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GÖDEL'S THEOREM AND THE CASE OF THE INTERNET INFORMATION COMMONS

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1. INTRODUCTION

In 1633 Galileo, then aged 70 years old, was forced under threat of torture by the Catholic Church's Inquisition to renounce his heretical 'belief' that the earth was not the centre of the Universe. In his famous abjuration the great scientist declared:[1]

> I have been judged vehemently suspected of heresy, that is of having held and believed that the Sun is at the centre of the Universe and immovable, and that the Earth is not at the centre and that it moves. Therefore, wishing to remove from the minds of your Eminences and all faithful Christians this vehement suspicion reasonably conceived against me, I abjure with a sincere heart and unfeigned faith these errors and heresies, and I curse and detest them as well as any other error, heresy or sect contrary to the Holy Catholic Church.

Galileo was indeed right to curse his error; the sun, no more than the earth, cannot be said to occupy a central position in the Universe. His crime, however, was to have challenged Ptolemic cosmology, which the Church authorities believed to conform to the Biblical version of creation. With the benefit of three hundred and fifty years of scientific inquiry, it is now easy to take the side of Galileo in this dispute. Yet, at the time in question, the Church's monopoly on knowledge and truth in Western Europe was only beginning to wane. For scientists or thinkers of any description, Church doctrine was not simply a matter of opinion; it was axiomatic of what was permissible as truth. Only when the epistemological foundations of its teachings became overwhelmed by theoretical and empirical proof to the contrary did its stranglehold on truth come to an end.

The reason for recounting Galileo's fate in a paper on copyright and economic theory is to highlight the importance of axioms to all knowledge systems that entail logical propositions. One can cite countless examples from history where complicated theoretical edifices have been constructed only to be later revealed as chimerical. Pure mathematics more so than any other discipline is alive to its own contingency and has long sought to identify the axioms on which it is founded. Bertrand Russell and Alfred Whitehead's *Principa Mathematica* represented a bold attempt to account for the logical premises from which all mathematical propositions flow. Their ambitious project was undermined by the publication in 1931 of Kurt Gödel's 'incompleteness theorem'. Gödel proposed that within any given axiomatic system there exists propositions that are either undecidable or that the axiomatic system is itself

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[1] See P. Redondi, *Galileo Heretic,* (Princeton: Princeton University Press, 1987).

incomplete. Gödel's theorem does not doubt the ability of science to know the world; it merely highlights that the logical edifice that one constructs from any given set of axioms is necessarily qualified by uncertainty. It stresses the importance of recognising new axioms when they appear and of re-formulating logical systems to account for them.

The factual context that has inspired this Paper is 'commons-based information production' that has become a recognisable phenomenon in digitally networked information economies. Examples of it include free software, free peer-reviewed journals, free textbooks and free encyclopaedias.[2] In simple terms, commons-based information production refers to useful information that is produced as a result of events or motivations that are distinct from production that is consequent on reactions to market prices and/or managerial commands.[3] Yochai Benkler describes it in the following terms:[4]

> At the heart of the economic engine of the world's most advanced economies, and in particular in the United States, we are beginning to take notice of a hardy, persistent, and quite amazing phenomenon – a new model of production has taken root, one that should not be there, at least according to the to our most widely held beliefs about economic behaviour.

When a phenomenon emerges that appears to defy the basic premises on which a knowledge system is based one can choose between two courses of action. One can, like the Catholic Church of the 17th century, deny its existence and wait for posterity to prove you wrong. Alternatively, one can re-evaluate and reformulate the present theory to account for the new circumstances. This Paper will argue that copyright economics as an axiomatic system is flawed in two respects. First, it is beset by an internal inconsistency regarding the relationship between the perceived incentive necessary to engage in information production and the reward afforded by copyright protection. Secondly, it falls foul of Gödel's theorem by failing to account for circumstances where the institution of common property emerges in preference to the protection offered by copyright law. In order to resolve both these flaws a deeper understanding of incentives is required.

Part 2 sets out the internally inconsistent feature of copyright economic theory. It will be argued that misconceptions about incentives can lead to the unjustified and economically undesirable enrichment of some information producers. Part 3 deals with the Internet information commons. It provides a definition and general

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[2] E.g. the Free Software Foundations' open source software (http://www.gnu.org); the NAJ Economics Journal (http://www.najecon.org); the Creative Commons initiative (http://www.creativecommons.com); and the Wikipedia encyclopaedia (http://www.wikipedia.com) .

[3] The term 'information' is being used in this Paper to refer to any symbolic representation that is capable of being communicated via the Internet. The term is regrettably coarse, and of course fails to capture the cultural significance of literary and artistic endeavour, nonetheless it functions as a useful shorthand in economic discourse. The related concept – knowledge – will be treated as synonymous with 'information' for the purpose of this Paper. For a more detailed discussion on the semantics of these concepts see F. Machlup & U. Mansfield, *The Study of Information: Interdisciplinary Messages* (New York: Wiley & Sons, 1983).

[4] Y. Benkler, *Coase's Penguin, or, Linux and The Nature of the Firm*, (2002-03) 112 Yale LJ (forthcoming). For a good survey of the economic literature on Open Source Software, see S. Weber, 'The Political Economy of Open Source' (BRIE Working Paper No. 140) at: http://e-conomy.berkeley.edu/publications/wp/wp140.pdf

description of the Internet information commons; it offers an economic rationale for the preference of common property over copyright protection; and considers the dynamics of common information production. Finally Part 4 sets out a principled argument for the institutionalisation of common property alongside the existing copyright regime.

2. AN ANALYSIS OF COPYRIGHT'S AXIOMATIC SYSTEM

2.1 The Utilitarian Framework

The overarching philosophical influence in Anglo-American copyright jurisprudence is Benthamite utilitarianism.[5] The purpose and justification for copyright law under this tradition is the achievement of a goal – the production and diffusion of protected works – through the mechanism of a legal device – the prohibition against copying. In contrast, continental European copyright law is said to have its origins in a concern for author's rights and as such advances the *a priori* interests of the author, rather than any particular conception of the public good.[6] The utilitarian objective can be interpreted in numerous ways; it could, for instance, be taken to mean the production of exceptionally useful or culturally superior works. If such a regime were to be put in place, a hierarchical system for choosing between useful and culturally superior works over inferior ones would be necessary. In practice no explicit discrimination is built into the copyright regime, as virtually all new works automatically qualify for protection. The non-discriminatory nature of copyright law does not however mean that it is 'value-neutral'; on the contrary as a consumer preference aggregating mechanism of financial reward, it promotes the quality of popular appeal over such qualities as diligence and risk-taking in creative endeavour.

Because utilitarianism stresses the importance of a *productive output it* leads one naturally to consider economic issues relevant to the production of information in a market economy. Copyright law in particular lends itself to a welfare economics analysis. [7] Welfare economics internalises the basic principles of utilitarian philosophy, namely that the production and distribution of information is a good in

[5] J. Bentham (J. Burns & H.L.A. Hart (ed.'s)), *Introduction to the Principles of Morals and Legislation* (Oxford: Clarendon Press, 1996) (first published 1789) formulated the principle of utility, which approves of an action insofar as it has a tendency to promote the greatest amount of happiness. Bentham also outlined a felicific calculus for establishing the degree of happiness that is consequent on an action. Scepticism about utilitarianism is widespread, in particular in moral philosophy. This Paper does not defend it as a legitimate basis for copyright protection, but rather seeks to question the coherency of the justifiactory argument. As an overarching 'philosophical' framework for reasons to act it should be contrasted with rights-based and deontological alternatives (R. Dworkin, *Taking Rights Seriously* (Cambridge: Harvard University Press, 1977) identifies 'rights-based', 'duty-based' and 'goals-based' as the three types of reason that can serve political decisions). Bentham only considered copyright in passing though did seem favourably disposed to it – see citation in J. Waldron, 'From Authors to Copiers: Individual Rights and Social Value in Intellectual Property' (1993) 68 Chi-Kent L Rev 841, 866.

[6] See generally B. Sherman A. Strowel, *Of Authors and Origin* (Oxford: Oxford University Press, 1994). This author is of the view that 'rights-based' arguments in favour of copyright protection are to borrow a Benthamite quote 'nonsense upon stilts', however there is no room here to consider that debate.

