

Secondary Fair Use

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I. INTRODUCTION

Should inventors of new technologies be liable to authors for acts of copying and distribution of copyrighted works that the technology allows?

Intellectual property law and policy are primarily about inducing two groups of creative people – authors and inventors – to come up with original works of authorship and new inventions, respectively. Conceptually, and as is done in practice by the respective laws on copyrights and patents, each of these objectives can be pursued independently. This Article however, is about the cases in which that is not true. Where authorship policy and invention policy intersect, promoting one policy comes at the cost of squashing the other. Which should the law favor?

The importance of understanding the way technology interacts with content cannot be overstated. Copyright law's emergence was the result of a technological innovation – the printing press – and it evolved ever since in response to further ones in an oft-recurring pattern. Initially, authors would operate under a certain business model. A disruptive technology would then emerge and threaten authors' livelihood. Examples include big technological leaps such as the advent of mechanical piano players, television, radio, the VCR, and most recently file sharing, and more modest technologies such as the Game Genie (a computer games enhancement device) and ClearPlay (a DVD-player allowing consumers to filter out objectionable content). The parties – authors on one side, inventors on the other – would start to engage in legal battles. Authors – a term that will, importantly, be used here to also include intermediaries that derive from author's rights, such as publishers and other assignees and licensees - would characteristically argue that the technology involves or facilitates copyright infringement of their works. Inventors would characteristically point at the new economic value unleashed by the new technology and suggest that courts and Congress should not impose liability on the benefactor of the American consumer. Results have varied: courts would in some cases find inventors liable,¹ but not in others.² At times, especially after losing in court, authors would turn to Congress for favorable legislation. These attempts resulted in varying degrees of success ranging over none, compulsory licenses, and the establishment of new property rights or expansion of existing ones in duration and scope. The judicial and legislative tussles would thus reconfigure the parties' rights and liabilities respecting the new technology, and the industry would settle into a new status quo and business model, which would, in turn, be disturbed by a new technology. The details of these cycles across different industries and time, the legal battles and the ensuing legal changes have been documented in the literature extensively.³

¹ See, e.g., *MGM v. Grokster* (2005).

² See, e.g., *Sony v. Universal* (1984).

³ See, e.g., WILLIAM FISHER, *PROMISES TO KEEP* ch. 3 (2004); PAUL GOLDSTEIN, *COPYRIGHT'S HIGHWAY: FROM GUTENBERG TO THE CELESTIAL JUKEBOX* (2003); JAMES LARDNER, *FAST FORWARD* (1987); JESSICA LITMAN, *DIGITAL COPYRIGHT* (2001); JOSEPH MENN,

This state of affairs is troubling. Though the tensions between authors and inventors are old and recurring, there is no clear framework from which to order our thinking about them. Are we doomed to forever sit back and watch authors being washed by one technological storm after another? Should we passively wait for each round to run its course through courts and Congress, letting each to reach its seemingly arbitrary ending point? Or can we find a way to navigate these two creativity ships as to minimize the incidence and harm from collisions? The costs of reliving the abovementioned cycle are not just psychological. Rather, they include uncertainty; litigation threats, suits and costs; copyright infringements; ruined business models; and lost investments in works of authorship and technological R&D. Further, the tussles of the last century have subjected technology companies to a host of different, changing and somewhat arbitrary legal standards. First, inventors may be found directly liable for copyright infringement, but in a way that is hard to predict. Liability may depend, for example, on whether a perforated roll of paper, inserted into a mechanical piano player as to play a tune, is a “copy” of the underlying sheet music, or whether a device allowing a computer game to play faster creates a “derivative work” of the underlying game, and whether a radio broadcast – intercepted by many private listeners – nevertheless consist of a “public” performance. Applying existing law to new technologies involves uncertainty, and indeed different courts grappling with the same question have at times reached different conclusions.⁴ In addition, inventors may be held indirectly liable, on the theory that the technology empowers third parties – often the consuming public - to infringe. The law of indirect liability - currently consisting of contributory infringement, vicarious infringement, and intentional inducement – is developing,⁵ and the legal outcome under it is similarly hard to predict.⁶ The legal uncertainty and risk, one should remember, add to those that inhere in technological R&D.⁷ Apart from

ALL THE RAVE (2003); EDWARD SAMUELS, *THE ILLUSTRATED STORY OF COPYRIGHT* pp. 9-124 (2000); Jane Ginsburg, *Copyright and Control Over New Technologies of Dissemination*, *Colum. L. Rev.* (2001); Timothy Wu, *Copyright’s Communication Policy*, *Mich. L. Rev.* (2004).

⁴ [In the context of computer enhancement devices, compare *Galoob* (no liability) with *Midway v. Arctic* (liability) [check]].

⁵ The Supreme Court in *Grokster* added the inducement theory as a new and independent head of liability. Though some argue that it was always a part of contributory liability, the supreme Court has not presented it as such, and the result surprised many if not most in the legal public. Certainly it was not anticipated by the two lower courts.

