ESSAY

INFORMATION WANTS TO BE FREE: INTELLECTUAL PROPERTY AND THE MYTHOLOGIES OF CONTROL

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This Essay challenges a central tenet of the recent criticism of intellectual property rights: the suggestion that the control conferred by such rights is detrimental to the continued flourishing of a public domain of ideas and information. In this Essay, Professor Wagner argues that such theories understate the significance of the intangible nature of information, and thus overlook the contribution that even perfectly controlled intellectual creations make to the public domain. In addition, this Essay shows that perfect control of propertized information—an animating assumption in much of the contemporary criticism—is both counterfactual and likely to remain so. These findings suggest that increasing the appropriability of information goods is likely to increase, rather than diminish, the quantity of "open" information. Further, the benefits of control in fostering coordination and enabling flexibility in arrangements are essential elements of promoting progress in a changing world.

"Inventions then cannot, in nature, be a subject of property."[1]

INTRODUCTION

Contemporary criticism of intellectual property rights is notable for its clear focus on the *control* inherent in the system of government-extended grants of exclusivity—in particular the assertion that such control is in tension with the development of a public domain of information.[2]

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1. Letter from Thomas Jefferson to Isaac McPherson (Aug. 13, 1813), *in* 6 The Writings of Thomas Jefferson 175, 181 (H.A. Washington ed., New York, Riker, Thorne & Co. 1855).

2. There are far too many examples of control-criticism in the literature to list here. Some of these include: James Boyle, Shamans, Software, and Spleens: Law and the Construction of the Information Society (1996); Lawrence Lessig, The Future of Ideas:

This development is (and has been) both intellectually and rhetorically significant. Intellectually, by emphasizing the effects of control, these critics can support intellectual property generally, yet condemn it specifically, where the pernicious side effects of the mechanism are seen. In a way, this approach seems to have largely transcended the more abstract question of whether intellectual property is a socially useful tool, and focused our attention on the specifics.[3] Rhetorically, an entire vocabulary has been built to support this line of argument. Control-talk is of "the second enclosure movement,"[4] the lurking "tragedy of the anticom-

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The Fate of the Commons in a Connected World (2001); Jessica Litman, Digital Copyright (2001); Yochai Benkler, Free as the Air to Common Use: First Amendment Constraints on the Enclosure of the Public Domain, 74 N.Y.U. L. Rev. 354 (1999); Yochai Benkler, Siren Songs and Amish Children: Autonomy, Information, and Law, 76 N.Y.U. L. Rev. 23, 112 (2001); Yochai Benkler, An Unhurried View of Private Ordering in Information Transactions, 53 Vand. L. Rev. 2063 (2000) [hereinafter Benkler, Unhurried View]; James Boyle, Cruel, Mean or Lavish? Economic Analysis, Price Discrimination and Digital Intellectual Property, 53 Vand. L. Rev. 2007 (2000); Dan L. Burk, Muddy Rules for Cyberspace, 21 Cardozo L. Rev. 121 (1999); Julie E. Cohen, Copyright and the Jurisprudence of Self-Help, 13 Berkeley Tech. L.J. 1089 (1998); Michael A. Heller & Rebecca S. Eisenberg, Can Patents Deter Innovation? The Anticommons in Biomedical Research, 280 Science 698 (1998); Mark A. Lemley, Beyond Preemption: The Law and Policy of Intellectual Property Licensing, 87 Cal. L. Rev. 111 (1999); Jessica Litman, The Public Domain, 39 Emory L.J. 965 (1990); Arti Kaur Rai, Regulating Scientific Research: Intellectual Property Rights and the Norms of Science, 94 Nw. U. L. Rev. 77 (1999); J.H. Reichman & Jonathan A. Franklin, Privately Legislated Intellectual Property Rights: Reconciling Freedom of Contract with Public Good Uses of Information, 147 U. Pa. L. Rev. 875 (1999); James Boyle, The Second Enclosure Movement and the Construction of the Public Domain (October 2001) (unpublished manuscript, on file with the *Columbia Law Review*) [hereinafter Boyle, Second Enclosure Movement].

3. This also offers a strategic benefit of largely allowing control-critics to avoid uncomfortable questions related to the correlation between the explosion of technological (and perhaps to a lesser extent, creative) advances during the same period—generally the past two decades—in which they criticize the intellectual property system as overly expanding.

Just to get my biases on the table early: While there is obviously some debate, the evidence in favor of intellectual property rights is, in my view, compelling. See F. Scott Kieff, Property Rights and Property Rules for Commercializing Inventions, 85 Minn. L. Rev. 697, 699 n.4 (2001) (collecting sources demonstrating "a causal link between the development of intellectual property and the growth of our national economy"); Michael Abramowicz, Perfecting Patent Prizes 3 nn.4–5 (George Mason Univ. School of Law, Law and Economics Working Paper Series No. 01-29, 2001) (collecting sources both for and against intellectual property rights).

4. The "first enclosure movement" being, of course, the long-term process (in England) of fencing in common areas and converting them to private property. See, e.g., James Boyle, Fencing Off Ideas: Enclosure & the Disappearance of the Public Domain, Dædalus, Spring 2002, at 13, 13–14 (describing first enclosure movement); see also Boyle, Second Enclosure Movement, supra note 2, at 1 (describing first enclosure movement and arguing that second enclosure movement exists in area of intellectual property); Dan Hunter, Cyberspace as Place, and the Tragedy of the Digital Anticommons 89–92 (Apr. 7, 2002) (unpublished manuscript, on file with the *Columbia Law Review*) (applying the metaphor to the increasing privatization and commercialization of the Internet).

mons,"[5] or the dangers of "patent thickets"[6]—not to mention the phenomenon of litigation efforts (or perhaps social movements?) sporting their own slogans (and logos), such as "Free the Mouse," "Create Like It's 1790," or "When Copyright Attacks."[7]

This Essay challenges a major tenet of this control-criticism: the claim that control will reduce the availability of information in the public domain.[8] The core contention here is that the critics understate—perhaps dramatically—the contribution that even "perfect" control of intellectual creations makes to the public domain, just as they overstate the current and potential effectiveness of this control. Combining this understanding with the dynamic incentive-effects of intellectual property rights suggests that such rights (even in strong forms) are likely to increase the content of the public domain rather than decrease it. Thus, while there are perhaps other reasons to limit the scope and enforceability of intellectual property rights, concern about the withering of the public domain seems not to be one of them.

The control-critics' approach is straightforward.[9] A defining feature of any system of property rights is the grant of control (over the thing

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5. The term anticommons refers to the possibility that fragmented and overlapping rights can prevent use of a good—in this context, an intellectual good. See, e.g, Heller & Eisenberg, supra note 2, at 698–700 (positing an anticommons in biomedical research). For a more general exposition, see Michael A. Heller, The Tragedy of the Anticommons: Property in the Transition from Marx to Markets, 111 Harv. L. Rev. 621, 660–79 (1998); see also Hunter, supra note 4, at 102–07.

6. "Patent thickets" refer to the fact that in many areas of technology, great numbers of related patents exist at any particular time, and many might have applicability to any commercial product. See, e.g, Carl Shapiro, Navigating the Patent Thicket: Cross Licenses, Patent Pools, and Standard-Setting 1–3 (Mar. 2001) (unpublished manuscript, on file with the *Columbia Law Review*).

7. Each of these is being used to promote the effort to overturn the Sonny Bono Copyright Term Extension Act, at issue this Term in *Eldred v. Ashcroft*. The logos include a silhouetted Mickey Mouse character behind bars; free bumper-stickers are available. See Eldred v. Ashcroft, 123 S. Ct. 769 (2003).

8. To date, there have been very few works opposing control-criticism in the literature. Those of which I am aware include: Jane C. Ginsburg, Copyright and Control over New Technologies of Dissemination, 101 Colum. L. Rev. 1613, 1631–32 (2001) (arguing in favor of anticircumvention provisions); Philip J. Weiser, The Internet, Innovation, and Intellectual Property Policy, 103 Colum. L. Rev. 534, 583 (2003) (rejecting control-critics' views of Internet regulation in favor of a "competitive platforms" model); Richard A. Epstein, Steady the Course: Property Rights in Genetic Material 2–3 (Univ. of Chicago, John M. Olin Law & Economics Working Paper No. 152 (2d Series), 2002), available at http://www.law.uchicago.edu/Lawecon/WkngPprs_151-175/152.rae.genome.new.pdf (on file with the *Columbia Law Review*) (arguing generally for strong property rights in biotechnologies); William M. Landes & Richard A. Posner, Indefinitely Renewable Copyright 3 (Univ. of Chicago, John M. Olin Law & Economics Working Paper No. 154 (2d Series), 2002), available at http://www.law.uchicago.edu/Lawecon/WkngPprs_151-175/154.wml-rap.copyright.new.pdf (on file with the *Columbia Law Review*) [hereinafter Landes & Posner, Indefinitely Renewable Copyright] (positing that an infinite term of copyright, punctuated by renewals, is efficient).

9. This general description is not intended to replicate any particular person's views, but rather to represent the common aspects of these and related arguments.

propertized) to the owner. In the context of intellectual property, the subject matter to be controlled is information: expression in the case of copyrights, (applied) ideas in the case of patents. Critically, information is both an output and an input of intellectual development. New expression and ideas are rarely (if ever) conjured up from whole cloth; instead they are the result of a vast array of informational inputs.[10] We all "stand on the shoulders of giants."[11]

The tension highlighted by the control-critics is this: If information is both an output and an input for intellectual flourishing, and intellectual property rules limit access to information as a consequence of conferring control, then intellectual property rights can be self-defeating. Without access to information (inputs), development (output) will suffer. Thus, the control-critics emphasize the existence of the "public domain" or "open" information (information that is not subject to proprietary rights, offering anyone access, anytime, for low or no cost) as a critical source of the informational inputs necessary for creative and technological progress.[12] Much of the intellectual property laws' restrictions on the rights of owners—temporal limits, allowances for "fair use," forced disclosures—can be explained, they note, as attempts to build the public domain. Perceived recent trends of eliminating or reducing some of these restrictions, easing enforcement of rights, or the extension of intellectual property into new subject matter, fundamentally conflict, the argument goes, with the construction of the public domain. And as goes the public domain, so do our hopes for a richer, fuller, and more interesting tomorrow.[13]

There is much that is correct in the control-critics' account. Surely our intellectual advancement depends on the quantity of information from which we can build. A rich public domain is important. And yet I

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10. As Judge Kozinski wrote, "Nothing today, likely nothing since we tamed fire, is genuinely new: Culture, like science and technology, grows by accretion, each new creator building on the works of those who came before." White v. Samsung Elecs. Am. Inc., 989 F.2d 1512, 1513 (9th Cir. 1993) (Kozinski, J., dissenting from denial of rehearing en banc).

11. The phrase comes from Sir Isaac Newton, who stated, "If I have seen farther, it is by standing on the shoulders of giants." Letter from Isaac Newton to Robert Hooke (Feb. 5, 1676), reprinted in Robert K. Merton, On the Shoulders of Giants: A Shandean Postscript, The Post-Italiante Version 1 (1993); see also Suzanne Scotchmer, Standing on the Shoulders of Giants: Cumulative Research and the Patent Law, J. Econ. Persp., Winter 1991, at 29.

12. Note of course that the information goods derived or created from "open" or "public domain" inputs can in many cases be themselves subject to intellectual property rights.

13. As Lessig articulates:

> This freedom [to innovate] has been lost. With scarcely anyone even noticing, the network that gave birth to the innovation of the 1990s has been remade from under us; the legal environment surrounding that network has been importantly changed, too. And the result of these two changes together will be an environment of innovation fundamentally different from what was, or promised to be.

Lessig, supra note 2, at viii.

suggest that this criticism of intellectual property overlooks what we have known since Jefferson, and confirmed in the digital era: Notwithstanding efforts to the contrary, information cannot truly be controlled, at least not in the way that the control-critics suggest. That is, the "fencing" of information is a remarkably futile proposition; the control we offer owners of intellectual property rights is simply not the control we offer landowners. It should not be, but more importantly, it *cannot* be. It turns out that information *does* "want to be free."[14] Understanding that this is the great strength of intellectual property, as well as the great challenge, offers a new perspective on the function of control and the benefits of strong intellectual property rights.[15]

Part I begins by noting the differences between tangible property such as land, and intangible intellectual property. As virtually everyone acknowledges, the nonexcludable and nonrival nature of information commands a different justification for intellectual property than for real property. But the full range of distinctions between the real and the intangible is often overlooked. Thus Part I sketches a theory of incomplete capture, a positive account of the nature of information and innovation. In particular, I note that a particular unit of expression or idea actually communicates three distinct types of information: (1) the core information itself; (2) closely related information, such as improvements or derivations; and (3) indirectly related information, which might be only obliquely suggested or stimulated by the core information. It is this third category, I suggest, that despite being the subject of extensive research in other fields, has been largely overlooked by the legal critics of control. It is inherent in information to generate further information. The limits are primarily those of human ingenuity rather than externally placed constraints.