[7] Not all law and economics scholars support the welfare analysis of intellectual property, e.g. T. Palmer, 'Intellectual Property: A Non-Posnerian Law and Economics Approach' (1989) 12 Hamline L Rev 261, rejects copyright and patent protection on the libertarian argument that they amount to unnecessary government interference in economic affairs.

itself, and attempts to construct an economic model and legal regime that best achieves that goal. Welfare economic analyses are essentially an estimate of how best to balance the goal of producing many information goods against the desire to have them widely distributed. Landes and Posner's classic welfarist analysis of optimal copyright protection concludes that the optimal copyright law will fall short of what would maximise the number of works. [8] In a similar vein Richard Watt has described how a certain amount of piracy is conducive to a maximisation of social welfare.[9]

The starting point of the economic analysis is to recognise the economically significant characteristics of information. They are numerous, though the ones that deserve particular attention are intrinsic non-rivalry and infinite expansibility.[10] A good is non-rival when it can be consumed or used simultaneous by an infinite number of people without there being any possibility of overcrowding;[11] a good is infinitely expansible when its quantity can be multiplied exponentially at negligible cost. A non-economist would likely think these qualities to be a Godsend, implying as they do that there is no limit to consumption opportunities.[12] By way of analogy, if all material goods could be replicated at will, given mankind's present state of development, there would be no obvious necessity for work, markets, money or indeed economists. Thus information stands alone from most other important economic goods: it has a use value but no exchange value.[13]

Turning to market systems of production and exchange; the non-rival, infinite expansibility of information goods means that under the standard Arrow-Debreu equilibrium model these goods will be priced at zero in a perfectly competitive market. This is not only their competitive price it is also the most socially efficient outcome. Again, one would expect there to be a positive reaction to this result: the market delivers a good for free. It is only when one comes to consider *the production of new information* that a problem arises. If the market price of information goods is likely to be zero, according to conventional wisdom, there is a real danger that people won't be sufficiently incentivised to create new information, because they will have no way of obtaining a monetary payment for their effort or investment. Thus, the market generally fails in respect of the production of new information. The introduction of copyright protection is commonly regarded as a welfare-increasing

[8] W. Landes & R. Posner, 'An Economic Analysis of Copyright Law' (1989) 18 J of Legal Studies 325.
[9] R. Watt, *Copyright and Economic Theory: Friends or Foes?* (Cheltenham: Edward Elgar, 2000).
[10] D. Quah, *Digital Goods and the Information Economy* (LSE Working Paper, December 2002) available at: http://econ.lse.ac.uk/staff/dquah, identifies three other economically significant characteristics of information: (a) discreteness, (b) aspatiality, and (c) recombinantness. See also W. Priest, *An Information Framework for the Planning and Design of the 'Information Highways': The Character of Information* (Washington: Office of Technology Assessment Project on Intellectual Property, 1994).
[11] Cornes & Sandler, *Externalities, Public Goods and Club Goods* (Cambridge: Cambridge University Press, 2001) p.8.
[12] The explosion of music file-sharing in Napster type networks indicates that many people do in fact appreciate the non-rival nature of information goods; ignoring the illegality of the activity, these networks prove that a free, efficient distribution of information goods is attainable without the necessity of commercial intermediaries.
[13] It of course acquires an exchange value as a result of copyright protection. One might think that by the same logic material goods also require *de jure* recognition of ownership in order to acquire an exchange value. The matter is not however simply one of legal recognition; material goods can be traded in the absence of legal norms, whereas informational goods cannot.

solution to this problem. It does not *optimise* the efficiency of the market, but rather *increases* its efficiency.

3.2 Internal *Non Sequitur*

The above account is meant as a basic summary of the principles that underpin copyright economics. Focus now turns to assessing the validity of some of the premises on which they are based. There already exists a large body of work that critically analyses the economic soundness of copyright protection.[14] The tradition of copyright scepticism can be dated to Arnold Plant's article in 1934[15] and it is continued to this day by authors such as James Boyle and Lawrence Lessig.[16] This Paper will not traverse already well-trodden ground, but will instead point to an overlooked flaw in the standard welfare economic analysis of optimal copyright protection, namely, that there is a logical correlation between the *ex ante* incentive necessary to engage in information production and the *ex post* reward that arises by virtue of copyright protection.

In the standard economic model, it is assumed that an author requires an incentive in order to engage in information production. It is further assumed that conferring the exclusive legal right on the author to control distribution of copies of an information good provides the author with the said incentive. Finally by so providing an author with a copyright incentive it is assumed that the goal of producing and distributing new information will have been achieved. The *non sequitur* occurs when one moves from the proposition that an information producer requires an incentive to engage in information production to the proposition that copyright protection provides that incentive. The following example illustrates why:

> **Scenario 1**
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> Assume musician (A) is a composer of love songs that have the potential for wide popular appeal, but their composition does not require any great musical skill or effort. In *the absence of copyright protection* if A were commissioned to compose a work by a well-meaning benefactor he/she would demand a payment of $5000. This is the *ex ante* incentive necessary for A to engage in musical production. Assume musician (B) is a composer of symphonic music, which has a small 'elite' following, and that B's talents are rare and that the effort required for B to produce a symphony is great. In the absence of copyright protection if B were commissioned to compose a work by a well-meaning benefactor B would require a payment of $20,000. Again this is B's *ex ante* incentive. It will be noted that in the absence of copyright protection,

[14] See generally, G. Hadfield, 'The Economics of Copyright: An Historical Perspective' published in R. Towse & R. Holzhauer, *The Economics of Intellectual Property* (Vol. 1) (Cheltenham: Edward Elgar, 2002)

[15] A. Plant, 'The Economic Aspects of Copyright in Books' (1934) 1 *Economica* 167-195. The other well-known critiques include R. Hurt & R. Schuchman, 'The Economic Rationale of Copyright' (1966) 56 *American Economic Review* 421; and S. Breyer, 'The Uneasy Case for Copyright: A Study of Copyright in Books, Photocopies and Computer Programmes' (1970) Harvard Law Rev 84.

[16] J. Boyle, *Shaman, Software and Spleens* (Cambridge MA: Harvard University Press, 1996); L. Lessig, *The Future of Ideas* (New York: Random House, 2001).

the incentive to engage in musical production is analogous to the incentive required for any service provider to engage in economic activity.[17]

Scenario 2

In this scenario, copyright protection is present but there are no benevolent commissioners prepared to contract for music creation. Assume that musician A's song is very popular and that he/she sells 100,000 copies at a monopoly price of $10 each. Accordingly A will receive $1 million from the sale of his/her song. Assume that B's song appeals to only an elite few and that he/she sells 500 copies at a monopoly price of $20 each; B will therefore receive $10,000 from the sale of his/her symphony.[18] Thus the net result is that A will receive a benefit that far exceeds his/her *ex ante* incentive; whereas B will receive a benefit that falls short of his/her *ex ante* incentive.

Scenario 1 describes a situation that is analogous to *information service provision*. This economic model is common where information products are not susceptible to trade as commodities (e.g. bespoke software provision). The assumption that benevolent commissioners are present in relation to non-rival *information goods* is merely a device and is not intended as a reflection on real world situations. The purpose of Scenario 1 is to show that the incentive needed to engage in the production of information goods is an *ex ante* matter, whether or not it can be satisfied is a separate issue. In the absence of copyright protection, and assuming the presence of a sufficient number of benevolent commissioners, the incentive necessary for a person to engage in productive activity will be the sum reckoned by the composer him/herself. There is no reason to believe that high levels of demand for a composer's music, under these conditions, will appreciably raise the sum he can expect, on the assumption that there is no incentive for competing commissioners to raise their bids beyond the musician's own minimum 'get out of bed' requirement. The net result is that the 'true' *ex ante* incentive for information production is determinable by reference to a composer's subjective calculations and not expected demand. The incentive will vary according to the composer's own circumstances and will include such matters as any capital costs that must be incurred as well as the earning opportunities available to the producer in other occupations.

Scenario 2 describes what may be termed the 'copyright incentive'. It is the aggregate of consumer demand times a monopoly price; it is in fact an *ex post* reward. Under conventional economic analyses the copyright incentive is treated as being equivalent to the *ex ante* incentive.[19] This assumption, it is submitted, is simply wrong. The

[17]M. Boldrin & D. Levine, 'The Case Against Intellectual Property' (2002) 92 *American Economic Review*, 209-212 develop a contract model for the purpose of showing how information production can occur in the absence of intellectual property protection.

[18] It is assumed that there will not be a great divergence between the monopoly price of a popular composition and a symphonic one on the basis that the consumers of each will have a similar pricing threshold.