⁶ This is evidenced by different holdings by different courts on substantially the same facts. See e.g. *Sony* (outcome reversed on appeal and then again in the Supreme Court), *Grokster* (outcome reversed in the Supreme Court).

⁷ [Contributory liability for copyright infringement, which requires knowledge and material contribution to the act of an infringing third party; vicarious liability, which requires a financial interest and the right and ability to control the act of another; and inducement, which requires intentional inducement of infringement by another. This standards have exemptions. For example, under contributory liability, there is a requirement that the two elements occur simultaneously (namely that material contribution to an infringement of another happen while the helper knows she is helping another infringe), but knowledge can also be constructive, unless the technology is ‘capable of substantial non-infringing use’ under the *Sony* standard. There is at least a sense of arbitrariness to these standards, their number, their elements and their exemptions. Why does the addition of knowledge and material contribution enough, but no knowledge and financial interest isn’t? Why is material contribution and the right and ability to control not enough? In order to satisfy *Sony*’s substantial non-infringing use standard, what percentage of the use has to be non-infringing, and does it have to be a current percentage or a future percentage? And is there reason to subject technology companies to different tests, as dependent on whether the infringement argument is direct or indirect?]

courts, Congress has applied a host of different and additional standards of liability to different technologies, which are different from the judicial ones.⁸ Why do the judicial and the legislative standards differ, and should they? These questions have long bothered intellectual property scholars,⁹ but as of yet, despite six Supreme Court decisions over the past century¹⁰ and numerous ones by the lower courts, there is still no clear answer to the question what copyright liability should be imposed on technology companies.

Although we may not know the answer, we at least have one good statement of the problem. When it last revisited the issue in the context of indirect liability, the Supreme Court said the following:

[Courts should strike] a sound balance between the respective values of supporting creative pursuits through copyright protection and promoting innovation in new communication technologies by limiting the incidence of liability for copyright infringement. The more artistic protection is favored, the more technological innovation may be discouraged; the administration of copyright law is an exercise in managing the trade-off. [] The tension between the two values is the subject of this case[.]

At the intersection of authorship policy and invention policy, two competing values – or policy objectives – conflict: promoting authorship and promoting invention. When authors approach courts and Congress wishing to impose copyright liability on inventors, the first issue to think about is why impose copyright liability at all? What good would it do? What cost would it come at? The more copyright liability is imposed on inventors, the more they would have to pay authors and hence the greater the incentive to authorship, but the smaller the incentive to invent new technologies that interact with content. Conversely, the less liability for copyright infringement the legal system imposes on inventors, the greater the incentive to invent but also the greater the harm to authors and the disincentive to create works of authorship.

The goal, then, is clear: law should impose copyright liability as to optimally advance authorship and invention. The problem is that thus far, Congress, Courts and commentators have not provided much guidance as to how the competing values of authorship and invention should be traded-off optimally nor much insight into the exact workings of this trade-off. What we have, instead, is a doctrinal hodge-podge of direct and indirect liability standards that do not seem to make much conceptual sense. For example, while the Supreme Court in *Grokster* has identified the right policy objective, it did not explain why imposing liability on *Grokster* – the defendant technology company -

⁸ For example, for ISP liability on the internet, Congress has legislated a series of safe harbors. See 17 USC 512. For VCRs, more than twenty years after they have been in use, Congress suddenly decided to include a technological mandate. See 17 USC 1201(k). For Digital Audio Tapes, Congress decided to enact a detailed tax and royalty system. 17 USC ch. 10. For mechanical piano players, cable TV, jukeboxes and satellites, Congress has enacted a series of compulsory licenses. See, e.g., 17 USC 115. For computer software and sound recordings, Congress has carved out exceptions to the first-sale exception to exclusive rights.

⁹ See, e.g., Landes and Lichtman, *Indirect Liability for Copyright Infringement: An Economic Perspective*, Harv. J.L. & Tech. (2003).

¹⁰ *Grokster* (2005), *Sony* (1984), *Williams & Wilkins v. U.S.*, 203 Ct. Cl. 74 (1973), *aff'd* by an equally divided Court, 420 U.S. 376 (1975); *Teleprompter* (1974); *Fortnightly* (1968); *White-Smith v. Apollo* (1908).

achieved it best. To be sure, the Court detailed the ways in which decentralized file sharing – the relevant technology - harmed authors. But since the Court recognized that we are in a trade-off zone, any point on the continuum ranging from no liability to complete liability would harm either authors, inventors, or both to some degree. Why did the Court conclude that the social benefit of imposing liability, i.e. increased authorship, outweighed the related cost, i.e. reduced invention?