I also suggest that there are additional, less abstract, reasons to understand the reality of incomplete capture. Constraints on control estab-

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14. The trope "information wants to be free" is a well-known techie-activist rallying cry, typically invoked against any efforts to limit access to or charge money for information. Paulina Borsook, Art's Cold Welcome on the Web, N.Y. Times, Feb. 23, 2001, at A19 (criticizing adherents to "a mindset that holds that creators shouldn't be compensated for their work, that all human creation is the equivalent of a Web log by a hobbyist with a day job"); Michael Kinsley, Pennies for Thoughts, Wash. Post, May 11, 2001, at A45 (noting that free information is hardly unique to the Internet).

Though it has clearly taken on a life of its own, most people attribute the origins of the phrase to Stewart Brand, The Media Lab 202, 211 (1987); see also Jon Katz, The Netizen: Birth of a Digital Nation, Wired, Apr. 1997, available at http://www.wired.com/wired/5.04/netizen_pr.html (on file with the *Columbia Law Review*) (reviewing a survey of network users, noting that "[t]he single dominant ethic in this community is that information wants to be free").

15. The account of intellectual property rights developed here is distinct from those which argue that the net social gains of even perfectly controlled information is positive. See, e.g., Robert Nozick, Anarchy, State, and Utopia 181–82 (1974) (suggesting that independent inventors of objects for which others hold patents "should not be excluded from utilizing their own invention as they wish (including selling it to others)").

lished by the law itself, the costs of enforcing rights, social norms, and the competitive marketplace each significantly limit the applicability of the control-critics' arguments. To be sure, at least some of these constraints are mutable (hence the recent academic outcry), but there is very good reason to doubt that any would be truly eliminated or reduced; and in any event, as I show in Part II, it may be that the erosions of these constraints will accelerate the building of the public domain rather than slow it.

The theory outlined in Part I is applied in Part II. First, I note how dynamic incentive-effects and the inherent nature of information combine to increase the content of the public domain over time, irrespective of the appropriability of the work protected by intellectual property. That is, because even perfectly controlled works nonetheless transfer significant information into the public domain, it turns out that over the long term, additional control is likely to stimulate additional works—and thus grow the public domain, even assuming no access to the protected work itself. Next, I suggest further reasons supporting control as an important driver of open information. Control allows a level of flexibility in structuring arrangements that cannot otherwise be achieved. This flexibility is particularly beneficial in circumstances of rapid change—such as we see today—where the details of future advances cannot be understood ex ante with certainty. In addition, the ability to effectively control can allow content owners to implement price discrimination, which in some situations can ameliorate the deadweight losses of any market power conferred on intellectual property owners.

The coordination that is effected by control can also build the public domain in a direct way: by the support of effective forms of dedication of intellectual goods. In particular, I point out the open source software movement as an example of the benefits of control in this regard, and discuss the recent (and beneficial) efforts to seek voluntary dedications of information. I finally offer a brief conclusion.

A note about scope is appropriate here. The challenge to the criticism of control set forth here does not itself make the case *for* intellectual property rights, but rather suggests that the case against them is unlikely to be made on the basis of control. For example, constitutional constraints with respect to copyright may require lesser control.[16] As I try to make clear throughout this Essay, and address directly in the Conclusion, although there are a variety of reasons we may want to limit the scope or effectiveness of intellectual property rights (though to be clear, my bias is generally to resist such calls), the corrosive effect of control on the public domain, however, does not seem to be one of them.

16. For excellent recent expositions on this point, see, e.g., C. Edwin Baker, First Amendment Limits on Copyright, 55 Vand. L. Rev. 891 *passim* (2002); Neil Weinstock Netanel, Locating Copyright Within the First Amendment Skein, 54 Stan. L. Rev. 1 *passim* (2001).

I. THE EXPANDING COMMONS: A THEORY OF INCOMPLETE CAPTURE

The traditional utilitarian basis for private property is conventionally described as having two components. The first is that private property prevents the overuse (and thus the exhaustion) of valuable resources, thereby avoiding the tragedy of the commons.[17] Second, the individual incentives generated by a system of private property helps assure the appropriate level of investment in development or improvement of resources.

In intellectual property,[18] of course, we deal in intangible, nonrivalrous goods. Because such goods cannot be depleted by overuse, theories based on avoidance of the tragedy of the commons drop away,[19] leaving incentive-based theories as the core argument. While some commentators finger this shift from the tangible to the intangible, from "real" goods to information goods, as fundamentally undermining the basis for intellectual property, most agree that information is inherently a public good,[20] and thus some level of incentives (or other regulatory impetus) is required to ensure an adequate level of production.[21]

It is also widely recognized that creativity and invention is a profoundly dynamic process.[22] Creation begets more creation; invention

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17. Garrett Hardin, The Tragedy of the Commons, 162 Science 1243, 1244–45 (1968).

18. Throughout the paper, the discussion relates particularly to copyrights and patents rather than trademarks, trade secrets, or other regimes of protection of intangible goods.

19. At least in the Hardin sense. There is a rich literature (dealing principally with patents) suggesting that an analogous tragedy may result from, for example, patent races—where multiple parties "race" to create a patentable invention, thereby reducing or eliminating the benefits of the advance through unnecessarily redundant effort. See, e.g., Jean Tirole, The Theory of Industrial Organization 394–414 (1988); Mark F. Grady & Jay I. Alexander, Patent Law and Rent Dissipation, 78 Va. L. Rev. 305, 316–21 (1992); see also Eric Rasmusen, Games and Information 372–78 (3d ed. 2001); Partha Dasgupta & Joseph Stiglitz, Uncertainty, Industrial Structure, and the Speed of R&D, 11 Bell J. Econ. 1, 25–26 (1980); Giovanni De Fraja, Strategic Spillovers in Patent Races, 11 Int'l J. Indus. Org. 139, 140 (1993); Tom Lee & Louis L. Wilde, Market Structure and Innovation: A Reformulation, 94 Q.J. Econ. 429, 435–36 (1980); Glenn C. Loury, Market Structure and Innovation, 93 Q.J. Econ. 395, 397 (1979); Jennifer F. Reinganum, A Dynamic Game of R&D: Patent Protection and Competitive Behavior, 50 Econometrica 671, 671 (1982).

20. Public goods are those where the cost of providing the good does not increase with consumption, and where it is generally infeasible to exclude others from consuming the good.

21. See, e.g., Abramowicz, supra note 3 (collecting sources); Kieff, supra note 3 (same). There are, of course, skeptics. An example of mild skepticism is found in Steven Breyer, The Uneasy Case for Copyright: A Study of Copyright in Books, Photocopies, and Computer Programs, 84 Harv. L. Rev. 281, 322 (1970). For a more radical critique see John Perry Barlow, The Economy of Ideas, Wired, Mar. 1994, available at http://www.wired.com/wired/archive/2.03/economy.ideas.html (on file with the *Columbia Law Review*) (making predictions about the future of intellectual property law in the digital age).

22. See generally Edwin Mansfield, Industrial Research and Technological Innovation (1968); F.M. Scherer, Innovation and Growth: Shumpeterian Perspectives (1984); Joseph

leads to further invention. Information fuels the fire of human progress; to a degree we perhaps underestimate, all of us in the fields of information production stand "on the shoulders of giants."[23] To the extent that information is both costless and nondiscriminatory—within an information "commons," in the "public domain," or "open," in the current vernacular—this will of course reduce the costs of further creation.[24]

Thus far, the control-critics and proponents of intellectual property are generally on common ground: (a) Intellectual property is based on incentives, and (b) such incentives are likely needed, at least to some degree, to ensure the adequate growth of information, which is in turn (c) needed to promote progress, and (d) a rich and plentiful source of open information beneficially reduces the costs of further development.

But here the paths diverge. Property rights, of course, confer control as perhaps their most basic feature: the ability of the rightsholder to determine the use of the property. Yet this characteristic, point out the control-critics, places intellectual property in fundamental tension with the underlying goal of creating a source of open, common information (and thus a font of creativity and invention). Too much control, these critics allege, turns the public good into merely a private benefit. The public domain withers, and progress slows.

This rallying to the information commons, however, falls victim to its own rhetoric. For the information commons is profoundly different from the realspace commons upon which the theory is modeled. Being intangible, an information commons (i.e., the public domain, or open information) can expand even as proprietary (propertized) information is created. Whereas on Blackacre every square yard that is propertized diminishes the total left in the commons, in the information commons, no such zero-sum game exists. Indeed, as we shall see, there is very good reason to believe that increasing propertization (increasing control) is likely to significantly expand the intellectual commons, not diminish it.

The basic insight here is a theory of incomplete capture, springing from the truism that an intellectual property owner cannot possibly appropriate all of the information (and thus social value) generated by her creation. Intellectual property laws, by definition, allow for the creators of intellectual property to individually capture value associated with the information they present to the world; this is, after all, the fundamental utilitarian bargain, a reward for the creativity or innovation that society wants. But the point that has been lost in much of the recent debate over

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A. Shumpeter, Capitalism, Socialism and Democracy (1942); Eric A. von Hippel, The Sources of Innovation (1988).

23. See supra note 11.

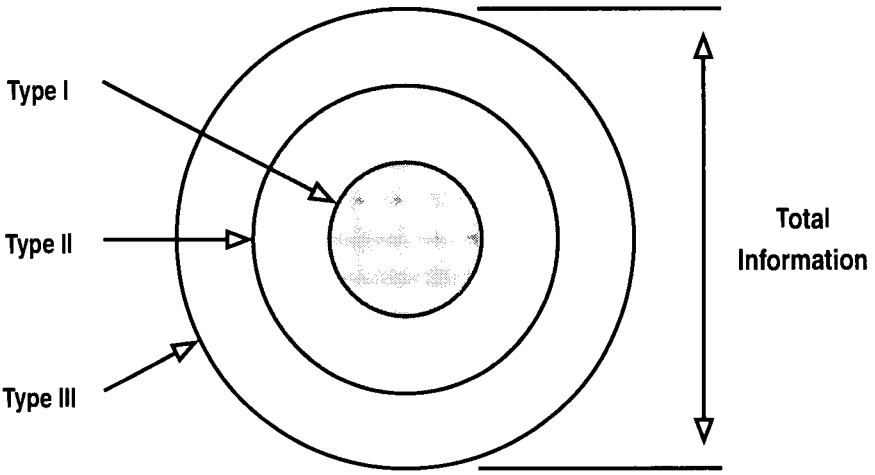
24. See William M. Landes & Richard A. Posner, An Economic Analysis of Copyright Law, 18 J. Legal Stud. 325, 332 (1989) [hereinafter Landes & Posner, Economic Analysis] (noting that "[c]reating a new work typically involves borrowing or building on material from a prior body of works" and that less extensive copyright protections would therefore lower cost of creation).

intellectual property rights is the limits inherent in this propertizing of information. Jefferson clearly understood this when he concluded, with evident satisfaction, that "[i]nventions then cannot, in nature, be a subject of property."[25] We can try, but we cannot really succeed: Information really does want to be free. To be sure, we can (and do, for good reason) grant creators of information certain rights; we can even allow these rights to be sliced, diced, poked, prodded, traded, rented, and sold; but we haven't converted the intangible into the tangible. At the end of the day there remains something fundamentally different between Blackacre and a Britney Spears album. And understanding why and how this is so is important.

A. *Information Wants to Be Free*

1. *A Taxonomy of Information Creation.* — The first aspect of incomplete capture is inherent in the nature of information. To illustrate this point, it is useful to consider the total quantity of information (or social value) created by an act of creativity or invention as having three relatively distinct components (designated Types I, II, and III), as depicted in Figure 1 below.

FIGURE 1: A TAXONOMY OF INFORMATION



In this taxonomy, information of Types I and II are well-understood and easily recognized. Type I is the core of the information created: the actual work of authorship or creativity in copyright, or the actual invention in the patent context. This type is the most easily delineated in a regulatory sense, and thus intellectual property laws are at their most potent in the Type I region—though, as I explain in Part I.B below, this

25. Jefferson, supra note 1, at 181.

does not imply that all of the information is appropriable by the rightsholder.

Type II information is that which is in some way *directly* derived from the underlying creation. In the patent context, we typically describe such follow-on inventions as improvements (and the process as "cumulative innovation").[26] Merges and Nelson, among others, document cumulative innovations in several fields, including automobiles, electric lights, airplanes, and semiconductors.[27] In the copyright context, derivative works are paradigmatic forms of Type II information.[28] For example, a book of *Seinfeld* trivia has been found to be a derivative work of the popular television series,[29] and still photographs of a ballet have been noted as derivative of the underlying performance.[30] The Type II information is both somewhat harder to define in scope[31] and (relatedly) less appropriable under the present laws than Type I information.[32] There is a fairly extensive literature concerning the optimal treatment of Type II information.[33]

It is Type III information, however, that I want to explore further. The basic premise here is that this information is associated only *indirectly* with the underlying creation: that there exists a class of information that is in some sense "derivative," but falls outside the reach of the intellectual property laws. The relationship between Type I and Type III thus consists

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26. For discussion of cumulative innovation and its implications, see Robert P. Merges & Richard R. Nelson, On the Complex Economics of Patent Scope, 90 Colum. L. Rev. 839, 843, 868–79 (1990); Scotchmer, supra note 11, at 29.