[19] E.g. W. Landes & R. Posner, (*supra* note X), begin by assuming that the author's cost of expression (e) (defined as 'the author's time and effort plus the cost to the publisher of soliciting and editing the manuscript and setting it in type') is independent of the number of copies distributed. However their model proceeds on the basis that the supply of new works (N) is determined by reference to the author's gross profit (R), which is calculated by reference to the revenue accrued from selling copies minus the cost of making those copies, or (p – c)x. Accordingly, they postulate that N will increase as

proposition that a creator requires an incentive in order to engage in information production is logically prior to the decision to implement a copyright regime, because that course of action is contingent on their being a need to incentivise information producers in the first place. To claim that the creator's incentive is equal to the reward obtainable as a result of copyright protection is therefore a tautology. It is assumed that there must be some measure of an information producer's incentive that is independent of the reward he/she obtains as a result of copyright protection. In Scenario 1, it was suggested that this sum is analogous to what an information service provider can expect. It is accepted that in certain cases the copyright incentive and the *ex ante* incentive will be the same, however, it is unlikely that this will often be the case. The more likely result is that either (i) the copyright incentive will fall short of the *ex ante* incentive, as with musician B or (ii) the copyright incentive will exceed the *ex ante* incentive, as with musician A. An economist may conclude that in respect of musician B the best result has been achieved, as if he/she cannot raise the requisite income with the advantage of a legally enforced monopoly, he/she should choose some other occupation. A's success, is however, impossible to defend; the difference between the *ex ante* incentive and the copyright incentive (i.e. $995,000 in the above example) is a dead weight transfer of consumer surplus that could, in the absence of monopoly pricing, be put to more socially efficient uses.

The significance of the combined effect of information's non-rival nature, the likelihood of homogenised consumer preferences and the grant of copyright protection cannot be overemphasised. Together they permit the producer of a popular information good to acquire an economic benefit that closer resembles a lottery winner's bonanza than what can be expected to arise as a result of market forces. To take an extreme example, the rights to the most widely sung tune in the English language, 'Happy Birthday to You', composed in 1893, were sold in 1998 for a reported $25 million and continue to earn royalties of about $2 million per annum for its present owner AOL Time Warner.[20] It is difficult to fathom how the incentive argument can justify such an outcome. The popularity of this song can be attributed to fortuitous circumstances that are entirely unrelated to the incentive to engage in creative activity, e.g. the fact that everyone has a birthday, cultural 'network effects' and the growth of communication technologies and the mass media. Copyright protection, however, enables the copyright owner to internalise a percentage of all these benefits, irrespective of their connection to the author's original contribution.

Economic models that equate the copyright incentive with the *ex ante* incentive are beset by logical difficulties. The literature on price discrimination is of particular note in this regard. Proponents of price discrimination argue that by enabling copyright owners to extract a greater amount of a work's social value, higher levels of investment into copyright dependent industries will be attracted and consequently more socially useful works will be created.[21] Despite the superficial appeal of this

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R increases and justify increases in copyright protection (z) up to whatever level of N that is not negatively affected by the increase in z. By implication they end up defining incentive in terms of the profits arising from copyright protection rather than in terms of the *ex ante* cost of expression.

[20] The original version entitled, 'Good Morning to You' was composed by two Kentucky sisters, Patsy and Mildred Hill. The lyrics were revamped in 1924 by Robert Coleman and were popularised by the Irving Berlin musical, *As Thousands Cheer*. See http://www.snopes.com/music/songs/birthday.htm

[21] E.g. W. Fisher, 'Property and Contract on the Internet' (1998) 73 Chi-Kent L Rev 1367; and W. Gordon, 'Intellectual Property as Price Discrimination: Implications for Contract' (1998) 73 Chi-Kent L Rev 1367.

rationale, the likely net effect of price discrimination is that an information producer like A in the example above, who is already incentivised beyond what is economically justified, will be in a position to accumulate even more consumer surplus. There may be a few marginal cases where the increased income will incentivise production, however, the likelihood is that price discrimination will simply enrich producers of already profitable works and thus have no appreciable effect on dynamic efficiency.[22]

Thus there is, it is submitted, a fundamental conceit running through copyright economics: copyright protection is assumed to provide creators with an incentive to engage in economic production, but in truth there is no logical correlation between *ex ante* incentives and *ex post* rewards. The former is endogenous to the individual creator whereas the latter is a function of consumer preferences. It is fair to say therefore that there is a strong likelihood that producers of popular information goods in a global market place where there are millions of potential consumers are incentivised far beyond what is economically justified.[23] Furthermore, it would seem that statistics which point to increased expenditure on copyrighted works as evidence of the growing economic significance of those industries may be recording an increase in dead-weight transfers of consumer surplus rather than any real economic growth.[24]

If this author's conclusions are correct, the economic justification for copyright protection is seriously undermined. Any government regulation that seeks to remedy a market ill is liable to miss its target. The problem is not that copyright protection does not create an incentive for information producers; that is hardly in doubt. Rather the incentive that it provides is random and unrelated to any informed notion of what a creator requires to engage in productive activity. Viewed from this light, copyright protection not only over-rewards certain information producers, but can also be seen to distort the market dynamic in damaging ways. For instance, evidence suggests that

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[22] Price discrimination is only feasible when the seller has market power, which in respect of copyright works is likely to be those producers that are already sufficiently incentivised by copyright protection. A number of commentators have expressed similar concerns about the effect of price discrimination in copyright industries. M. Meuerer, 'Copyright Law and Price Discrimination' (2001) 23 Cardozo L Rev 55, 90-102, discussing the effect of price discrimination on the distribution of surplus, incentives to engage in production, diffusion of copyright works and rent-seeking activities. J. Boyle, 'Cruel, Mean or Lavish? Economic Analysis, Price Discrimination and Digital Intellectual Property' (2000) 53 Vanderbilt L Rev 2007, 2025 analyses the effects of price discrimination in terms of distributional outcomes and concludes that 'Either perfect competition, or monopoly with perfect price discrimination will produce an optimal economic outcome. The differences are distributional. Perfect competition moves consumer surplus to the pockets of consumers. Monopoly coupled with perfect price discrimination moves the surplus to the pockets of the producer'.

[23] In opposition to this assertion one might invoke the Hayekian analysis of prices as efficient conveyors of information regarding the optimal allocation of economic resources (F. Hayek, 'The Use of Knowledge in Society' (1945) 35 *American Economic Review* 519), i.e. they signal to intellectual workers whether or not their efforts are being but to uses that society views as useful. It is unlikely that Hayek, bearing in mind his views on intellectual property, would have supported this argument. First, copyright protection by definition prevents the competitive price system operating, and therefore is likely to be an unreliable conveyor of information regarding resource allocation. Secondly, a 'hit list' could provide the same information at a fraction of the cost.

[24] According to figures published by the International Intellectual Property Alliance in 2001 copyright industries contributed a total of $791 billion to the US economy which constituted 7.75% of GDP. Interestingly, they accounted for only 3.5% of the U.S. workforce. See S. Siwek, *Copyright Industries in the US Economy: The 2002 Report* (International Intellectual Property Alliance, 2002).

the remote prospect of exceptional wealth in the entertainment industries has resulted in an oversupply of labour to it.[25]

It takes no great genius to point to flaws in a property solution to the provision of public goods. Most economic writings, including ones that support strong copyright protection, acknowledge that copyright is a second best solution to market failure, but argue that it is preferable to a publicly financed or law of the jungle alternatives. There can be no doubt that the copyright reward results in the production of information goods and that many industries are dependent on it as their principal source of income. For that reason alone it is incumbent on sceptics of copyright protection to point to workable alternatives. Nevertheless, from the perspective of political economy the copyright solution cannot be favoured in the long term as the dominant model for provisioning information goods and distributing surplus. In market economies based on material production the 'invisible hand' is said to promote the general good even though each individual pursues his own interests. In copyright economies based on immaterial production, that very corrective mechanism - the competitive price system - is prevented from functioning.[26] The next section explores the emergence of a phenomenon that suggests that a partial solution may be taking shape in digitally networked economies.

3. THE CASE OF THE INTERNET INFORMATION COMMONS

3.1 On Common Property

The term 'commons' raises rich but ambiguous historical suggestions. Possibly the oldest use of the term is in political philosophy where it denotes a pre-historical or Utopian model for holding material resources. In Plato's *Republic* all property is held in common [27] and in John Locke's, *Two Treatises of Government*, common ownership is taken to be the state of nature prior to individual appropriation.[28] In 19th and 20th Century political philosophy, common ownership was most closely associated with left libertarianism.[29] In more recent times common property has become synonymous with 'tragedy' because of the supposed risk of over-appropriation when pastures, fishery resources and the like are held in common.[30] To some common property

[25] See R. Towse, *Economics of Artist's Labour Markets* (London: Arts Council of England, 1996).
[26] J. B. de Long & M. Froomkin, 'Speculative Economics for Tomorrow's Economy' in B. Kahin & H. Varian *Internet Publishing and Beyond: The Economics of Digital Information and Intellectual Property* (Cambridge MA: MIT Press, 2000) eloquently discuss the macrofoundational implications of intellectual property based economies.
[27] See K. Eden, 'Friends Hold All Things in Common: Tradition, Intellectual Property, and the Adages of Erasmus' (Yale University Press, 2001) for an anthology of classical and Medieval attitudes to literary property.
[28] J. Locke (P. Laslett ed.), *Two Treatises of Civil Government* (Cambridge: Cambridge University Press, 1988) (first published 1690) Chapt. V, Bk. II. See P. Drahos, *A Philosophy of Intellectual Property* (Aldershot: Dartmouth, 1996), Chapt. 3, for a critical assessment of Locke's labour theory as applied to intellectual property.
[29] The well known exclamation 'Property is Theft!' was coined by French left-libertarian Pierre Joseph Proudhon (B. Tucker (trans.)), *What is Property?* (New York: Dover Publications, 1970) in his essay advocating common property ownership. The influence of this tradition is echoed in some writings on the information commons, e.g. E. Moglen, 'Anarchism Triumphant: Free Software and the Death of Copyright', (1999) *First Monday*, at: http://emoglen.law.columbia.edu/my_pubs/anarchism.html
[30] G. Hardin, 'The Tragedy of the Commons' (1968) *Science* 162.

represents the noblest of human ambitions, whereas to others it is a naïve and ultimately regressive form of economic organisation. The conventional perspectives on common property are, however, concerned with scarce material resources; the non-rival nature of information may demand a radical reappraisal of the concept's utility.

