyright and other intellectual property rules) and to look at the function of sharing arrangements before condemning them as cartels.

The viability of some sharing arrangements does not, however, justify in my eyes the conclusion that we can do without the incentives of private property rights or discovery logic that comes with exclusive control (fences). Trade economies and share economies have different characteristics as to quality, creativity and cost and may serve different publics for different functions. I see little ground to curtail private rights on the mere argument for an information-rich environment, and a substantial danger that such a call will serve as a cover for rent-seeking and will be detrimental for innovation. It is important to let experience driven by interested persons in the field tell us which type of rights or arrangements we prefer for what purpose.