27. See Merges & Nelson, supra note 26, at 881–94 (citing sources).

28. A derivative work is a work "based upon one or more preexisting works . . . consisting of editorial revisions, annotations, elaborations, or other modifications which, as a whole, represent an original work of authorship." 17 U.S.C. § 101 (2000); see also Midway Mfg. Co. v. Artic Int'l, Inc., 704 F.2d 1009, 1013–14 (7th Cir. 1983) (discussing boundaries of derivative works). See generally Paul Goldstein, Derivative Rights and Derivative Works in Copyright, 30 J. Copyright Soc'y 209 (1983).

29. See Castle Rock Entm't v. Carol Publ'g Group, 150 F.3d 132, 135 (2d Cir. 1998).

30. See Horgan v. Macmillian, Inc., 789 F.2d 157, 162–64 (2d Cir. 1986) (noting that still photographs can, in some cases, infringe choreography).

31. Douglas Lichtman, Copyright as a Rule of Evidence (Univ. of Chicago, John M. Olin Law & Economics Working Paper No. 151, 2003). See generally Yoram Barzel, Optimal Timing of Innovations, 50 Rev. Econ. & Stat. 348 (1968).

32. In the copyright context, subject to (a) difficult line-drawing concerning the borders of the derivative work concept, and (b) various restrictions on excludability, see 17 U.S.C. § 107, such works are generally appropriable by the original (Type I) author. See 17 U.S.C. § 106. For discussion of patents, see infra note 33.

33. See, e.g, Howard F. Chang, Patent Scope, Antitrust Policy, and Cumulative Innovation, 26 RAND J. Econ. 34 (1995) (offering a model for how cumulative innovation should be treated by copyright and antitrust law); Jerry R. Green & Suzanne Scotchmer, On the Division of Profit in Sequential Innovation, 26 RAND J. Econ. 20, 22 (1995) (discussing how the "length and breadth" of a patent affect innovation); Mark A. Lemley, The Economics of Improvement in Intellectual Property Law, 75 Tex. L. Rev. 989, 1013–23 (1997) (discussing the treatment of derivative works by copyright law); Scotchmer, supra note 11, at 30 (discussing "the use of patent protection and cooperative agreements among firms to protect incentives for cumulative research").

of a "but-for" causal link, but the relationship is generally sufficiently indistinct and removed so as essentially to preclude appropriation by the Type I creator—and, indeed, may not even be conceived as appropriable. In other words, Type III information is "open" information, available for widespread use, as an inherent consequence of the creation of the underlying Type I information.[34]

Table 1 summarizes the basic features of this informational framework:

TABLE 1: A TAXONOMY OF INFORMATION

Type of Information	Description	Appropriability
Type I	"Core" information/invention	Mostly appropriable
Type II	Directly related information	Partially appropriable
Type III	Indirectly related information	Not appropriable

2. *"Like Fire, Expansible over All Space": The Importance of Type III Information.* — There are, I think, at least two related but distinct forms of Type III information. The first is inherent in the natural law of information dissemination, one that, as Jefferson stated, "seems to have been peculiarly and benevolently designed by nature."[35] In the realm of technological advancement, economists have long (and aptly) described this form of information as spillovers, or more technically, a positive externality on research and development.[36] That is, a spillover is when information created by an underlying innovation (Type I) flows to others. This information may not be embodied in any product or service, but instead might consist more generally of ways of viewing problems, adaptations of old or unrelated principles, a promising direction of research, or the identification of new uses for materials.[37] For example:

34. It is of course true that at least some Type III information can be "converted" into subsequent Type I works via mixing it with further creativity or research. A newspaper article critiquing Eminem's lyrics is undoubtedly copyrightable itself. Yet this does not imply that the Type III information does not exist, or that it is valueless; quite the contrary, precisely the point of growing the quantity of open information is to stimulate the production of new information.

35. Jefferson, supra note 1, at 180.

36. Richard Levin notes that Kenneth Arrow in 1962 first brought this point to the attention of economists, who then appear to have "largely overlooked" it for the next two decades, to be revived by a 1984 work by Michael Spence. Richard C. Levin, Appropriability, R&D Spending, and Technological Performance, 78 Am. Econ. Rev. 424, 424 (1988).

37. Historian James Burke has made a career of identifying and popularizing these unexpected links between innovations, through a series of books and television shows. See generally James Burke, Connections (1978); James Burke, The Day the Universe Changed (1985).

- the creation of hybrid corn revealed entire new avenues of inquiry in agricultural technology;[38]
- the invention of the steam engine suggested the utility of considering rotary motion as a mechanical function;[39]
- the advent of semiconductor technology brought forth the use and further development of binary logic as a multipurpose operational tool;[40] and
- the fundamental breakthroughs inherent in the invention of nylon opened up the possibility of further developments in synthetic polymers.[41]

In a more distinctly copyright-oriented vein, consider:

- the hit television show *Survivor*'s (U.S) demonstration of the device of "reality-based-settings" as a popular entertainment product, yielding an abundance of such efforts;[42]
- the creation of a copyrighted bookkeeping ledger, demonstrating a particular accounting technique;[43] and
- *Gone with the Wind*'s historical-romantic setting in the antebellum and Civil War South.[44]

Table 2 below summarizes these examples in the framework discussed here[45]:

38. Zvi Griliches, Hybrid Corn: An Exploration in the Economics of Technological Change, 25 Econometrica 501, 501–25 (1957).

39. Timothy F. Bresnehan & Manuel Trajtenberg, General Purpose Technologies: "Engines of Growth?" 5–6 (Nat'l Bureau of Econ. Research, Working Paper No. 4148, 1992).

40. Id. at 6–9.

41. David A. Hounshell and John K. Smith, Jr., Science and Corporate Strategy: Research and Development at Du Pont 249 (1988).

42. See, e.g., Bill Carter, Britons Revamp American TV: Exporting 'Millionaire' and 'Survivor' Was a Hard Sell with Crosscultural Allies and a Detour to Sweden, N.Y. Times, July 18, 2000, at E1 (describing origins of *Survivor*); Bill Carter, In Reality Show Derby, NBC Has 2 New Entries, N.Y. Times, Aug. 14, 2000, at C9 (noting interest in reality-TV format); Bill Carter, 'Survivor' Puts CBS in Land of Superlatives, N.Y. Times, Aug. 25, 2000, at C1 (describing original show's success, and noting future reality-TV effects).

43. See Baker v. Selden, 101 U.S. 99 (1879).

44. See Suntrust Bank v. Houghton Mifflin Co., 268 F.3d 1257 (11th Cir. 2001).

45. For further examples and discussion of the transmission of creativity and invention, see generally James Burke, Circles (2000); James Burke, The Knowledge Web (1999); Everett M. Rogers, Diffusion of Innovations (4th ed. 1995).

TABLE 2: EXAMPLES OF INHERENT TYPE III INFORMATION

Type I	Type II	Type III
Hybrid corn	Other (improved) variants of hybrid corn	Hybridization processes
Steam engine	Improved steam engines	Importance of rotary motion
Semiconductors	Improved semiconductors	Binary logic
Nylon	Improved nylon, close variants	Synthetic polymers
Survivor (first edition)	*Survivor* (subsequent eds.)	Reality television
Accounting ledger	Variants on the accounting ledger	Techniques of bookkeeping
Gone with the Wind	Works using same plot, characters, etc.	Historical-romantic setting in antebellum and Civil War South

In each of the above, the initial invention or work of expression, once disclosed,[46] conveyed *more* information than simply the invention or expression itself. This information is now free to spread "like fire, expansible over all space,"[47] limited only by human ingenuity. Given a regime of intellectual property rights, of course, the creator of the original information (Type I) will be able to appropriate at least some of the value—certainly the use of the Type I information, and perhaps much of the Type II information as well.[48] But this represents only a portion, potentially a very small portion, of the total information that has been generated.

The second important form of Type III information is *stimulative* in nature. Information begets more information. We respond to stimuli, whether our motive is political, artistic, or fiscal. This is most obviously seen in creative fields. Eminem's music stimulates public discussion of spousal abuse, adolescent role models, and a good deal more.[49] Robert Mapplethorpe's photographs spur debate about the boundaries of art,

46. Note that the patent law in particular, by affirmatively requiring disclosure of a protected invention, is well-designed to enable the creation of Type III information. See 35 U.S.C. § 112 (2000).

47. Jefferson, supra note 1, at 180.

48. See, e.g., Warner-Jenkinson Co. v. Hilton Davis Chem. Co., 520 U.S. 17, 21 (1997) ("[A] product or process that does not literally infringe upon the express terms of a patent claim may nonetheless be found to infringe if there is 'equivalence' between the elements of the accused product or process and the claimed elements of the patented invention."); Graver Tank & Mfg. Co. v. Linde Air Prods. Co., 339 U.S. 605, 608 (1950) (describing doctrine of equivalents as a means to prevent fraud on a patent, by "temper[ing] unsparing logic," and "prevent[ing] an infringer from stealing the benefit of an invention" (internal citations omitted)).

49. See, e.g., Jon Pareles, Pop Music's War of Words: While Eminem Is Attacked, Steely Dan Gets a Free Pass, N.Y. Times, Feb. 18, 2001, at B1 (cataloging controversies).

societal support for artists, and censorship.[50] A movie like *Schindler's List* inspires tremendous amounts of information about our past and about our future.[51] Even last summer's commercial-hit movie *Spider-Man* engendered a rash of spider-related information.[52] The point here is that information, once unleashed, will naturally and inevitably stimulate further information.

Importantly, this stimulative response can be a result of the information itself—such as the cases above—or the ways in which the information is used. For example, it is well-known that patents encourage efforts to "invent-around,"[53] so as to avoid infringement or licensing fees. Further, the mere existence of patents in a particular technological field can induce additional patenting behavior by others, perhaps as an "arms race" effort to discourage overzealous infringement claims.[54] Both of these responses, of course, generate additional information—and these secondary innovations may indeed be as important (if not more so) than the original. In this sense, the existence of intellectual property rights will itself stimulate Type III forms of information emanating from an earlier creation, in addition to the more traditional incentive-effects on future creations. In other words, contrary to the control-critics' central thesis, additional "control" is actually likely to induce the creation of additional open (here, Type III) information. Table 3 below notes some examples:

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50. See, e.g., Tom Shales, 'Pictures': Worth a Thousand Words, Wash. Post, May 27, 2000, at C1 (describing controversy over exhibition of Mapplethorpe's work and resulting obscenity trial).

51. Simon Jenkins, History Is Not Bunk, but Most Historians Are, Times (London), July 5, 2002, at 22; Bob Schwarz, Photo Show Focuses on Schindler, Holocaust, Charleston Gazette, Aug. 28, 2002, at 1D.

52. See, e.g., Terence Chea, Spinning Gold from Goats: Canadian Biotech Says It's Found a Way to Mass-Produce Spider Silk, Wash. Post, May 31, 2002, at E1; BBC, The Science of Superheroes (June 13, 2002), at http://www.bbc.co.uk/science/hottopics/superheroes/index.shtml (on file with the *Columbia Law Review*).

53. See, e.g., London v. Carson Pirie Scott & Co., 946 F.2d 1534, 1538 (Fed. Cir. 1991) ("Although . . . inventing around patents to make new inventions is encouraged, piracy is not."); Kimberly-Clark Corp. v. Johnson & Johnson, 745 F.2d 1437, 1457 (Fed. Cir. 1984) (holding that "defendants have successfully designed around [plaintiff's] claims, as they had a right to do").

54. See, e.g., Rosemarie Ham Ziedonis, When the Giants' Shoulders Are Crowded: Fragmented Rights and Patent Strategies in Semiconductors 29 (Jan. 2002) (unpublished manuscript, on file with the *Columbia Law Review*) (examining this development in the semiconductor industry).

TABLE 3: EXAMPLES OF STIMULATIVE TYPE III INFORMATION

Type I	Type II	Type III
Musical work by Eminem	Works using same words, music	Commentary on social ills
Schindler's List	Works adapting story, visuals	Discussion about Holocaust
Mapplethorpe photography	Similar photos or live shows	Debates about free expression
Spider-Man	Related stories, books	Information about spiders
Locking transmission differentials with concentric springs[55]	Similar techniques	Concept of back-up mechanism

While the magnitude of Type III information is difficult, if not impossible, to determine (by definition, Type III information is exceptionally difficult to quantify or measure), the limited evidence available suggests that such effects may be quite significant, at least in the patent context in which such studies exist. In the specific example of spillovers from research and development, Griliches notes that collected empirical studies confirm that "R&D spillovers are present, their magnitude may be quite large, and social rates of return remain significantly above private rates."[56] Indeed, Griliches estimates that spillovers could provide "most of the explanatory effect" of estimates of productivity growth spurred by investments in research and development.[57] Levin shows that research and development executives themselves count spillovers as among the most important methods of gaining information from outside the firm.[58] Scherer's work on interindustry R&D flows paints a compelling picture of the importance of technological interdependencies in even distinct industries.[59] These examples are but a small portion of the fairly substantial work done on at least one aspect of Type III information.