A number of definitions of the 'commons' in the context of the Internet have already been offered. Lawrence Lessig has suggested that the essence of the term is 'that no one exercises the core of a property right with respect to these resources – the exclusive right to decide whether the resource is made available to others.'[31] Yochai Benkler offers a more comprehensive definition: 'The 'commons' refers to institutional devices that entail the government abstention from designating anyone as having primary decision-making power over use of a resource.'[32] David Bollier, states that the commons includes, 'tangible assets such as public forests and minerals, intangible assets such as copyrights and patents, critical infrastructure such as the Internet and government research, and cultural resources such as broadcast airwaves and public spaces.'[33]

Clearly the concept is capable of connoting numerous related meanings; and at first blush it would seem to bear a close resemblance to public (state owned) property. It is perhaps best explained in terms of analytical jurisprudence. Three prototype property institutions are recognised under the law – private, public and common property.[34] In every modern state, irrespective of its political and economic constitution, each of these models for holding resources of economic value co-exist to one degree or another. What distinguishes them is the question of who (if anyone) has the *de jure* authority to make decisions regarding access to and use of a resource; it may be a private individual or legal entity, a state official, or no specific individual or entity at all. Private property refers to a state of affairs where one or more individuals or a private legal entity is recognised under the law as having a right to exclude all others from access to and use of a given object. Similarly public property refers to the situation where the state, or one of its agencies, is recognised under the law as having the right to exclude others from access to and use of a given object.[35] In respect of each, the non-owning population is under a correlative legal duty not to interfere with the designated owner's exclusive right.[36] The essence of ownership, whether it be the public or private variety, is legally authorised and enforceable exclusion. In common law jurisdictions the law generally refrains from mandating what an owner must do or not do with a given resource; its principal role is to carve out a sphere of exclusive influence and power.

It would be misleading of course to imply that public property is in all respects logically equivalent to private property. Normatively the two are similar; where they differ is in terms of how individual and collectivist social rules can guide decisions

[31] L. Lessig (*supra* note 16) p. 20.
[32] Y. Benkler, 'The Commons as a Neglected Factor of Information Policy', presented at Telecommunications Policy Research Conference, September 1998: http://www.law.nyu.edu/benklery/commons.pdf
[33] D. Bollier, *Public Assets, Private Profits: Reclaiming the American Commons in the Age of Market Enclosure* (Washington DC: New American Foundation, 2001).
[34] J. Waldron, *The Right to Private Property* (Oxford: Clarendon Press, 1988)
[35] See J. Harris, 'Private and Non-Private Property: What is the Difference?' (1995) 111 LQ Rev 421.
[36] The account of property institutions provided herein is a simplified rights-based or Hohfeldian-type description. See, J. Penner, *The Idea of Property in Law* (Oxford: Clarendon Press, 1997).

regarding the use and allocation of a resource. When a private individual is recognised as owner he is entitled (though not obliged) to use that object so as to maximise his own well being. When a state body owns property, it is expected or prescribed that public officials will make decisions regarding the use and allocation of material benefits that advance collective rather than individual interests.[37] The question of what constitutes the collective interest and whether public officials are actually guided by it is another matter.

In modern states most assets of economic value are held as either public or private property. Common property is in a sense their Cinderella relation, having been largely overlooked during the political conflicts of the 20th Century. In its purest form, it is a negative legal concept. It entails a situation where no specific individual or entity is recognised under the law as having a right to exclude others from access to and use of a given resource. Thus when a resource is held as common property everyone has an equal privilege to use it and likewise no-one is under a duty to anyone else (including the state) regarding how they may take actions or decisions that involve that resource. One can take the position that a resource, which is subject to a common regulatory standard (e.g. on environmental harm) remains common property provided that the regulatory standard applies to everyone in a non-discriminatory fashion. Examples of resources that are held as common property include atmospheric gases, open seas, sunlight and natural languages. No legal norm exists that purports to restrict access to or use of these resources (subject to the qualification that non-discriminatory limitations may restrict the activities of all).[38]

The defining feature of common property is an absence of exclusive legally recognised control. The shared characteristic of the material resources that are nowadays held in common is that they are in such abundance as not to require a regulated system of allocation. For instance in open spaces any one individual's consumption of air does not affect the consumption opportunities of others (though pollution may). Public highways and parks are an anomalous category; generally access to them is non-discriminatory and they therefore resemble somewhat common property. Ownership of them, however, normally vests in a public authority and that authority will have a right, *qua* property owner, to restrict uses that it deems inappropriate (e.g. felling trees in a park); strictly speaking they are therefore best viewed as instances of public property.

The list of material resources that are held in common, though important, is relatively compact. In contrast, the list of immaterial, ideational resources that are held in common is vast and of incalculable economic value. Mankind's shared linguistic traditions, mathematical and scientific knowledge, organisational and institutional concepts and cultural heritage are the very foundations of material prosperity, yet they are not, nor have they ever been, held other than as common property. The application of property norms to intellectual creations and forms is a relatively recent historical

[37] See C. MacPherson, "The Meaning of Property" in C. MacPherson (ed.) *Property: Mainstream and Critical Positions* (Oxford: Blackwell, 1978) p 5-6.

[38] Roman law explicitly recognised two categories of things that belonged to no one – *res nullius* and *res communes*. *Res nullius* were things that remain in common until appropriated by an individual, e.g. fish and wild animals. *Res communes* referred to a category of resources that could not *by their nature* be capable of individual appropriation. See C. Rose, 'Romans, Roads, and Romantic Creators: Traditions of Public Property in the Information Age' presented at Duke Conference on the Public Domain, 9-11th November 2001.

occurrence and is best regarded as the exception rather than the rule. While economic theory may teach the contrary, cultural and scientific creativity has been taking place throughout recorded history in the absence of protection from copyright and patent laws. One might say that inasmuch as fish swim and birds sing, mankind thinks.

So, the information commons, in the widest sense, includes all ideational creations to which access and use is non-exclusive. Copyrighted information in contrast is a category of private property: the copyright owner has the legal right to exclude others from access to and use of protected works. However, copyright protection is by no means an absolute form of private property. The copyright regime explicitly recognises a public domain in respect of works protected by copyright law.[39] The idea/expression dichotomy, the uncopyrightable nature of certain ideational creations, e.g. facts under US law and the fair use/dealing exceptions are all instances of where the copyright regime has institutionalised partial common ownership of ideational creations. Furthermore the limited duration of copyright protection means that all privately owned copyright works are ultimately destined for common ownership.[40] It is a near certainty that all information in the world which is held as common property is of greater economic value and significance than privately owned information; however because the latter is susceptible to monetisation and measure, it tends to take centre stage in economic texts.

3.2 Defining the Internet Information Commons

To claim that the Internet is just another form of communication would shock the average technophile or cyberfuturist. From the prosaic perspective of property theory it is however true. Digital content, as is the case with any other informational object, communicated via the Internet, can be held as private, public or common property. The news and financial information contained on the *Wall Street Journal's* website is private property; the legislative material made available through Her Majesty's Stationery Office website is public property of the Crown;[41] and the public domain books published by Project Guthenberg are common property.[42] In legal theory it can be said that *plus ça change, plus ça la même chose*.

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[39] The term 'public domain' is at times used interchangeably with the term 'commons'. In this Paper 'information commons' is taken to refer to the broadest set of ideational creations and forms that are free from proprietary norms; the term 'public domain' has a particularly close connection with the copyright regime and will therefore be understood in this Paper to refer to the ideational creations or the aspects of them that are explicitly recognised under copyright law as being held in common; 'public domain' is therefore a subset of the 'information commons'. On the 'public domain', see D. Lange, 'Recognising the Public Domain', (1981) 44 L. & Contemporary Problems 147; J. Litman, 'The Public Domain' (1990) 39 Emory LJ 965; and E. Samuels, 'The Public Domain in Copyright Law' (1993) 41 J of Copyright Office Society 137.