Even less is known about the magnitude of the other forms of Type III information described above, such as stimulative information, but there is little reason to expect their magnitude is trivial. Inventing-around is certainly a well-understood business and technology strategy.[60]

55. See Vehicular Techs. Corp. v. Titan Wheel Int'l, Inc., 141 F.3d 1084, 1085—93 (Fed. Cir. 1998).

56. Zvi Griliches, The Search for R&D Spillovers, 97 Scandinavian J. Econ. S29, S43 (1992).

57. Id. at 44.

58. Levin, supra note 36, at 425–26.

59. Scherer, supra note 22, at 32–65. For example, Scherer's analysis shows how certain industries "export" R&D spillovers to others, with computers and farm equipment in particular being sources of innovation. See id. at 39.

60. See *Vehicular Techs.*, 141 F.3d at 1093 (vacating and remanding grant of preliminary injunction against alleged infringer who modified product so as to avoid literal terms of the claim).

Hall and Ziedonis have documented an additional patenting response to competitors' patenting behavior.[61]

In the end, however, the precise magnitude of Type III information is perhaps less important than the recognition that it clearly exists. For its existence suggests that even fully "propertized" intellectual goods will nonetheless contribute, perhaps significantly, to the growth of open information. As I argue in Part III below, the failure to address this fundamental aspect of information creation is deeply damaging to the control-critics' argument against intellectual property rights.

B. *Information Wants to Be Consumed: The Real Limitations on Control of Information*

In Part I.A above, I have articulated the view that a complete understanding of the effects of intellectual property laws must necessarily consider the contributions of what I have described as Type III information. That is so because Type III information is in essence a direct contribution to the total public knowledge, information that is substantial (albeit indistinctly known), yet incapable of being appropriated by the holder of the underlying intellectual property rights.

In this Part, I turn to a more tangible (yet often overlooked and understated) aspect of intellectual property rights: the real limitations that exist and serve to temper the "control" that owners have over information, even within the largely-appropriable regimes of Type I and Type II information. Again, the recognition here relates to the intangible nature of information—and the resulting fact that intellectual property rights are a social construction, not a law of nature.[62] To that end, we must remember that there is a distinction between having the right to appropriate and actually doing so; there is a palpable limit to the law's effects.[63] The inquiry is commanded by the observation that a great deal of intellectual property infringement occurs every day: Books or newspaper articles are photocopied, extra copies of software are made, videotapes of movies are created and exchanged, patented products are copied, modified, and studied. Unquestionably, the advent of digital media and modern communications has only increased such forms of "everyday" infringement, such as file-sharing and digital video recording. This gap between rights and enforcement is worth considering, as it implicates theories of intellectual property based on control. This section identifies and describes these limitations on intellectual property rights, and then

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61. See, e.g., Bronwyn H. Hall & Rosemarie Ham Ziedonis, The Patent Paradox Revisited: An Empirical Study of Patenting in the U.S. Semiconductor Industry, 1979–1995, 32 RAND J. Econ. 101, 108–10 (2001); Ziedonis, supra note 54, at 10–14.

62. Jeremy Waldron, From Authors to Copiers: Individual Rights and Social Values in Intellectual Property, 68 Chi.-Kent L. Rev. 841, 850–51 (1993).

63. See, e.g., Harold Demsetz, Toward a Theory of Property Rights, 57 Am. Econ. Rev. 347, 355–57 (1967) (noting critical benefits of property rights in facilitating bargaining between rightsholders and others).

turns to the question of their implications for the contemporary debate about intellectual property.[64]

1. *Enforcement Costs.* — It is axiomatic that rightsholders will not enforce rights where the cost of doing so would outweigh the returns.[65] In the intellectual property context, the nonrival nature of the property implies that in many circumstances, ex ante enforcement may not be cost-justified: The marginal cost to the owner of "one extra copy" of a copyrighted work is likely to be quite low relative to enforcement efforts. It simply is not worth trying to stop me from making an extra copy of a music CD for use on my iPod. The calculus is quite different, of course, where many copies are made and distributed—or at least potentially distributed. Thus, it may well be worth suing me for ripping[66] that CD and making it available online.[67] While the line between cost-prohibitive and cost-justified enforcement will depend upon a number of contextual factors, the point here is to recognize that the line exists: There will be some low level of infringement that, even if known to the content owner, will simply be tolerated.[68] As a form of price discrimination, such toleration is likely to be welfare-enhancing in the intellectual property context.[69]

Two additional points are in order when describing enforcement costs. The first is that that some owners will evaluate costs according to non-economic factors, and thus may be more or less sensitive to enforce-

64. In the interests of brevity, I set aside the obvious limitations on intellectual property rights emanating from the patent and copyright statutory schemes themselves. See, e.g., 17 U.S.C. § 107 (2000) (fair use); 35 U.S.C. § 271(e) (2000) (experimental use exception).

65. See Demsetz, supra note 63, at 355.

66. "Ripping" refers to the process of extracting the soundtracks in digital format from a compact disc and copying them to a computer hard drive.

67. The history of copyright law in particular is replete with cases where changing the relationship between enforcement and distribution costs held out the prospect of radically changed levels of enforcement—which resulted in changes in the underlying legal regime. See Robert P. Merges, One Hundred Years of Solicitude: Intellectual Property Law, 1900–2000, 88 Cal. L. Rev. 2187, 2191–2206 (2000).

68. Savvy content owners will likely embrace this economic reality, by emphasizing the additional value of the underlying work. For example, note Apple Computer's pricing with respect to its release of its recent OS X 10.2 operating system. Though the single-license cost was $129, Apple also offered a $199 "family pack" that entitled the purchaser to install the software on all machines in a household (limit five). Apple Computer, Mac OS X v10.2 Family Pack, at http://store.apple.com/1-800-MY-APPLE/WebObjects/AppleStore.woa/70303/wo/2y4QkmgyalcP2QjBQEucw05TBhs/2.5.0.3.27.12.1.5.0.13.0 (last visited Jan. 24, 2003) (on file with the *Columbia Law Review*). In doing so, Apple clearly recognized the reality that such duplication was likely to happen in any event, noting that the family pack was "an inexpensive way for customers to be legal." Id. A related example here is the conventional licensing of most desktop software to cover two machines used primarily by the same person, or the common practice of "site-licensing" software at deep discounts.

69. John P. Walsh et al., The Patenting of Research Tools and Biomedical Innovation 27–28 (Oct. 9, 2000) (unpublished manuscript, on file with the *Columbia Law Review*).

ment costs than an idealized model of rational behavior would suggest.[70] Some rightsholders will seek enforcement at any cost, while others will eschew enforcement measures altogether. Yet this, I think, does not undermine the fundamental existence of enforcement costs, especially in an era where the creation and distribution of information is an increasingly important economic activity.

The second point to be made is that technological enforcement measures, paradigmatically digital rights management (DRM), may lower enforcement costs over time. Of course, DRM solutions themselves have significant costs associated with them, both in terms of fixed costs of development, deployment costs, and, potentially, lost sales due to consumer dissatisfaction. These effects of DRM are discussed at greater length below. As a general matter, the prospect of the elimination of the enforcement costs through technology is quite unlikely anytime in the foreseeable future. Certainly the early efforts in this regard have not been auspicious.[71]

2. *Normative Limitations.* — The important role that social norms play in structuring behavior, both within and without a legal framework, is well documented.[72] In the intellectual property context, this is true as well; powerful social norms against appropriating information exist in many contexts. Few people think of asserting a proprietary right to the information they post on an e-mail list, for example. Academics—the creators of enormous amounts of potentially-propertized information—have deeply-held norms concerning the free exchange of ideas.[73] At least part of the success of open source software development can be attributed to the social norms beld by those in the software-development community. Some have suggested, though the point is not without dissenters,

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70. One is hard-pressed to see the economic rationality in the Church of Scientology's use of copyright suits. See, e.g., Religious Tech. Ctr. v. F.A.C.T.N.E.T., Inc., 907 F. Supp. 1468 (D. Colo. 1995) (discussing copyright infringement and trade secret misappropriation action against nonprofit corporation which allegedly posted unpublished, copyrighted documents to the Internet); Religious Tech. Ctr. v. Lerma, 908 F. Supp. 1362 (E.D. Va. 1995) (addressing "a disgruntled former member of the Church of Scientology" who disclosed what church called copyrighted "Advanced Technology works"); Religious Tech. Ctr. v. Netcom On-Line Communication Servs., 907 F. Supp. 1361, 1365 (N.D. Cal. 1995) (addressing a "former minister of Scientology turned vocal critic of the Church" who used Usenet newsgroup alt.religion.scientology to critique Church and allegedly to post copyrighted documents).

71. See, e.g, Associated Press, SDMI: Quintessential Vaporware, Wired News, Apr. 29, 2002, at http://www.wired.com/news/politics/0,1283,52163,00.html (on file with the *Columbia Law Review*) (noting the music industry's failed efforts to develop encryption software); Matt Richtel, Digital Lock? Try a Hairpin, N.Y. Times, May 26, 2002, at D12 (noting that encryption on copy-protected CDs can he broken with a black magic marker).

72. See, e.g., Robert D. Cooter, Decentralized Law for a Complex Economy: The Structural Approach to Adjudicating the New Law Merchant, 144 U. Pa. L. Rev 1643, 1643–96 (1996) (analyzing the interplay among fair and efficient norms, decentralized and centralized law, philosophical concepts, and game theory).

73. See Rai, supra note 2, at 89–90 (discussing communal view of knowledge in scientific arena).

that norms enable the development of collective rights organizations and facilitate informational transactions.[74] To at least some nontrivial degree, norms clearly and directly limit the enforcement of intellectual property rights, and as Professor Rai has suggested, have proven relatively resilient in the face of long-term pressures.[75]

An easy response to this is that norms can change, or be overwhelmed by other pressures, such as profit motives. Professors Rai and Eisenberg have warned that the effects of intellectual property rights, combined with modern financial pressures in higher education, may undermine academic norms, thus resulting in less valuable intellectual exchange.[76] That norms can be changed over time is surely true; the questions are how much and how long it takes. Certainly for the foreseeable future, we can expect norms to limit—at least to a degree—the enforcement of intellectual property rights.[77]

3. *Marketplace Effects.* — The market's effect on intellectual property merits brief consideration in two ways. First, market pressures are likely to substantially limit the real monopoly power one might otherwise expect to be conferred by intellectual property rights. Additionally, similar pressures may even induce market actors to give away their intellectual property for low or for no cost.

a. *Intellectual Property ≠ Monopoly.* — A significant and yet oft-overlooked or understated limitation on intellectual property rights is the marketplace. Notwithstanding some of the language used to describe the grants of rights, intellectual property grants do not typically confer a "monopoly" in an economically significant sense.[78] To be sure, by definition, a good or service embodying the subject of intellectual property will be incompletely commodified;[79] exact substitutes are unlikely to exist. Yet,

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74. Robert P. Merges, Contracting into Liability Rules: Intellectual Property Rights and Collective Rights Organizations, 84 Cal. L. Rev. 1293, 1353 (1996). For the contrary view, applied to the biotechnological context, see Rai, supra note 2, at 133–34 (noting that diverse players in biotechnology field can in some cases lead to poor information sharing).

75. Rai, supra note 2, at 115 (noting that the efforts to stimulate patenting of university research have not proven entirely successful due to strongly held norms).

76. Id.; Rebecca S. Eisenberg, Patents and the Progress of Science: Exclusive Rights and Experimental Use, 56 U. Chi. L. Rev. 1017, 1085 (1989).

77. Rai, supra note 2, at 112–15 (concluding that legal changes did not much affect the scientific norm that basic research was best left unpatented).

78. Edmund W. Kitch, Elementary and Persistent Errors in the Economic Analysis of Intellectual Property, 53 Vand. L. Rev. 1727, 1730 (2000); Edmund W. Kitch, Patents: Monopolies or Property Rights?, 8 Res. L. & Econ. 31 (1986) (asserting that a patent confers a property right which is subject to competitive market pressures).

79. See Steven Cherensky, A Penny for Their Thoughts: Employee-Inventors, Preinvention Assignment Agreements, Property, and Personhood, 81 Cal. L. Rev. 597, 664–69 (1993) (noting that inventions are incompletely commodified because of recognition of "personhood" of director); Ruth L. Gana, Has Creativity Died in the Third World? Some Implications of the Internationalization of Intellectual Property, 24 Denv. J. Int'l L. & Pol'y 109, 141–42 (1995) (discussing third world societies that don't consider intellectual property to be as commodifiable as western nations); Marlin H. Smith, Note,

given the ability to use or create near substitutes, true monopoly power is likely to be quite rare. Differences will of course exist—some patents are broader than others, and particularly unique creative works may be difficult to substitute—but this does not diminish the point that market forces will customarily constrain, at least to some degree, the ability of intellectual property owners to control information.[80] Note also that competitive marketplace pressures are likely to increase as the number of intellectual works (both protected and unprotected) increases.

b. *The Economic Rationality of "Free."* — Another element of marketplace effects is the use of information as a sort of "loss-leader" in an effort to gain a competitive advantage in other markets. For example, in the computer software industry, there is an increasing movement to "open" valuable software code, in the hopes that complementary products can benefit. For example, no less an aggressive competitor than Microsoft is releasing much of the software infrastructure for its new .NET initiative,[81] in the clear hope that such an act will induce industries to further buy into this initiative, and ultimately redound to the company's benefit. (And, of course, such moves have their own pressures: A consortium led by Sun is releasing its own versions.[82]) Apple Computer, long derided as a "closed" company, is freely releasing a software implementation of a standard technology for creating automatically-interoperable network devices, because getting peripheral makers to adopt such a technology will stimulate sales for computers.[83]

The economic rationality of releasing information for free is not limited to software (though the standard-setting and network effects there make it particularly popular). A very large portion of our media and entertainment is offered to consumers without cost, and relatively little controls are placed on it.[84] Celera, a corporation involved in mapping the human genome, released the "raw" sequence data as it was obtained.[85]

Furthermore, releasing one's work in "open" (as in absence of control) form will often be a clear signal by the owner about the quality or nature of the good. We think differently about movies that are released

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The Limits of Copyright: Property, Parody, and the Public Domain, 42 Duke L.J. 1233, 1267–68 (1993) (describing copyrights as "incomplete" property).

80. See Landes & Posner, Indefinitely Renewable Copyright, supra note 8, at 41 (making the point that market forces will limit companies desire to control information).

81. See Microsoft, What is .NET?, at http://www.microsoft.com/net/basics (last visited Mar. 5, 2003) (on file with the *Columbia Law Review*); Microsoft, Technical Resources, at http://www.microsoft.com/net/technical (last visited Jan. 24, 2003) (on file with the *Columbia Law Review*).

82. See Sun, Sun ONE, at http://wwws.sun.com/software/cover/2001-0205 (last visited Jan. 24, 2003) (on file with the *Columbia Law Review*).

83. Jim Dalrymple, Apple to Release Rendezvous as Open Source, MacCentral, Aug. 30, 2002, at http://www.computerworld.com/networkingtopics/networking/lanwan/story/0,10801,73883,00.html (on file with the *Columbia Law Review*).

84. See Kinsley, supra note 14.

85. Rai, supra note 2, at 114. Celera's business model relied in part upon licensing access to its database and technologies developed in the human genome effort.

to critics and those that are not. And book reviews can be an important driver of sales.[86] Here, the rationality of free also suggests the rationality of open.

4. *Technological-Logistical Limitations.* — Another extra legal effect on the appropriability of information under intellectual property rights is what might be called technological-logistical reality. Put simply, perfect control is impossible. To a significant degree, this observation is only heightened by the continuing development of the Internet and digital communications; indeed, the impossibility of control is a consistent (if perhaps overstated) complaint of the content industries.[87]

In the copyright context at least, the conventional story is that further development of DRM technologies will change this equation, by either easing identification of infringement (via, for example, watermarking), or by automating the enforcement mechanisms.[88] While the holy grail of perfect DRM is plainly a major goal of at least some in the copyright industries, I deal in this section with reality. And there are very good reasons to doubt the meaningful impact of DRM anytime soon. The software industry's experience with widespread copy protection in the 1980s stands as a stark lesson, with significant problems of implementation, consumer acceptance, and effectiveness eventually yielding the current negligible level of efforts.[89] Further, as noted above, initial steps in the current development of DRM have not proved auspicious.[90] In many copyright contexts, the persistence of current technologies will profoundly delay the meaningful implementation of DRM technologies.[91] Even the aggressive legal efforts mounted by the content industries have had relatively little effect on the reality of some level of unauthorized

86. Landes & Posner, Indefinitely Renewable Copyright, supra note 8, at 359 (arguing that, because book reviews are a credible form of advertising, they are useful to publishers and consumers, and thus should be granted as fair use).

87. See Jane Black, Brass-Knuckle Marketing vs. the Pirates, BusinessWeek Online, Aug. 13, 2001, at http://www.businessweek.com/bwdaily/dnflash/aug2001/nf20010813_790.htm (on file with the *Columbia Law Review*); Brad King, Pirates Beware: We're Watching, Wired News, Jan. 3, 2001, at http://www.wired.com/news/technology/0,1282,40866,00.html (on file with the *Columbia Law Review*).

88. The paradigmatic example here is the various copy-protection schemes being developed and tested for CDs. For another example, see Software Guards Could Help Fight Piracy, Geek News, June 27, 2002, at http://www.geek.com/news/geeknews/2002june/gee20020627015153.htm (on file with the *Columbia Law Review*).

89. See Peter H. Lewis, Software Copy Protection: More Companies Shun It, N.Y. Times, Aug. 19, 1986, at C5; T.R. Reid, Consumers Win as More Software Firms End Copy Protection, Wash. Post, Nov. 10, 1986, at 13; see also Steven Levy, The Customer Is Always Wrong, Newsweek, Mar. 11, 2002, at 65 (predicting similar response to CD protections).

90. See supra note 71 and accompanying text.

91. For example, as long as I can play a DVD or CD on my current equipment, nothing prevents me from simply directing its output onto my computer, even if the CD is "protected" from ripping. See, e.g., Levy, supra note 89, at 65 (predicting that consumers will retain current equipment).

copying.[92] And this does not even begin to address the additional reality that almost all DRM solutions are themselves vulnerable to countermeasures (information about which is easily disseminated).[93] In any event, DRM has little applicability to the logistical limitations on the enforcement of patents, which typically concern an inability to detect (or prove) infringement that is not embodied in a publicly available good or service. The bottom line here is that the fact of technological limitations on the enforcement of intellectual property rights is likely to persist for the foreseeable future.

5. *The Mutability of Real Limitations on Intellectual Property Rights.* — The explication of current "real" limitations on the enforcement of intellectual property rights will spur an easy and obvious response: At least some of these limitations are mutable, changeable either by the law itself, long run economic pressures, or technological development. To some degree, of course, this is what the contemporary debate is all about: the perception, at least, that intellectual property rights are increasing in applicability and enforceability. Yet this objection only exposes the weakness of the control-critics' approach. On the one hand, as an empirical matter, there are serious reasons to doubt that the limitations noted above will dramatically diminish anytime soon, suggesting that analyses based on such assumptions are on shaky ground. On the other hand, as I note further in Part II below, allowing creators and inventors additional control over information of Type I and Type II is likely to be welfare-enhancing in the long run.

II. GRAZING THE EXPANDING COMMONS: IMPLICATIONS OF INCOMPLETE CAPTURE

Articulating the view that any given rightsholder cannot completely, or perhaps even substantially, appropriate (or control) the informational value of her creation leads to several important conclusions with application to the contemporary debate. First, given the expanding nature of

92. Notwithstanding the enormous legal effort undertaken by the content industries against DeCSS, a small software program that decrypts the compressed content of DVDs, this author was able to obtain a copy in less than two minutes, using only a web browser.

93. There are several recent examples of major DRM systems being compromised. The "smart cards" used by DirecTV and other major satellite television services to authenticate subscribers have long been a (successful) target of hacking efforts, notwithstanding that by some accounts "[t]he cards used by DirecTV and Dish are considered among the most sophisticated conditional access products in the world." See, e.g., Barbara Whitaker, 7 Accused of Creating Ways To Steal Satellite Television, N.Y. Times, Feb. 3, 2003, at A24 (noting the theft of millions of dollars in revenue). Consumer electronics equipment, such as TiVo, DVRs, and MP3 players, often include DRM features that invariably seem to be overcome—often in the name of "improving" the devices. See, e.g., Kevin Savetz, Breaking It Open, Making It Better, Wash. Post., Mar. 2, 2001, at E1 (reporting increasing popularity of hacking consumer electronics devices). Indeed the success (and ubiquity) of hacking DRM systems has perhaps spurred an alternative approach, using marketing to emphasize the legal rules against piracy rather than simply beefing-up DRMs. See, e.g., Black, supra note 87 (noting this trend).

the information commons engendered by intellectual property rights, one major implication is that additional appropriability, at least along some dimensions—thus increasing the incentives to produce information covered by intellectual property—is likely to be to welfare-enhancing. Second, the flexibility of private arrangements allowed by control is likely to be important, both because of the need to keep options open in an era of rapid changes, and because the ability for owners to price discriminate may reduce deadweight losses under some circumstances.[94] And third, the ability to coordinate activities is important for recent trends in supporting the direct building of the public domain, such as the open source software projects, or the voluntary dedication of intellectual works to the public domain.

A. *Additional Appropriability (Probably) Means Greater Information*

In contrast to the arguments that greater control necessarily implies less overall public information, the identification of Type III information in particular supports the view that appropriability is as likely to be welfare-enhancing in this context.

To the control-critic, the answer will seem quite clear: How can it *not* be welfare-enhancing to relax control on information? If half of my property is converted to common use, how can it *not* be the case that the commons has increased? Yet the answer, I suggest, is not nearly as simple, for any analysis of the information-effects of intellectual property rights must evaluate the dynamic effects and account for the nature of intangible property. Factoring in dynamism and intangibility (e.g., the incomplete capture described in Part I.A) yields a far different result. The question is not whether converting half of my property to the commons will increase the commons, but whether doing so today will increase the commons of tomorrow—as much as would occur if the conversion had not occurred. For the quantity of open information (the information commons) will increase in either case; it is not limited to the presently available "land."[95]

Again, returning to Figure 1, it is useful to think of the total quantity of information produced by an invention as being comprised of three distinct components: the core creation (Type I), directly related information (Type II), and indirectly related information (Type III). As described above, each of these components has a different level of appropriability (or, if one prefers, control), with Type I being the most appropriable, Type II being partially appropriable under current law, and

94. See, e.g., William W. Fisher III, Property and Contract on the Internet, 73 Chi.-Kent L. Rev. 1203, 1234–40 (1998) (arguing that use of contracts and technological means enable rightsholders to engage in price discrimination, which reduces deadweight loss). But see Wendy J. Gordon, Intellectual Property as Price Discrimination: Implications for Contract, 73 Chi.-Kent L. Rev. 1367, 1369 (1998) (critiquing arguments calling for additional price discrimination).

95. See supra Part I.A.

Type III being open (or uncontrolled). So the total quantity of information (I) produced by creations or ideas (during a given time frame) is represented by the sum of each of the components (i_I, i_{II}, i_{III}), or symbolically $I = i_I + i_{II} + i_{III}$. Our interest here is in the open information (O), which is some proportion of the total. The open information produced is then the sum of the open information component of each of the three sub-types (I, II, III). (Note that definitionally, all Type III information is open.) If we let c_n be a coefficient representing the proportion of open information in each type, then symbolically the production of open information is represented by

$$O = c_I i_I + c_{II} i_{II} + i_{III} \quad (1)$$

Intuitively, the production of open information is a function of both the quantities of each type (i_I, i_{II}, i_{III}) and the proportion of open information generated by Types I and II (c_I, c_{II}).

We now need to account for the dynamic incentive-effects. Such effects are a function of the control given to rightsholders, and will thus affect the quantity of creations or information produced. As a general matter, greater control should yield greater incentives, and thus greater production of works.[96] (We'll relax that assumption below.) Thus, increasing control will reduce the proportion of open information on Types I and II (in equation 1 above, it will reduce c_I and c_{II}), but it will result in a greater total number of works, which for simplicity we can represent as a coefficient z in our equation:

$$O(z) = z[c_I i_I + c_{II} i_{II} + i_{III}] \quad (2)$$

Recall, of course, that information is cumulative, so over time, the open information produced in any time period will be added to the total.[97]

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96. Landes and Posner's model of copyright protection suggests that incentive-effects will be dampened at some level by the additional costs that authors will have to incur to create as a result of greater protection (i.e., control) and the necessity of licensing transactions. Landes & Posner, Economic Analysis, supra note 24, at 334–35. For the purposes of the analysis here, I am assuming, as most of the control-critics seem to, that new information goods are almost entirely constructed of "open" information (either that in the public domain, or that freely accessed), and thus that these effects will be negligible. Note also that my analysis suggests that the "cost of inputs" effect may itself be ameliorated by the growth of open information.

97. The reader will note of course that the potential exists for authors or inventors to transmogrify the open information of today into the Type I (proprietary, controlled) information of tomorrow. As I earlier argued, supra note 34, this (a) does not diminish the utility of open (or Type III) information, and (b) is equally true for models that do not recognize Type III information. For example, the curtailment of the derivative work right in copyright (a paradigmatic reduction in the scope of the right), see 17 U.S.C. § 106 (2000), would obviously leave room for "derivers" to secure their own copyrights.

Combining information-intangibility (that is, recognizing Type III information) with dynamic effects (as I've tried to do in simplistic form in Equation 2) suggests the following fundamental points:[98]

[1] *Even as control becomes perfectly effective,*[99] *open information will continue to be created and disseminated.*

[2] *The production of open information will be greater under a regime of "perfect" control than any system of less control under the following conditions:*

[a] *a long-term time horizon; and*

[b] *a positive relationship between control and incentives to create.*

Point [1] is supported by the recognition, established in Part II.A, that information wants to be free: that all creations of even highly proprietary information (Type I) have a corresponding open component (Type III). Point [2] is derived from the combination of Point [1] and dynamic incentive-effects. If greater control yields greater incentives to create works of Type I, then "perfect" control (maximizing creation of Type I) will likewise maximize the creation of Type III (open) information, given the cumulative nature of information and a long enough time period.