[40] See P. Samuelson, 'Digital Information, Digital Networks and the Public Domain' presented at Duke Conference on the Public Domain, 9-11 November 2001, for a complete mapping of copyright's public domain.

[41] In the United Kingdom Crown or Parliamentary copyright subsist in most works created by public officials and employees in the course of their duties (s 163-167 of the Copyright Patents and Designs Act 1988). In contrast, under s 105 of the US Copyright Act 1976 federally produced works are precluded from copyright protection. Information that is published by the US Federal Government is therefore automatically a part of the information commons.

[42] Project Guthenberg is located at: http://promo.net/pg.

Most digital content communicated via the Internet is protected under copyright law irrespective of its nature or economic value. So minimal are the criteria for qualification as a copyright work that everything from the most profane email to *Encyclopaedia Britannica* are under the eyes of the law private property. Even Open Source Software projects are strictly speaking private property, held as they are under a licence that asserts the rights conferred by copyright law. If the Internet is awash with private property what then is the relevance of the 'information commons' concept? To understand its significance in the context of the Internet requires one to recognise the divergence that is emerging between the *de jure* state of privately owned information and the *de facto* reality that individuals and legal entities are, both expressly and by implication, abandoning the private property rights conferred on them by law over information that they create.

The Internet information commons is being understood in this Paper to refer to any instance where an individual, group or legal entity, either expressly or by implication, creates and makes available information via the Internet without asserting a legal right to exclude others from access to or further use of that information. Information that is made available in this fashion can be classified as *de facto* common property. Software that is released under the GNU/GPL public licence or creative works licensed pursuant to the Creative Commons licences are the best examples of where creators have expressly abandoned their property rights. The implicit cases are more difficult to discern; however it does not take a great stretch of the imagination to classify the abundant information made available by *inter alia* non-governmental organisations, think-tanks, university professors, hobbyists and webloggers as examples of where property rights over information, for all practical purposes, have been abandoned. Anyone who uses the Google search engine for research purposes will appreciate the vast quantities of useful information that is made available free of charge and without limiting conditions on its re-use.

One might ask - Is their any difference between people giving away information that they 'own' and other acts of altruism that are common in every day life? Yes. First, a gift of physical property will, by virtue of its rival nature, benefit at most a defined group of individuals; in contrast, the placing of information into the commons potentially benefits everyone with a connection to the Internet. Secondly, there are cases where opting for common property over private property can benefit economically both the donor and donee of information; a gift of physical property on the other hand is a unilateral transfer of wealth. Thirdly, common property gives rise to a *sui generis* productive dynamic distinct from market and state organised production, whereas gifts of physical objects normally take place within the parameters of those productive paradigms. Finally, the act of donating a physical object does not alter its exchange value; in contrast, a donation of information to the commons by definition destroys its exchange value (though not its use value), and thus removes it from the economic calculus.

The author accepts that the rather vague definition above is not wholly satisfactory; however the reason for this vagueness lies not in the actions and intentions of information producers and users, but rather the institutional design of the copyright system. Under copyright law virtually every original symbolic representation (i.e. sounds, images and textual expressions that are not copies) that is reduced to a material form is, by operation of law, an item of private property. A small quantity of

information may actually be in need of the copyright incentive, yet the entire expressive output of society is conferred with the dubious accolade of proprietary protection. Prior to the Internet, this may not have been have been an issue of obvious concern because the channels for communicating and distributing information goods were scarce and controlled by either state or commercial operators. Now that access to a mass audience has in itself ceased to be a scarce resource, the opportunity for non-commercial information producers to communicate and distribute their content on the same terms as state and commercial actors has become a reality. For this category of information producers copyright protection is often neither necessary nor desirable. It is not necessary because they are not in need of an incentive and it is not desirable because *de jure* private ownership of a *de facto* common resource gives rise to uncertainty in respect of both producers and user's legal rights. It is not surprising therefore that *de facto* common information property has emerged as an important (if not dominant) ownership form on the Internet.

3.3 The Incentive to Engage in Information Production: The Case for Common Property

So far an attempt has been made to describe the nature of the information commons in the language of legal theory. Focus now turns to economic issues. The idea that wide scale production of valuable goods can take place outside of the parameters of market or state organised production is likely to be scoffed at by economists of both the right and left. Certainly, no one but the most romantic would suggest that an entire economy could function on this basis. However few economists believe that all economic functions can be performed exclusively by the state or the market. Furthermore the so-called 'third sector', i.e. charitable, religious and voluntary organisations, plays an increasingly important role, in terms of net contribution, in modern economies. The instrumental vision of a 'mixed economy' sees a role for market, state and the third sector according to which institutional form is best suited to providing the good or service in question.

The core assumption or postulate of economic theory as applied to copyright is that a monetary incentive is a *sine qua non* of information production. In section 2.2 it was shown that there is no logical connection between the *ex ante* incentive needed to engage in information production and the *ex post* reward that is granted by copyright protection. So, even if one agrees about the necessity for an incentive it seems that copyright protection fails to deliver on its own promises. The strained relationship between incentive theory and copyright protection is however more profound than this logical inconsistency. There are, it is submitted, two broad categories of information production for which the copyright incentive is an irrelevance: (a) information production that is financed notwithstanding the potential for acquiring copyright royalty income; and (b) information production that occurs for the purpose of non-monetary/indirect appropriational gains.

The first category includes state organised information production and certain third sector and private enterprise financed information goods. In terms of economic theory there is nothing exceptional about these production models; they are being discussed in this section in order to highlight the wide range of cases where common property should, as a matter of principle and public policy, be adopted as the preferred ownership form.

State organised information production can regarded as an alternative Pigovian solution to the appropriation problem that arises as a result of market failure in relation to informational goods. Paul David, the economic historian, has described how three institutional devices have been traditionally employed to encourage the provision of scientific and technological knowledge, what he terms the three 'P's': public patronage, state procurement (or production) and intellectual property.[43] Public patronage refers to when the state awards public funding or prizes to independent information producers in return for the disclosure of their findings. It characterises the institutional model associated with academic research in developed Western countries; information producers in these institutions are generally provided with the economic freedom to pursue their own research agendas, as such they do not in addition require a copyright incentive. State procurement refers to when the state contracts a specific individual or organisation to produce knowledge in accordance with specifications laid down by state officials, e.g. military research. The first two 'P's' are examples of government financed information production, whereas the third P – intellectual property – is a market solution to market failure. David argues that none of them on their own solves the appropriation problem but that a carefully balanced combination of each produces the best results.[44]

In relation to the third sector, many charitable and non-profit organisations directly subsidise information production through the award of grants, scholarships and the like. Even though third sector financed producers normally retain the copyright in their works; such protection cannot be said to be because of the need to incentivise the beneficiary of the grant or award. Finally, in the private sector there are many instances where the information goods produced by business are a 'spin off' of their principal economic activity, e.g. betting information about sporting events produced by bookmakers in the course of their trade. Where one can show that a business would produce an information good irrespective of the potential for receiving copyright royalty income, the incentive justification for copyright protection cannot be invoked. The causal connection between incentive and production will not have been established. All these cases are examples of where, because of the absence of the provisioning problem, there is no economic justification for the application of property norms. Accordingly, the optimal socially efficient outcome in respect of each will be to deny copyright protection. In practical terms, because copyright protection rather than an absence of copyright protection is the default position in Berne Convention countries, there may be difficulty in fully implementing this policy in a legislative instrument.

The first category of information goods that falls outside of copyright's productive paradigm can be explained in conventional economic terms. They are simply instances where alternative direct financing mechanisms have been used in order to pay for the labour and capital costs that are associated with information production. While the Internet is a means by which to diffuse these goods in an efficient manner,

[43] P. David, 'Knowledge, Property and the Systems Dynamics of Technological Change' in L. Summers and S. Shah (ed's) *World Bank Economic Review* (Washington, DC: International Bank for Reconstruction and Development, 1993)

[44] See P. David, 'The Digital Technology Boomerang: New Intellectual Property Rights Threaten Global 'Open Science', presented at World Bank ABCDE (Europe) Conference, 27 June 2000, available at:

it does not raise any special or novel considerations regarding their financing and production. The production of the second category of information goods can however be explained by reference to the unique communicative and organisational opportunities that have arisen directly as a consequence of the Internet.