These Points can be simulated for illustration purposes, making some assumptions for simplicity, and constructing reasonable estimates of the various factors. (Note of course, that the factors in Equation 2 are likely to be virtually unascertainable; the following simulations should be considered in this light.)

Consider the following three scenarios. Scenario 1 might be said to assume the current situation, with Type I information being 10% open (c_I = 0.10), Type II information being 40% open (c_{II} = 0.40), and Type III information being completely open. Scenario 2 moves to a less controlled situation, perhaps as a result of expanding the legal set-asides (such as fair use or exceptions for experimentation or reverse engineering). Here, appropriability in Types I and II drops by a third, so openness becomes 40% and 60%, respectively (c_I = 0.40, c_{II} = 0.60). (Type III, of course, remains open.) Scenario 3 models "perfect" control (an increase of about a third, when looking at Types I and II combined), where information of Types I and II becomes completely appropriable (c_I, c_{II} = 0). Table 4 summarizes the scenarios.

98. See infra note 108 and accompanying text for a discussion of the limits of those concepts.

99. As c_I and c_{II} drop to zero in Equation 2.

TABLE 4: PERCENTAGE OF OPEN INFORMATION

	Type I (c_I)	Type II (c_{II})	Type III
Status Quo (scenario 1)	10%	40%	100%
Less Control (scenario 2)	60%	60%	100%
More Control (scenario 3)	0%	0%	100%

Note that these scenarios—for simplicity and in keeping with the general thrust of the arguments against control—set aside any informational quantities that (a) result from the limitations on control described in Part I.B above, or (b) are released when the rightsholder has chosen to disseminate her information for others' use, such as through licensing agreements or affirmative designations of openness (as described more fully in Part II.C below). Thus, the scenarios are likely to dramatically understate the real quantity of accessible information.

Assuming for simplicity that the quantity of information in each of the three categories is the same[100] (a unitary amount), one can easily sum the rows, revealing that Scenario 2 (less control) clearly dominates either of the other two options. Yet as I noted above, ending the analysis here would ignore the dynamic effects of intellectual property rights on information production. Instead, we need to repeat the calculation in series, factoring in differences in ex ante incentives. Again, for simplicity, assume a directly proportional relationship between appropriability and incentives[101] (more on this assumption below). Thus the one-third reduc-

100. This assumption would seem to understate rather significantly the informational importance of Type III (indirect) information, and thus favor the "less control" scenarios. Most research on the magnitude of these sorts of indirect informational externalities indicates perhaps a two-to-one ratio in favor of what I call Type III information. See, e.g., Griliches, supra note 38, at 501–25; see also supra notes 55–61 and accompanying text.

101. See generally F.M. Scherer & David Ross, Industrial Market Structure and Economic Performance 613–60 (3d ed. 1990) (surveying effects of the patent system); Schumpeter, supra note 22, at 87–106 (arguing that the granting of monopoly rights would stimulate innovation); Demsetz, supra note 63, at 345–54 (arguing "that property rights arise when it becomes economic for those affected by externalities to internalize benefits and costs"). For more background material, see Richard C. Levin et al., Appropriating the Returns from Industrial Research and Development, 1987 Brookings Papers on Econ. Activity 783, 815–18 (comparing the influence of the patent system in different industries); Edwin Mansfield, Patents and Innovation: An Empirical Study, 32 Mgmt. Sci. 173, 173 (1986) (summarizing effects of the patent system on innovation); Edwin Mansfield, Unauthorized Use of Intellectual Property: Effects on Investment, Technology Transfer, and Innovation, *in* Office of Int'l Affairs, Global Dimensions of Intellectual Property Rights in Science and Technology 107, 133–39 (Mitchel B. Wallerstein et al. eds., 1993) (comparing effects of intellectual property rights protection on technological innovation in developed and developing countries); Robert P. Merges, Uncertainty and the Standard of Patentability, 7 High Tech. L.J. 1, 10–12 (1992) (describing how the patent standard influences research).

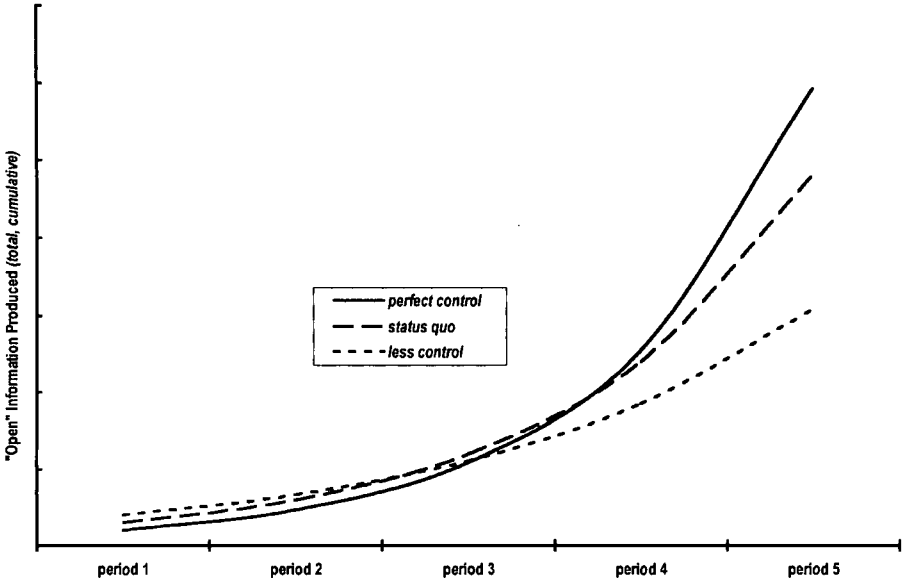
tion of appropriability for Scenario 2 would correspondingly decrease incentives by one-third; the similar increase in appropriability for Scenario 3 would increase incentives as well. Recognizing that total open information is cumulative, and running the calculation for multiple periods (five, for example), yields a markedly different result, shown in Table 5:

TABLE 5: TOTAL OPEN INFORMATION

	p1	p2	p3	p4	p5
Status Quo (scenario 1)	1.5	3.0	6.0	12.0	24.0
Less Control (scenario 2)	2	3.3	5.6	9.3	15.4
More Control (scenario 3)	1	2.3	5.4	12.7	29.6

The results of Table 5 can be graphically depicted as well:

FIGURE 2: OPEN INFORMATION PRODUCED



As can be observed, the "perfect" control scenario appears to be the clear choice in the long term (at least under these assumptions),[102] though the less control scenario is somewhat better in the early periods. Note that because of the cumulative nature of information, extending periods beyond the five depicted here only makes the results more dra-

102. At least taking our goal to be (myopically and unrealistically) information production. See infra note 118 and accompanying text.

matic; using the same numbers as above, comparing Scenarios 2 and 3 to the status quo baseline, results are set forth in Table 6:

TABLE 6: OPEN INFORMATION (PERCENT OF STATUS QUO)

	p5	p10	p15
Status Quo (scenario 1)	100%	100%	100%
Less Control (scenario 2)	64%	26%	10%
More Control (scenario 3)	124%	267%	577%

Taken together, these fundamental insights provide a powerful counterweight to the contemporary criticisms of control as destructive of open or public domain information. Their limits, however, must be clearly understood. I do not mean to suggest that the policy implications of the analysis above are to maximize control as much as possible (as Point [2] might seem to imply at first glance). Nor do I assert that eliminating the restrictions on control of intellectual property will result in a 477% increase in open information as compared to the status quo.

A particular note is in order concerning the relationship between control and incentives to create. Some important contributions to the literature suggest that additional control may have relatively little effect on incentives to create, at least in specific circumstances.[103] As should be apparent, this would suggest that the provisos for Point [2] noted above are not present in these cases, and that the expansion of control would not necessarily expand open information. Indeed, in some circumstances, a reduction in control might be beneficial to the public domain,[104] if such actions did not reduce the incentives to create.[105]

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103. See generally, e.g., Wesley M. Cohen et al., Protecting Their Intellectual Assets: Appropriability Conditions and Why U.S. Manufacturing Firms Patent (or Not) (Nat'l Bureau of Econ. Research, Working Paper No. 7552, 2000), available at http://www.nber.org/papers/w7552 (on file with the *Columbia Law Review*) (analyzing survey data with R&D managers, suggesting that patents are of relatively small importance in R&D decisions); Mariko Sakakibara & Lee Branstetter, Do Stronger Patents Induce More Innovation? Evidence from the 1998 Japanese Patent Law Reforms (Nat'l Bureau of Econ. Research, Working Paper No. 7066, 1999), available at http://www.nber.org/papers/w7066 (on file with the *Columbia Law Review*) (finding quite small response in levels of R&D and innovation following significant patent law expansion). For more background, see generally Benkler, Unhurried View, supra note 2 ("There is no *a priori* theoretical basis to claim that these laws would, on balance, increase the social welfare created by information production."). For contrary views, see supra note 96.

104. Though it would decrease the other benefits I identify in Part II.B below.

105. The analysis above can be repeated under these changed circumstances: Looking back at equation 2, an increase in c_I and c_{II} could be possible without a corresponding decrease in the coefficient z. This would yield more open information with less control.

Exploring the effect of the assumption of a positive relationship between control and incentives reveals an important policy analysis insight: the crucial importance of the relationship between changes in appropriability (control) and incentives.[106] The analysis suggests that the production of open information is determined by the details of the control-incentives relationship: A positive relationship (increasing control yields increasing incentives) yields a positive effect on open information; a neutral or negative relationship (increasing control yields no additional incentives) yields a negative effect.[107] This in turn argues rather persuasively that the impact of intellectual property policy proposals are best evaluated according to their effects on *incentives*, rather than on their perceived effects on the public domain or open information. That is, the focus on the public domain may be obscuring the analysis rather than providing any particular policy insights. Thus, the public domain-based arguments against the control of intellectual property seem not only to have the issue backwards much of the time, but to be asking the wrong question altogether.

Showing that control does not have the debilitating effect on information production that some have suggested, however, does not itself support the conclusion that intellectual property rights should be aggressively expanded. Recall that the analysis above focuses solely on the key question posed by the control-critics—information production—rather than a fuller analysis of the costs and benefits of intellectual property rights, such as the balancing of the quantity of information produced with its quality, or constitutionally related concerns about the breadth and scope of intellectual property rights.[108]

In sum, if the goal is the production of open information (i.e., information available for further use and development by all comers), the preceding analysis has shown that a full consideration of the dynamic effects and intangible nature of information argues rather strongly in favor of

106. This is a rather complex question. Even assuming that people are rational maximizers, there are still, it seems to me, rather difficult questions about the interplay between control and incentives. For example, if additional control yields more information goods, then that will increase the market pressures on rightsholders, competing away some of their surplus. Yet the additional open information may actually decrease the costs of entry into the information-production field.

107. Note that from a policy perspective, of particular import is the ratio of the change in control to the corresponding change in incentives to create. Policy proposals that exhibit a large increase in incentives for only a modest increase in actual control are particularly attractive under this analysis. Conversely, increases in control that appear to have little expected incentive effects are decidedly less beneficial. See, e.g., Brief of George A. Akerlof et al. as Amici Curiae in Support of Petitioners at 6–7, Eldred v. Ashcroft, 123 S. Ct. 769 (2003) (No. 01-618) (arguing that the additional compensation provided by adding twenty years to the end of a copyright term is 0.33%); see also *Eldred*, 123 S. Ct. at 814 (appendix to opinion of Breyer, J., dissenting) (same).

108. For example, a determination that information of Types I and II were qualitatively superior to Type III information would obviously argue against the quantitative argument set forth here.

the widespread benefits of granting creators of information rights of control. Although this analysis necessarily does not make a complete case for extending strong rights of control to informational creations, it does suggest additional benefits of the control inherent in intellectual property rights, as described in the following sections.

B. *Flexibility and Control*

This section builds on the analysis in Part II.A above to discuss two important benefits of control that seem likely to create conditions wherein additional information can be created for the public benefit. Both relate to the nature of control as enabling flexibility in private arrangements. The first point is that in this era of rapid change and upheaval, there is much that we do not know about the future shape of technological and creative progress: Who will do it, how it will be paid for, etc. We can be sure, however, that any definitive statements as to, for example, the range of appropriate business models to stimulate the production and distribution of music in the digital era are likely to be incorrect ex ante. Thus, the flexibility of control can provide an important hedge against current mistakes.

The second point is to note the role of control in facilitating price discrimination in some situations. In the intellectual property context, price discrimination can address, at least to some degree, concerns that might arise about market power, by increasing access to information without decreasing dynamic incentive-effects.[109] I take each of these in turn.

1. *Fostering Flexibility.* — Just as the quantity of information produced is bounded only by the limits of human imagination, the various uses and (in particular) business models based on innovation and creativity have the potential to be enormously flexible. This is especially true in the context of new communications technologies such as the Internet, which open up entire new realms of opportunities to the information entrepreneur.[110] Yet while we can recognize the general prospects of rapid changes in the marketplace for information goods, it seems exceedingly unlikely that we can ex ante predict their scope and direction with any reliability. In such an environment, where change is certain but visibility is limited, strong intellectual property rights offer a way to ensure that development is not hindered by unclear or limited rights.

Consider, for example, the case of *Kelly v. Arriba,*[111] involving whether the copyright law should allow Kelly, a professional photographer offering digital versions of his photos via his web site, to control whether an Internet search engine (specifically for images) could display

109. See generally Fisher, supra note 94, at 1234–40 (summarizing effects of price discrimination).

110. See generally Jane C. Ginsburg, Copyright and Control over New Technologies of Dissemination, 101 Colum. L. Rev. 1613, 1642–45 (2001) (suggesting that copyright control may lead to future innovations in technology in order to evade such control).

111. Kelly v. Arriba Soft Corp., 280 F.3d 934 (9th Cir. 2002).

full-size images of Kelly's works as part of search results. To control-critics, Kelly's request seems like an unwarranted extension of copyright to "control" the operation of search engines; imagine, the argument goes, if anyone could assert proprietary rights over links to their pages: Search engines would likely cease to exist, collapsing under the weight of contracts and copyrights.[112] Instead, argue the critics, Kelly's copyright (if allowed at all) should be limited to cases where his files were actually moved or copied to another location, and not applicable via the use of the ubiquitous hyperlink technology.[113] This argument may seem reasonable at first glance: Why should the Kellys of the world have the ability to determine the way they are, in essence, referenced by others? (Indeed, in realspace, giving someone directions would hardly constitute copyright infringement.)

Yet this argument, whether or not it is sound as a matter of the copyright statute,[114] does not account for the effects of the decision on the range of business models available to the Kellys of the world. Denying Kelly the ability to determine the use of his work in the hyperlinking context reduces the available options to an all-or-nothing selection: Either tolerate the link, or remove the material from the Internet.[115] Consider, for example, if Kelly's business model involved passing users through specific pages of his web site, perhaps because of advertising or the hope of

112. These sorts of claims are unfortunately common in the Internet context. In a 1999 case involving the right of eBay to legally enjoin particular "bots" or automated search agents (sent, in that case, by auction-aggregation services) under a theory of trespass, twenty-eight intellectual property law professors asserted that the application of trespass to web servers would inevitably destroy search engines—by allowing owners of individual web pages to demand conditions upon which they could be searched. See Brief of Amici Curiae in Support of Bidder's Edge at 8–11, eBay v. Bidder's Edge, No. C-99-21200 RMW, 2000 U.S. Dist. LEXIS 21971 (N.D. Cal. Dec. 8, 2000). Such a claim was (and is) spectacularly broad. Search engines continue to offer billions of web pages, providing enormously valuable services to users, and more to the point, to the web pages themselves. Indeed, the relevant concern with search engines is quite the opposite, with the increasing popularity of "paid results" at least potentially decreasing their utility—unless used as a signal of web site quality. See Michael Totty & Mylene Mangalinda, Cat and Mouse: As Google Becomes Web's Gatekeeper, Sites Fight to Get In, Wall St. J., Feb. 26, 2003, at A1; cf. Robert P. Merges et al., Intellectual Property in the New Technological Age 562 (2d ed. 2000) (summarizing economists' arguments that advertising serves a "signaling function," indicating to consumers that product advertised is of high quality because firm went to expense of advertising it).

113. The photos, even in full size, were not physically moved from Kelly's server, but were instead referenced by the Arriba pages in such a way as to appear as an integral part of the page.

114. There is some question regarding whether the practice of "inline linking" fits the definition of a copy under the statute.

115. I am setting aside here any ability that Kelly undoubtedly has to use technological means to prevent hyperlinking. While technological self-help might provide an additional range of options, there is little question that flexibility afforded by a property-backed transaction would be greater. Further, technological approaches will impose nontrivial costs on Kelly, whether the actual cost of implementing the technological fix or the cost due to error, inflexibility, or circumvention.

stimulating further sales, or even some other reason.[116] In the absence of control over the way that visitors are referred to his site, a range (and perhaps a great range) of alternative arrangements will be substantially precluded.

Some might argue that such choices are simply inherent in this new medium, and that Kelly should (or, in a stronger version, "will") still realize a net gain as a result of being able to access the huge audience of the Internet. But this approach is a troubling declaration of the "appropriate" arrangements to be made on the Internet. Suggestions that rely on a permanently-fixed conception of the "nature of the Internet" should be regarded with caution; in such an explosively changing social, economic, technological environment, there would seem to be no a priori reason to privilege any particular state of the world over those yet to be realized (and, indeed, good reasons not to). We simply cannot foresee the development of this medium (and indeed, succeeding ones) with any reliability.[117] Fixing the range of future possibilities today carries with it great risks. To the extent that a policy goal is to increase the amount of informational content accessible via the Internet, extending rights to creator-owners in this new medium will be beneficial.[118]

The point that is often missed in such discussions is that these new markets for intellectual goods which spring forth from technological change present creators and inventors with an only somewhat modified version of the standard ex ante investment decision. It is not inevitable that realspace content owners will enter the realm of cyberspace, just as it is not inevitable that today's creators will have sufficient incentives to create for an increasingly digital, increasingly online marketplace. Kelly chose to invest in Internet distribution, seemingly assuming that he could tailor online arrangements to his needs. Whether his choice of business model was "correct" is a decision that he seems best placed to answer.[119]

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116. Maybe he offers an e-mail list for interested parties, or maybe the photos are simply part of a larger artistic work that must be seen in its entirety to appreciate. However, we cannot predict the full range of models that might be followed. In reality, he apparently sells books of his photographs, and thus seems likely to want to drive traffic to his own pages.

117. Yet it is quite likely that one can *generally* foresee the commercial potential, for example, of these opportunities, thus affecting the ex ante incentives. See Landes & Posner, Indefinitely Renewable Copyright, supra note 8, at 4 & n.11 (noting that new works build heavily on earlier works); see also Ginsburg, supra note 110, at 1642–45 (arguing the Internet as one of a foreseen class of opportunities).

118. I do not doubt that there might be other valid policy goals that could guide the analysis, such as the support of the Internet as a medium for primarily noncommercial forms of interaction. If we want to optimize the quantity of intellectual content in this new medium, then control provides a means for doing so.

119. Some might point to the potential for transaction costs in allowing web page owners to "strike a deal" with anyone wanting to reference them in a link. Such costs seem likely to be rather small, however. One expects that the default rule will be to allow linking, given the almost universal nature of the reason to build a publicly accessible web site in the first place. Again, note that the decentralized nature of the Internet grants

2. *Reconciling Market Power and Incentives.* — Social costs related to monopolies are often noted as a fundamental challenge for intellectual property rights.[120] And although (as noted above) intellectual property rights are not, as a general matter, accurately described as monopolies, to the extent that such pricing power was of concern in any particular instance, greater—rather than less—control is likely to be the appropriate response. First, control allows price discrimination, which is generally understood to have two beneficial effects of relevance here. One, it can ameliorate costs related to monopoly, by increasing access to the good or service. Two, it can increase the monopolist-discriminator's revenue, thus maintaining or increasing ex ante incentives. More than two decades ago, Demsetz noted the potential for price discrimination to address concerns about access (the basic social cost of monopolies) without decreasing the levels of investment in invention and creativity.[121] Indeed, to a large degree, the basic structure of intellectual property rights facilitates at least rough price discrimination, allowing inventors and creators to distinguish among classes of buyers, thus facilitating a form of price discrimination that serves to stimulate investment and creativity while increasing access to the informational goods.[122]

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substantial power to search engines and other collections of links vis-à-vis individual web pages, thus dramatically tempering any real power of web pages to engage linkees in costly negotiations. This intuition is confirmed by the fact that, in the aftermath of Kelly v. Arriba Soft. Corp., 280 F.3d 934 (9th Cir. 2002) (granting content owners a right to enjoin at least some kinds of links), the specific types of services at issue remain universally available and apparently undiminished—suggesting that the burden of persuasion rests squarely on those arguing against the result. Ditto.com and Google.com provide two examples. There are viable concerns, however, about transitional effects: To the extent that the pro-linking default rule becomes questioned, then one can expect potentially severe chilling effects on hyperlinking due to the fear of damages. It may then be necessary to establish by legislation (or creative judicial interpretation) a clear default rule in favor of linking.

120. See, e.g., William D. Nordhaus, Invention, Growth, and Welfare: A Theoretical Treatment of Technological Change 86–90 (1969); see also Scherer & Ross, supra note 101, at 450–54 (surveying the social costs of the patent system, including costs related to market power).

121. Harold Demsetz, The Private Production of Public Goods, 13 J.L. & Econ. 293, 296–97 (1970). Demsetz was assuming fully monopolistic pricing power for intellectual property owners and perfect price discrimination—neither of which seems very likely in the current reality.

122. For a discussion of how intellectual property laws intersect with price discrimination, see Stanley M. Besen et al., An Economic Analysis of Copyright Collectives, 78 Va. L. Rev. 383, 390 (1992); Gordon, supra note 94, at 1375; Glynn S. Lunney, Jr., Reexamining Copyright's Incentives-Access Paradigm, 49 Vand. L. Rev. 483, 630–34 (1996); Michael J. Meurer, Copyright Law and Price Discrimination, 23 Cardozo L. Rev. 55, 55 (2001); Michael J. Meurer, Price Discrimination, Personal Use and Piracy: Copyright Protection of Digital Works, 45 Buff. L. Rev. 845, 869–75 (2001). But see Julie E. Cohen, Copyright and the Perfect Curve, 53 Vand. L. Rev. 1799, 1800 (2000) (critiquing the contractual price discrimination model of copyright and proposing instead an economic model of copyright that acknowledges the central role of unpredictability in the creative process).

This is not to suggest that price discrimination is a panacea. The full benefits of price discrimination are achieved only under conditions of perfect control, which are impossible under foreseeable circumstances.[123] In addition, price discrimination is advantageous when compared to single-source monopoly pricing; it is unlikely to appear as favorable when set against the reality of most intellectual property situations, where in near substitutes—and perhaps competition even within the good or service itself—prevent the sort of pricing power that leads to substantial deadweight losses.[124] Yet where concerns about monopoly costs do arise, increasing control is as likely to be a solution as decreasing it.[125]

Revisiting the issue of dynamic effects suggests a second benefit of control in the context of deadweight loss. Given that additional control will generate additional production of intellectual goods (via ex ante incentives), this will likewise increase the potential for competition between near substitutes, and thus reduce pricing power.[126] Increasing the appropriability of books or music, for example, will make investments in such items more attractive, thus increasing the pool of available substitutes. If patents in a particular area were to occupy a particularly powerful position, an effective remedy might be to *increase* the incentives for R&D in that field, thus creating more competition as well as increasing the total pool of available information.[127] This is not to say that all creative works are perfect substitutes, even within similar categories of goods: *The Bonfire of the Vanities* occupies a different market than does *The Cat in the Hat.* Instead, the point is that, on the margin, the addition of intellectual goods into the marketplace will increase the potential for meaningful competition between near substitutes.[128]

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123. See supra Part I.B.

124. See Joan Robinson, Economics of Imperfect Competition (1933) (asserting that price discrimination is most appropriate where products are not near substitutes). For another perspective, see Gordon, supra note 94, at 1389–90.

125. Note, of course, that where incentives are not required to stimulate production of information, increasing control so as to facilitate price discrimination would be potentially counterproductive.

126. Landes and Posner acknowledge, but downplay, this possibility, noting that (in the copyright context at least), substitutes are imperfect, and that additional appropriability is likely to reduce the competition between copyrighted works and public domain works. Landes & Posner, Indefinitely Renewable Copyright, supra note 8, at 9–10. Again, following from the analysis in Part I.B above, it is not at all clear that increasing appropriability will result in a reduced public domain.

127. See supra Part II.A; cf. Rai, supra note 2, at 137–38 (suggesting decreasing appropriability due in part to concerns about the powerful position of patents in certain "upstream" biotechnological fields).

128. See Landes & Posner, Indefinitely Renewable Copyright, supra note 8, at 9–10 (renewal data).

C. *Adding to the Public Domain: Control and Coordination*

This point should be obvious, but is often missed or understated in the debate. To the extent that the control of intellectual property allows owners to coordinate the uses of their works to restrict access, it also enables those owners to coordinate in such a way as to enhance access. Two examples seem of particular relevance here: open source software development and outright dedications to the public domain.

1. *Control and Open Source Software Development.* — "Open source" software is so designated because the source code for an application is released along with the compiled version,[129] thus (in theory at least) allowing users to inspect, alter, improve, and perhaps even redistribute the software at low or no cost. User-programmers are exhorted to volunteer time to improve the software, adding their contributions to that of a great many others. Champions of such an approach argue that this will, in the long run, produce better software than the more traditional, corporate-driven approach. There certainly have been some notable successes, particularly with respect to the Apache web server software.[130]

While some control-critics point out the successes of the open source "movement" as an example of the triumph of openness over craven corporate interests, in fact it stands as a rather important example of the benefits of control conferred by intellectual property. As should be obvious, open source software invites a form of free-riding whereby open software is taken, improved or altered, and then distributed under the more typical closed commercial model. To the open source advocate, such a step is high treason. It is philosophically abhorrent because, in the rhetoric of the movement, "those users [will] not have freedom."[131] On a more functional level, it demoralizes the (volunteer) programmers—who see their work being appropriated for commercial gain—thus diminishing the crucial human inputs into the open source projects. Thus, for the

129. In software parlance, a program's "source code" is written by the programmers, typically in a "language" that is easily understood by (trained) persons, such as Java or C++. To get a program to run on a computer, the source code is "compiled" into a format utilized by the deeper layers of software and hardware. Typical commercial software packages do not offer the source code, which is generally regarded as an important asset for software companies.