Into the second category falls all unsubsidised information goods that are produced and published via the Internet by individuals and groups without concern for the potential royalty income that can be obtained through copyright protection. It includes all voluntary, unpaid information production that takes place through the medium of the Internet, e.g. Open Source Software projects, volunteer supported magazines and news sites, and freely distributed music and literature.[45] At first glance information production of this nature appears to defy economic predictions because it takes place without the benefit of direct financial assistance or the expectation of future monetary reward. Volunteers may actually make a net loss by participating in such activities. However, economic predictions that insist on the necessity of a financial incentive forget that the copyright system is a far from perfect means for delivering that promise. In reality copyright protection significantly rewards only a small percentage of the overall expressive output of society. Furthermore copyright protection can work against other important objectives of an information producer, e.g. the desire to reach the widest possible audience. An information producer may be prepared to trade off a royalty income in exchange for these advantages. The incentive to engage in the production of information goods outside of the copyright productive paradigm need not be seen as a total mystery once one recognises the shortcomings of the copyright regime. The following table lists *some* of the factors an information producer faces in deciding whether to chose copyright protection over common property:

(1) Copyright Benefits (B_1)	**(2) Copyright Costs (C_1)**	**(3) Commons Benefits (B_2)**	**(4) Commons Costs (C_2)**
Money	Loss of Potential Audience	Non-monetary Gains	Unrewarded Labour and Capital
Capital Investment /Advertising Opportunities	Transaction Costs	Indirect Appropriation Gains	Opportunity Losses
Non-monetary Gains	Possible Efficiency Losses	Low Transaction Costs	Disincentive of Free Riding
Indirect Appropriation Gains		Possible Efficiency Gains	

Table 1

Column (1) lists the potential benefits (B_1) that can accrue to an information producer who decides to avail of the protection afforded by copyright law. The most obvious benefits are monetary in nature, though these are contingent on a high level of consumer demand. Furthermore the owner of a successful copyrighted information good will be able to afford to promote the good and in turn stimulate demand and thus increase the overall royalty income. The creator of a copyright work can also benefit

[45] Y. Benkler (*supra* note 4) discusses a number of case studies.

from non-monetary gains (e.g. creative pleasure) and indirect appropriation (e.g. reputation enhancement) gains (I_1). It is likely that there will be a direct relationship between the monetary reward and I_1, i.e. the fact of monetary success is likely to magnify the indirect gains that accrue to an information producer; this is especially true of the entertainment industries. Column (2) lists the potential costs (C_1) that an individual may incur if he/she decides to avail of the protection offered by copyright law. The only direct financial costs are transactional; however these may be considerable and can include legal, accounting and financial planning charges. In the Internet environment they may also include the expense of implementing Digital Rights Management (DRM) technology. Furthermore the fear of Internet piracy may result in producers putting in place cumbersome and onerous licensing arrangements that ultimately deter consumers. The loss of audience is listed as a cost; because (ignoring perfect price discrimination) it is assumed that the monopoly rents and transaction costs factored into the price of a copyrighted work will necessarily lower the potential consumption. The possible efficiency losses refer to the informational and efficiency costs that may arise as a consequence of organising group information production within a market/firm structure (see section 3.4 below).

Column (3) lists the potential benefits (B_2) that can accrue to an information producer who decides to abandon the protection afforded by copyright law. The two positive benefits are non-monetary and indirect appropriation gains that can accrue to the producer of an information good (I_2). The basic assumption here is that I_1 does not normally equal I_2 and furthermore there are cases where $I_2 > I_1$. There may be some overlap between the two measures of non-monetary/indirect appropriation gains, however, at an intuitive level it seems likely that the motivations and pleasures associated with voluntary activity are largely distinct from those associated with commercial activity.[46] It is true that the nature of volunteer motivations are difficult to estimate and measure, though there can be no doubt they can have a powerful influence on individuals.[47] They include the self-serving desire to fill one's resume, the spin-off benefits from the information good itself and the serendipitous pleasure of intellectual discovery; the important thing is that they exist. The other two benefits attributed to common property are relational, i.e. they are the savings that one makes from not having availed of copyright protection. Column (4) lists the potential costs (C_2) that an individual may incur if he/she decides to engage in common information production. The financial costs include both any sunk costs invested by the information producer as well as opportunity losses. The disincentivising effect of seeing others gain financially from one's efforts has also been included as this may deter some individuals from partaking in commons-based information production.

A standard economic model will only take into account the cost/benefit analysis associated with Columns (1) and (2). It will predict that a rational information producer will only engage in information production where the gains from copyright protection outweigh the costs associated with it, i.e. where $B_1 > C_1$. If one expands

[46] Y. Benkler (*supra* note 4) makes a useful analogy with the different motivations for engaging in sexual intercourse: (a) the prostitution fee, i.e. a monetary incentive; (b) the orgasm, i.e. the 'hedonic' incentive; and (c) love, i.e. the 'socio-psychological' incentive. Each incentive can on its own or in combination result in the very same activity occurring, though there are cases where the presence of one incentive (e.g. love) will preclude the presence of another incentive (e.g. monetary).

[47] J. Lerner and J. Tirole, 'Some Simple Economics of Open Source' (2002) J of Industrial Economics 197 provide a good account of the different motivations that drive skilled computer programmers to volunteer in open-source projects.

the range of possible decisions to include the possibility of engaging in commons-based information production a very different picture emerges. Four scenarios may arise: (a) $B_1 > C_1$ and $B_1 > B_2$: copyright protection will only be chosen when both the benefits of copyright protection outweigh the costs *and* when the benefits of copyright protection outweigh the benefits of common property; (b) $B_1 > C_1$ but $B_1 < B_2 > C_2$: when the benefits of copyright protection outweigh its costs but are less than the benefits that can arise through common property, the common property option will be chosen; (c) $B_1 < C_1$ but $B_2 > C_2$: when the benefits of copyright protection are outweighed by its costs but the benefits of common property outweigh its costs, common property will be chosen; and (d) $B_1 < C_1$ and $B_2 < C_2$: when both the benefits of copyright protection and common property are outweighed by each other's respective costs, neither will be chosen.

Thus common property will be chosen not only when implementing copyright protection proves too expensive, but also when the common property option offers greater advantages (whatever they may be) to the information producer than the copyright protection alternative. Perverse as it may seem, there are certain cases where information production will *only* occur in the absence of direct monetary reward, e.g. where the cost of appropriating positive externalities are prohibitive or where commercially driven motivations conflict with the volunteer ethic.[48] The 'leap of faith' that one is required to make in order to approve this more variegated model, is to accept that there are many motivations other than the prospect of a royalty income that drive people to engage in information production. If one accepts this proposition the decision to abandon copyright protection may seem as rational as the decision to avail of it.

The above analysis focuses on the microeconomics of commons-based information production. It suggests that individual incentives are the critical microeconomic factor for determining the success or otherwise of commons-based information production. Related matters such as co-ordination of productive activity and integration of functions and components are also of importance in this regard. Of possible greater significance to the future of commons-based information production are macrofoundational issues.[49] By this term I mean the social and economic structures that bring into being the productive dynamic of the type we are now witnessing. Speculative writings on these issues associate the phenomenon with the high-level of material affluence attained in advanced Western economies.[50] The market has delivered material abundance, which has in turn led to the birth of gift cultures and economies in respect of immaterial goods, or so the argument goes.

There are numerous socio-economic and cultural explanations for the emergence of volunteer produced common information property as a distinctive institutional form in the digitally networked environment. Two techno-centric reasons are worth alluding to as they highlight the importance of the Internet's decentralised architecture and the

[48] Case studies on blood donation are instructive in this regard, e.g. K. Healy, *Embedded Altruism: Blood Collection Regimes and the European Union's Donor Population* (2000) 105 American J of Sociology 1633 suggesting that the opportunity to sell blood plasma reduces the likelihood of a person donating.

[49] S. Weber (*supra* note 4) draws a distinction between microfoundational and macrofoundational issues in relation to open source projects.

[50] See E. Raymond, 'Homesteading the Noosesphere' (1998) *First Monday*, at: http://www.firstmonday.dk/issues/issue3_10/raymond

social norms that it promotes. First, the Internet has in effect made access to a mass audience of information consumers a non-scarce resource.[51] Prior to the Internet the channels of communication were scarce due to inherent physical restrictions, e.g. electromagnetic spectrum, regulatory obstacles, and/or the presence of high-fixed costs of publication and distribution. As a result most mass media channels were owned by either state entities or sizeable private corporations. When the channels of communication are scarce, the opportunities for dispersed and essentially unorganised labour to engage in commons-based information production are limited. The owner of the communication channel acts as an intermediary between the independent information producer and the audience and he/she is unlikely to publish a new work without the cushion of copyright protection. Secondly, the reality of the Internet appears to be that the most effective way to reach a mass audience is to give your content away for free. Even successful information producers with existing consumer bases like the *New York Times* have found it difficult to establish viable subscription models. For many independent information producers the desire to reach a wide audience takes priority over any potential financial gains. Choosing the *de facto* common property model best achieves this goal.

To summarise, copyright economics is founded on one key assumption: the incentive necessary to engage in economic production. This section has shown that in many cases public and third sector financing of information production overcome this problem. As a matter of principle, copyright protection should be denied to these works and they should on publication enter the public domain. If such a policy were implemented one can expect there to be significant dynamic gains from the increased competition in relation to the works themselves as well the spin-offs from wider public access to important informational resources. This section has also shown how in the context of the Internet, common property will in some cases be preferred to copyright protection. Furthermore, information production that occurs without the producer availing of the economic advantages conferred by copyright law and without the benefit of public financing constitutes a novel model of economic organisation.

3.4 The Dynamics of Common Information Production and Diffusion

Section 3.3 has set out the *ex ante* conditions that will result in an information producer choosing common over private property. A complete account of the dynamics involved in commons-based information production is a more complex undertaking and is beyond the scope of the Paper. Some commons-based information production is likely to take place within existing organisational models, though without the benefits provided by copyright protection. Others such as Open Source Software appear to be taking place within a new organisational paradigm. This Paper will briefly consider three distinctive features of the commons-based productive dynamic: (a) the organisational structure of production and the associated efficiencies, (b) the nature of the product likely to be selected for creation by producers of common information property, and (c) the distribution and consumption of common information property.

3.4.1 Organisational Structure

[51] See generally L. Lessig (*supra* note 16)

Yochai Benkler's *Coase's Penguin*[52] is the most comprehensive empirical and theoretical account of commons-based information production to date. His analysis focuses on collaborative information production that is organised through the Internet medium. This Paper has argued that commons-based information production is not dependent on the size of the project or the number of participants involved. Rather the key factor for determining whether common property will be preferred over copyright protection is a basic cost/benefit assessment by the information producer of each model's respective merits. If one accepts this proposition individuals and small groups may also be candidates for commons-based information production. It may be the case that in general collaborative projects are most suited to commons-based information production; the diversity of individual motivations means however that one cannot make predictions to fit all situations.

Benkler locates his theoretical approach in the literature on economic organisation, though he acknowledges that 'commons-based peer production' [53] may be analysed from a diverse range of perspectives. He takes Ronald Coase's organisational theory of the firm and Harold Demsetz's economic explanation of property rights as reference points for explaining the emergence of peer-based production in the digitally networked environment.[54] Briefly, Coase hypothesised that economic organisation takes place within the hierarchy of a firm structure when using the price system alone to guide economic decisions proves too costly. Demsetz explained that private property rights emerge in place of common ownership regimes once the social cost of having no property rights exceeds the cost of implementing a property system in respect of any given resource. Benkler combines and inverts the transaction/social cost logic to predict that peer production will emerge when 'the cost of organising an activity on a peered basis is lower than the cost of using the market, and the cost of peering is lower than the cost of hierarchical organisation'. His 'trick' is to place the institution of common information property and peer-based production alongside markets and firms as a possible strategy for organising information production.

Another important theoretical device employed by Benkler is to separate the issue of productive efficiency from the question of individual motivation/incentive necessary to engage in information production (see section 3.3 above). This approach allows one to examine the relative efficiency of peer-based production in isolation from the question of whether or not sufficient and skilled individuals will volunteer for information production. Benkler's analysis suggests that peer-based production has two advantages over firm or market alternatives: (a) information gains and (b) allocation gains. The information gain refers to the reduction in uncertainty as to the likely value of various courses of productive action. Markets signal the value of productive action through the price mechanism and firms signal the value of productive action through managerial commands and evaluations. As information conveying devices both markets and firms are imperfect. The primary advantage of

[52] Y. Benkler (*supra* note 4)
[53] This is the term used by Benkler. I have preferred the term 'commons-based production' because I envisage the productive model as extending to individual as well as peer enterprises.
[54] R. Coase, 'The Nature of the Firm' (1937) 4 Economica 386; and H. Demsetz, 'Toward a Theory of Property Rights' (1967) 57 *American Economic Review* 347.

peer-based production is in its capacity to collect and process information about human capital: [55]

> The hypothesis is that rich information exchange among large sets of agents free to communicate and use existing information resources cheaply will create sufficiently substantial information gains of this sort that, together with the allocation gains ……overcome the added information exchange costs necessary to overcome the absence of pricing and managerial direction, and the added co-ordination costs created by the lack of property and contract as institutional bases for structuring co-ordination.

In other words, peer-based production involves a form of self-selection of productive functions, which in turn leads to an efficient co-ordination of individual actions. The idea is that, when the set of possible agents is large and dispersed, the individual engaged in extensive communication and feedback exchanges is best positioned to adjudge his/her suitability for a particular task.[56] Decentralised communication systems are also an efficient mechanism for providing information on what tasks need to be performed, their relative importance, what are in fact being performed and whether or not an individual's contribution is of value. Allocation gains refer to the advantage that peer production has over market and firm alternatives in its capacity to draw unbounded agents from a large pool of human capital and to apply them to unbounded resources in the pursuit of an unbounded set of projects. In other words the essential freedom of individuals to engage in peer-based production can give rise to allocation gains over an above what arises with markets and firms.

Thus according to Benkler the organisational structure of collaborative peer production is predominantly decentralised and it has therefore achieved one of the Holy Grails of contemporary organisational theory.[57] However against this theoretical model is empirical evidence which indicates that most successful Open Source Software projects have in fact involved only a small number of key developers and that they involved varying degrees of hierarchical ordering.[58] Kevin Healy and Alan Schussman's survey of the 46,000 open source projects hosted by the www.sourceforge.net reveals that activity across the range of open source projects currently ongoing is 'spectacularly skewed'.[59] Only a small number of projects have more than a handful of developers and participants; and the number of truly flourishing projects is in the 99th percentile. Furthermore their findings indicate that there is no close relationship between the number of developers involved in a project and the popularity of applications with end-users. These findings, if true in respect of

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[55] Y. Benkler (*supra* note 4).

[56] Central to Benkler's hypothesis is the notion that human intellectual capital is highly variable and individuated. While we may all be prone to overestimating or underestimating our abilities, no one else is any better position to come to a more accurate estimation.

[57] Eric Raymond's 'The Cathedral and the Bazaar' *First Monday* (1998) used the metaphor of the 'cathedral' to refer to the cumbersome model of firm production and the 'bazaar' to refer to the babbling Linux model of organisation, which spontaneously creates order out of chaos.

[58] For instance A. Mockus, R. Fielding and J. Herbsleb, 'A Case Study of Open Source Software Development: the Apache Server' in *Proceedings of the 22nd International Conference on Software Engineering* (ACM Press, 2000) found that the Apache project was driven by 15 key developers who contributed up to 90% of the code.

[59] K. Healy & A. Schussman, 'The Ecology of Open Source' (draft paper, January 14, 2003) available at:

all information goods, are not detrimental to the concept of commons-based production. In fact they may provide some useful insights. It is likely, as with any other enterprise, that there will be many failed common-based projects for every successful one (though only participant's time rather than investor's money will be lost). It may be that the self-selection process described by Benkler naturally results in a few skilled programmers taking on the core responsibilities of information production and that self-selected leadership skills will emerge as an important component in the overall productive enterprise. The decentralised information processing function may be of greatest importance in relation to editing, bug-proofing and other such activities that are also vital to information production.

This author takes the view that no general organisational structure can fully describe commons-based information production. Information projects are so diverse that different organisational structures are likely to emerge to meet the demands of the individual project; some may require high levels of hierarchy, while others may be best suited to modularised decentralisation. The key human-factor that drives commons-based information production is non-monetary motivation (denoted I_2 in the previous section), which is unpredictable. However, once this factor is high any intellectual endeavour can be undertaken under the strictures of commons-based production, irrespective of the comparative advantage over market and firm alternatives. Benkler's efficiency analysis explains why in certain cases commons-based production is superior to market and firm organised production. It does not explain the conditions under which all commons-based production takes place.

3.4.2 Nature of Commons-Based Information Projects

Commons-based production is by no means a universal model for producing information goods. It can only flourish where intellectual labour is the principal input of the information good. Information goods that require significant levels of investment in physical assets are unlikely to be produced under the model. Motion pictures, for example, generally entail large expenditure on material outlays and production occurs far away from the digitally networked environment. Assuming that intellectual capital is the principal input, the critical microeconomic factor that will determine the nature of commons-based projects is again non-monetary motivation. In some information producing sectors this factor would appear to be particularly high, e.g. computer programming. In general, where there is a well established cultural of sharing ideas and collaboration in information projects it is most likely to emerge. Academia more so than any other sector can boast such a culture and would therefore seem to be the best candidate for adopting the commons-based information production model (indeed many commons-type academic journals have already been established).