130. As of August 2002, the Apache web server software ran more web sites than all other server programs combined (specifically, over 62% of the total). Note that Apache continues to gain relative market share notwithstanding major efforts on the part of Microsoft. See Netcraft Web Server Survey, at http://www.netcraft.com/survey (last visited Feb. 3, 2003) (on file with the *Columbia Law Review*); see also Nikolaus Franke & Eric von Hippel, Satisfying Heterogeneous User Needs via Innovation Toolkits: The Case of Apache Security Software 5–8 (MIT Sloan School of Management Working Paper No. 4341-02, 2002).

131. GNU Project, What Is Copyleft?, at http://www.gnu.org/copyleft/copyleft.html (last visited Feb. 3, 2003) (on file with the *Columbia Law Review*). GNU is a recursive acronym for "GNU's Not Unix."

efforts to be successful in the long term, the use of open source software must be coordinated:[132] that is, controlled.

It should come as no surprise that participants in open source development efforts recognize the need for external coordination, chiefly attempting to accomplish this through the licensing of intellectual property rights to the software.[133] Such licenses are not trivial; perhaps the best known open source license, the GNU General Public License (GPL), has been noted as an aggressive approach to both contract and copyright law, purporting to bind all subsequent users of the software to the terms of the original license.[134] Furthermore, many open source licenses (there are dozens advertised as such) contain a number of significant restrictions, such as:

- a requirement that any software containing licensed code be distributed only under the same license;[135]
- a requirement that all changes to licensed code be noted and released to the public;[136]
- a prohibition on "mixing" code subject to varying licenses;[137]
- a requirement that patent claims be waived;[138]
- a requirement that credit be given to original sources of the code;[139]
- a requirement that all changes to the code be licensed back to the original source;[140] and
- termination-of-license clauses implying that the original source can assert infringement claims under certain conditions.[141]

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132. Note, for example, that the GNU recommends the use of intellectual property rights rather than pure dedication to the public domain. Id.

133. In an interesting bit of rhetorical misdirection, the GNU suggests that its use of the copyright law, intended to restrict uses so as to maintain "freedom," is best termed "copyleft." Id.

134. Robert P. Merges, The End of Friction? Property Rights and Contract in the "Newtonian" World of On-Line Commerce, 12 Berkeley Tech. L.J. 115, 129 (1997); Margaret J. Radin & R. Polk Wagner, The Myth of Private Ordering: Rediscovering Legal Realism in Cyberspace, 73 Chi.-Kent L. Rev. 1295, 1312–13 (1998) (noting the challenges for contract law concerning licenses that "run with" the object of the license, such as the GPL).

135. GNU General Public License (version 2) (June 1991), available at http://www.gnu.org/copyleft/gpl.html (on file with the *Columbia Law Review*).

136. Id.

137. Id.

138. Apple Computer, Apple Public Source License (version 1.2) (Jan. 2001), available at http://www.opensource.apple.com/apsl (on file with the *Columbia Law Review*) [hereinafter Apple Public Source License]; International Business Machines Corporation, IBM Public License Version 1.0, available at http://www-124.ibm.com/developerworks/oss/license10.html (last visited Apr. 18, 2003) (on file with the *Columbia Law Review*).

139. The FreeBSD Project, 4.4BSD Copyright, available at http://www.freebsd.org/copyright/license.html (last visited Mar. 6, 2003) (on file with the *Columbia Law Review*).

140. Apple Public Source License, supra note 138, cl. 11.

141. Id. cl. 12.

That is, despite rhetoric to the contrary, it seems quite clear that the "open" in open source is actually rather tightly controlled, albeit in the name of generally greater access along certain philosophically-favored dimensions.[142] And it is fundamentally the control of intellectual property rights that allows such arrangements to be struck.

It is thus interesting that thoughtful proponents of open source would condemn the very tools, such as patents, with which they could additionally coordinate uses of community-developed software.[143] If the claims of efficacy and innovation are to be believed (and there is no reason to doubt them),[144] then it would seem that development according to an open source model would have an equal claim to patentable innovations, and obtaining important patents might help ensure that particular software development avenues proceed according to the free software philosophy. Of course, the relative lack of financial resources of open source projects is likely to place them at a significant practical disadvantage vis-à-vis large commercial operators. But even in the absence of obtaining patents, the open and collaborative approach of the open source

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142. The GNU notes that its animating goal is to promote "freedom" in software, which it defines as:

> [A] matter of the users' freedom to run, copy, distribute, study, change and improve the software. More precisely, it refers to four kinds of freedom, for the users of the software:
>
> - The freedom to run the program, for any purpose (freedom 0).
> - The freedom to study how the program works, and adapt it to your needs (freedom 1). Access to the source code is a precondition for this.
> - The freedom to redistribute copies so you can help your neighbor (freedom 2).
> - The freedom to improve the program, and release your improvements to the public, so that the whole community benefits (freedom 3). Access to the source code is a precondition for this.

GNU Project, The Free Software Definition, available at http://www.gnu.org/philosophy/free-sw.html (last visited Mar. 6, 2003) (on file with the *Columbia Law Review*).

There is obviously nothing inherently wrong with the support of such activities; each is laudable, if unrealistically based on the assumption that even a small portion of users can take advantage of them. It does, however, impose a particular philosophy about the way software should be developed and distributed. Cf. Craig Mundie, The Commercial Software Model (2001) (written by a Microsoft vice president) (describing the commercial view of software development); Eric S. Raymond, The Cathedral and the Bazaar: Musings on Linux and Open Source by an Accidental Revolutionary (2001) (describing the virtues of open source development).

143. See, e.g., Lessig, supra note 2, at 213; Stallman, The GNU Operating System and the Free Software Movement, *in* Open Sources: Voices from the Open Source Revolution 53, 67 (Chris DiBona et al. eds., 1999).

144. See, e.g., Franke & von Hippel, supra note 130, at 2–3 (arguing that development of custom products by consumers instead of producers more efficiently serves individual customers' needs). See generally Josh Lerner & Jean Tirole, Some Simple Economics of Open Source, 50 J. Indus. Econ. 197 (2002).

projects should ensure the preclusion of others' patents by generating and disseminating substantial quantities of relevant prior art.[145]

All this is not to say that there is anything wrong with the goals or techniques of the open source movement. As a method for developing good software, it certainly appears to have great promise, though whether it will prove better than traditional commercial models is yet to be seen.[146] As a meaningful counterexample to the utility of control, however, it has feet of clay.

2. *Dedicating the Public Domain.* — The recent trend to dedicate intellectual assets to the public domain illustrates another important, if underutilized, feature of intellectual property rights. That is, control can be used affirmatively to increase and/or to maintain the public domain. In the realspace context, this point is obvious: Dedicating Blackacre as a public park is futile if another can erect a fence and thereby appropriate it. Property then steps in to enforce the desired arrangements. In the intellectual property context, the argument is more subtle—information in the "public domain" cannot really be removed in the sense that it can in the realspace context. Yet a significant role for intellectual property exists here as well; when the creator-owner does not want to grant completely unfettered rights to the work, he creates an intellectual easement of sorts. The reasons for such restrictions might range from a desire that the work continue to be attributed to the original author, or to a view about the appropriate role for commercial activity using the dedicated information. In such instances, the control conferred by intellectual property will enable a huge range of measures that can directly enlarge the public domain while meeting the needs of the creator-owner.

The Creative Commons project, for example, represents a particularly compelling recognition of this role for intellectual property rights. Formed by a coalition of academics and activists—ironically, some of the most determined critics of control of intellectual goods—Creative Commons seeks to assist owners in crafting "deeds" to their works by drafting copyright licenses generally granting public access, but tailoring them to

145. See generally Douglas Lichtman et al., Strategic Disclosure in the Patent System, 53 Vand. L. Rev. 2175 (2000) (noting the importance of disclosure to preclude patenting by one's competitors); Gideon Parchomovsky, Publish or Perish, 98 Mich. L. Rev. 926 (2000) (same).

146. There are still some important theoretical issues to be worked out with respect to the model's long-term viability. For example, Stallman's suggestion in this vein that computer engineers should (and will) accept about $35,000 per year should obviously be treated with skepticism. See Richard Stallman, Why Software Should Not Have Owners (1994), available at http://www.gnu.org/philosophy/why-free.html (on file with the *Columbia Law Review*). On the other hand, Benkler has argued persuasively that given increasing access to (human) inputs engendered by the continuing expansion of modern communications, the model is sustainable. Yochai Benkler, Coase's Penguin, or, Linux and the Nature of the Firm, 112 Yale L.J. 369, 380–81 (2002).

the particulars of the situation.[147] Such efforts demonstrate the benefits that come with granting creators broad, flexible rights to control the uses of their inventions.[148]

Applying the lessons of Part I, this section has outlined an affirmative case for the control conferred by intellectual property rights. First, in contradistinction to the arguments of many control-critics, additional control may in fact increase the production of open information rather than reduce it. Second, control provides the flexibility in private arrangements crucial to navigating the uncertainty of the new information economy. Third, coordination is enhanced by control, thus enabling a host of beneficial activities related to the production of information.

CONCLUSION: CHALLENGING THE MYTHOLOGIES OF CONTROL

The cyber-libertarian slogan, "Information Wants to Be Free," has heretofore been viewed by most as a rallying cry against our system of intellectual property, both the status quo and the perceived expansionist future. As this Essay has suggested, however, the essential truth it conveys—that information is impossible to appropriate fully to oneself—may instead be a formidable new argument in favor of the control conferred by intellectual property rights. That each creation of even proprietary information expands the sum total of open information available for further technological, cultural, and social development suggests that the distinction between intellectual and more traditional forms of property may in fact provide even stronger justifications for intellectual property. Unlike the realspace commons, the intellectual commons is not limited: There are no zero-sum games in the fields of the human mind.

In addition to the features of information that prevent the complete capture of information, I argue that there are a number of significant limitations on the exercise of intellectual property rights, such as market discipline, enforcement costs, and normative considerations, that temper the appropriability of rights in information. These limitations ensure that even fully controlled information is only so in theory, and that the creation and dissemination of information is only further enhanced.

In presenting these observations, the Essay takes issue with much of the recent criticism of the control conferred by intellectual property

147. The project also plans to develop embeddable metadata (computer-readable information) about the licenses, thus enabling systems that could dramatically reduce transaction costs of determining the content of licenses. See Creative Commons, How Can I Use Creative Commons Metadata in My Program?, available at http://www.creativecommons.org/faq (last visited Feb. 3, 2003) (on file with the *Columbia Law Review*).

148. Note of course that not all, if any, dedications will be wholly charitable in nature. Placing information in the public domain can preclude related patents, which in turn can serve to discourage entry into a particular field. See Epstein, supra note 8, at 48–49. Similarly, as noted in the open source context, some actors appear to use dedications as a "trade" in exchange for grant-back rights to subsequent creations. See Apple Public Source License, supra note 138, cl. 3.

rights found in the legal-academic literature, especially those critiques based on the premise that additional control will substantially diminish the public domain. Instead, I suggest that control may in many cases actually increase open information or the public domain. In any event, because production of open information is tightly linked to the relationship between control and incentives to create, policy analysis of intellectual property based on public domain effects is not independently useful. Furthermore, control offers both flexibility in information-sharing or transfer arrangements and better coordination of activities that both produce and disseminate open information, to society's benefit.

That this Essay challenges the central tenet of much of the contemporary criticism of intellectual property rights does not mean that it advocates limitless rights in information. There are a number of important reasons to consider carefully the scope of intellectual property rights, especially transaction costs and coordination problems.[149] Furthermore, the approach taken is distinctly quantitative in nature: evaluating arguments in terms of quantity of open information produced, rather than focusing on the qualitative nature of such information.[150] Nonetheless, the analysis here does suggest that the control-critics have not met their burden of persuasion for reducing current intellectual property rights.

There can be little doubt that a rich source of open information, an intellectual commons from which new ideas and creativity can be drawn, is crucial to the advancement of our culture and our economy. In seeking policies that would build such a domain, we will do well to recognize that the primary challenge in this regard is to establish a regime tailored to the production of information; once produced, substantial components of such information will inevitably "spread . . . like fire, expansible over all space,"[151] irrespective of our best efforts to contain it.

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149. For arguments stating the potential problems of coordination and transaction costs related to intellectual property, see generally Heller & Eisenberg, supra note 2, at 698; Rai, supra note 2, at 115–29. For a skeptical response, see generally Epstein, supra note 8.

150. Thus, for example, even though a particular policy proposal (say, to eliminate fair use) could be analyzed as having a likely positive effect on the quantity of open information, see supra Part II.A, concerns about maintaining access to qualitatively "better" goods (original sources) might compel a different decision.

151. Jefferson, supra note 1, at 180.