Aside from the information producing communities that have a culture of openness and sharing, certain information projects will, by virtue of their scale, lend themselves to commons-based production. Benkler argues that peer-based production is best suited to large scale collaborative projects because of the inverse relationship between the incentive problem and pooling large numbers of motivationally diverse volunteers: 'Given a sufficiently large number of contributors, direct monetary incentives necessary to bring about contributions are trivial.' Furthermore he identifies three properties - modularity, granularity and integration costs - which will

determine whether or not peer-based production will succeed as a model of economic organisation. Modularity refers to which an information project can be broken down into asynchronous component parts. Granularity refers to the size of the component part in terms of the time and effort an agent must invest in production. Where a project can be broken down into fine-grained components there is an increasing likelihood, because of efficiency gains, that commons-based production will emerge over market and firm alternatives.

3.4.3 The Distribution of Common Information Property

By placing an information good into the commons the creator abandons the legal right of exclusion and thereby reverses the artificial scarcity that copyright law engineered. In economic terms the effect of this decision is (a) to destroy the good's exchange value, but (b) to maximise social welfare. The diffusion of common information property via the Internet is radically different to the distribution model for privately owned information goods. The latter by definition requires a centralised distribution structure, i.e. where the information owner alone controls delivery of the information good. The former, in contrast, can harness the Internet's communicative structure and diffuse the information good through its decentralised network. With common information property every consumer can simultaneously be a distributor and thus the distinction between those two asymmetric roles becomes blurred. Another difference between the distribution of private and common information property is in relation to the manner in which each good is promoted. The owner of a copyrighted information good has a strong incentive to market the good because the more paying consumers he can attract the higher his economic rents will be. There is no equivalent incentive present with common information goods; thus demand for them will be stimulated through the process of consumer feed backs and 'word of mouth' rather than through any conventional advertising or sponsorship strategy. Finally, because of the absence of conditions on its re-use, common information property can be freely utilised by consumers as a direct input into the production of new information goods.[60] This represents an added welfare gain.

The fact that an information good is held in common rather than as private property does not mean that commercial activity in relation to that good cannot take place. On the contrary, businesses that are able to provide a *service* connected to the common pool resource for which consumers are willing to pay can avail of commercial opportunities. The Linux operating system has spurned a number of multi-million dollar enterprises. There are many examples of where an information good requires an additional service in order for it to be of use to the consumer; in such circumstances business will have a role to play. Common information goods may be non-rival, but service provision is still in scarce supply.

[60] The issue of whether the resultant product should be obliged to also enter the commons is a matter of controversy. The GNU/GPL licence stipulates this as a condition whereas other Open Source licences do not.

4. RE-CONCEIVING THE UTILITARIAN FRAMEWORK

4.1 The Internet as a Productive Universe

Commons-based information production is here and now taking place. It is a productive dynamic that has emerged without any government regulation or subsidisation; nor are its participants demented ideologues consciously trying to subvert existing economic structures. The communicative architecture of the Internet, along with many other factors, has facilitated the birth of a new productive paradigm that has none of the distributive drawbacks of copyright protection. Yet, debates about the Internet and copyright law remain focussed on how the copyright's economic model can be replicated in the online environment. It seems clear that for it to succeed many people will have to stop doing what the Internet is designed for – decentralised interactive communication – and that commercial information producers will have to implement costly technological protection measures that are unlikely to be appreciated by their customers. Copyright becomes increasingly about restricting individual freedom rather than about advancing the overall happiness of society as Jeremy Bentham would have recommended.

The two alternate visions – commons-based versus proprietary production – are not mutually exclusive, i.e. the success of either model is not dependent on the other's failure. While successful commons projects may pose a competitive challenge, copyright owners have no reason to fear commons-based information production. For them the Internet is simply a novel means for *delivering* information goods and increasing profits. Whatever the success of DRM the productive dynamic that copyright law entails remains constant in the Internet environment. Commons-based information production on the other hand is only in its infancy and offers far more interesting long-term possibilities. It harnesses rather than resists the Internet's communicative architecture and taps into under-utilised productive capacities. In a digitally networked environment the common property model is undoubtedly a superior strategy for allocating information goods. This Paper has argued that given the presence of the right motivational mix that commons-based production may also succeed in provisioning information goods.

4.2 The Commons as an Organising Idea

James Harris states that as an institution private property is a 'complex organising idea'.[61] By this he means that the concept of private property is as a reference point for individuals to mediate between brute facts (i.e. material objects that exist in the world) and each other's expectations, desires and claims in respect of those objects. For individuals and enterprises engaged in productive activity private property is not just about defining legal rights and duties, its more pervasive normative impact is to act as a signal to tell individuals how they should interact with each other. We do not enter a stranger's house uninvited, because we acknowledge that the owner's property rights entail him having an uninterrupted private domain. Likewise an employee will follow his employer's instructions because he recognises that the employer's ownership of the productive apparatus entitles him to make decisions regarding its disposition and use. In straight material terms this complex organising idea would

[61] J. Harris, *Property and Justice* (Oxford: Oxford University Press, 1996).

appear to be a great success;[62] private property has helped deliver unparalleled material prosperity to developed Western countries.

The idea of private property as a means for organising social relations did not appear out of thin air. The *a priori* material condition recognised by every property theorist for bringing it into being is *scarcity*. When a resource is scarce and there is competition for access to it only the rule of law offers the hope of peaceable enjoyment. The desire to avoid a Hobbesian struggle may, more so than any other reason, explain the near universal existence of private ownership. It is not simply a matter of individual gain, but of social harmony. The power of the property concept is therefore deeply rooted in the reality of our fragile material condition. In the shift to post-industrial economies it is hardly surprising that the temptation to transpose this concept into the sphere of non-scarce ideational objects is strong. After all, for anyone who appreciates the idea of owning his or her own car, the idea of owning one's own novel, song or software programme must seem intuitively appealing. However, this is where the fatal error occurs, the *a priori* condition of scarcity that instantiates private ownership as a complex organising idea is simply not present in the case of ideational objects. Rather, this Paper advocates that the 'commons' be recognised as the prime organising idea in respect of arranging access to and use of informational resources. Only where provisioning can be shown to be a serious problem (i.e. failure to provide means that some widely acknowledged social need is not met), should it be departed from. Where such a case has been made, one of Paul David's 3 'P's can be applied to resolve the situation.

The author accepts the reality that copyright protection is so well-entrenched that it would be destructive in the short-term (and in any event politically unfeasible) to make sweeping changes to the present system, whatever its drawbacks. The proposal of this Paper is therefore somewhat modest, symbolic almost. In Berne Convention countries, as noted above, the default position is that new works are automatically protected by copyright law upon their creation. Persons engaged in commons-based information production therefore have to resort to using licences, whose legal validity is always open to challenge, in order to avoid 'contamination' by proprietary norms. In order to improve the certainty of the legal situation, copyright codes should be amended so as to incorporate a facility whereby individuals can, by a simple act of proclamation, abandon the protection afforded to them by copyright law.[63] This amendment is far from radical and would not impact on the business affairs of existing commercial information providers. The main purpose of it would be to signal to information producers that an alternative productive paradigm exists for them to organise their creative and inventive activities. Private property is a powerful signalling device; its explicit legal consequences are normally only experienced by the thief or vandal; yet, it (together with contract law) lays the foundations for the capitalist economic system. Likewise, a law that expressly recognised the information commons as a thing in itself could help lay the foundations for an expansion of commons-based information production. The 'commons' costs nothing to implement, requires minimal government supervision, interferes with nobody's

[62] M. Heller, 'The Tragedy of the Anti-Commons: Property in Transition from Marx to Markets' (1998) 111 Harvard L Rev 621 outlines the cases where it is not a success.

[63] A provision of this type can have varying degrees of complexity. One version could simply permit the abandonment of immediate property rights; another could deal with ownership of modifications and additions. It is beyond the scope of this Paper to deal with these issues in any depth.

liberty, enables people to engage in a wider range of productive endeavours, and has favourable distributive outcomes.

The classic conservative defence of private property rights has been that through a 'slow selection of trial and error'[64] private property has emerged as a system of rules for delineating individual spheres of control over limited resources. It may seem ironic, but this rationale can be invoked to justify *de jure* recognition of the information commons. From time immemorial ideas and expression, have been regarded as the common property of man.[65] Only with the invention of the printing press and the technologies of mass communication did it become profitable to claim ownership over informational goods. Now that individuals and organisations, in light of a new communicative paradigm, are spontaneously (and admittedly rapidly) adopting an alternative model for producing and distributing cultural and technical information, it is only reasonable that the law facilitate them by conferring *de jure* recognition of *de facto* common information property.

[64] F. Hayek (W. Bartley (ed.)), *The Fatal Conceit: The Errors of Socialism* (London: Routledge, 1988) p.36.
[65] R. Bowker, *Copyright Its History and Its Law* (Boston: Houghton Mifflin, 1912) p.8-9 cites some isolated evidence of recognition in classical and early Christian times of protean copyright protection. The evidence is however very thin.