A first hurdle to conducting this balance-of-values inquiry is that it seemingly involves trading-off apples and oranges. In other words, how could judges trade-off quantities of different qualities? In the *Grokster* case, for example, dozens of *amici* briefs suggested striking the balance between authors and inventors in many different points on the conceptual continuum of liability. The background rule against which the parties and *amici* were arguing was the Ninth Circuit's inventor-friendly interpretation of the Supreme Court's *Sony's* staple article of commerce doctrine. The many *amici* who advocated keeping the holding below highlighted *Sony* standard's benefits in terms of incenting technological innovation. The many *amici* who suggested departing away from *Sony* and ratcheting up inventors' standard of liability highlighted the ways in which the lenient *Sony* standard chills authors' incentives to create. All *amici* were partially right, in the sense that they highlighted one facet of the proverbial elephant. By and large, however, the *amici* did not advance a way of telling whether the encouragement of invention is worth the discouragement of authorship.

Part II reviews some of the cycles concerning disruptive technologies, and how they affected copyrighted industries. Part III presents a conceptual framework to answer this last question. It does so by examining the costs and benefits of new technologies, and expressing them in terms of beneficial and harmful effects on markets for expressive works. The potential benefits are three. First, new technologies may increase consumer demand for works of authorship. Second, new technologies may reduce the cost of producing and distributing such works. Third, which is related to the first two, new technologies may enable the production of new works of authorship and the entry of new authors into the market for authorship. Lastly, on the cost side, new technologies may decrease the size of markets for expressive works (by reducing the appropriability of the fruits of intellectual labor) and may make authors exit the market. Thus understood, the benefits new technologies create and the harm they cause can be brought to a common denominator: the overall effect on markets for authorship. Once one such metric exists, Courts should impose copyright liability on inventors as to maximize social welfare in the market for expressive works. The optimal legal rule would do that through the combined actions of authors and inventors.

Part IV lays out a framework that gives concrete insight into the internal workings of the author-inventor tradeoff. It models the author-inventor conflict as one in which a harmful effect may result when two economic agents, an author and an inventor, act in the world simultaneously. The inventor would clearly want a legal entitlement to invent freely while the author would want the inventor to be liable for any harm resulting from technological innovation. With such competing claims, the law has to determine which of the parties should bear the costs of the conflicting use, and to what extent.

The framework takes as its goal providing both the author and the inventor optimal incentives to maximize the value of their creative endeavors and to minimize the size of the harm resulting from their conflicting activities. The article studies the investment decisions of the author and the inventor under the four Calabresi and Melamed rules for allocating the entitlement. These are chosen not only to exemplify how four classic balancing points that span across the hypothetical continuum of liability would affect authors' and inventors' investment decisions, but also because they correspond quite well to major proposals for judicial standards of liability that were suggested in the context of the *Grokster* litigation. We shall see that the four rules provide authors and inventors different ex-ante incentives to invest in their respective intellectual creations and in minimizing the size of potential interference between the activities. In order to allow us to focus on ex-ante effects, we shall assume that ex-post transaction costs are zero, as is common in the literature. The analysis, which applies general law and economics insights to the problem at hand, shows that no rule can simultaneously provide both authors and inventors with optimal incentives to invest in value creation and harm reduction. It also shows that different rules would fare better on different fronts.

Part V advances a new rule of liability that – while not leading to optimality on all fronts – is superior to the four Calabresi and Melamed rules. Rather than adhering to one predetermined rule of liability, law can do better by declaring who owns the entitlement and how it is to be protected during litigation. Courts would do that based on the eventual, realized values of the parties' creative endeavors and on the size of the interference resulting from simultaneous operation. It is shown that if parties know ex-ante that the entitlement would be allocated ex-post this way, they would have superior, nearly optimal, incentives to invest in value creation and interference minimization. The Article recommends that courts should make use of the fair use doctrine – which allows them to allocate the entitlement as they see fit in particular cases – in order to achieve such superior investment incentives ex-ante. Indeed, it suggests that this is what the fair use doctrine already does.

Part IV shows that the framework has two types of payoffs: descriptive and normative. On the descriptive side, it has three particular payoffs. First, it maps the costs and benefits of each of the various ways of allocating the entitlement. In the *Grokster* litigation, for example, dozens of *amici* briefs advocated the adoption of different standards of liability, and each celebrated the advantages of the proposed standards and pointed at the disadvantages of the competing standards as reason not to adopt them. The framework here makes sense of seemingly irreconcilable views by highlighting their relative advantages and disadvantages systematically. Second, it explains the different holdings of Sony and *Grokster*, which, as many have pointed out, have very similar fact patterns yet were decided differently. While both the Betamax VTR in Sony and the file sharing software in *Grokster* were capable of substantial non-infringing use, *Grokster*'s software arguably created more harm than unleashed new value, while the new value unleashed by Sony's Betamax was greater than the harm it inflicted on authors. If so, these facts would justify the disparate treatment of the two technologies by courts. The test proposed here would yield this result, whereas the Supreme Court's surprising declaration of a new standard of liability fails to bring clarity or predictability. Third, the framework explains the rationale behind the inducement doctrine. The aforementioned model shows that were the law to protect

inventor with a property rule – which is what the Sony rule, as understood by the Ninth Circuit, largely does - it creates an incentive for inventors to produce technologies that harm authors. As such, inventors may do a socially perverse thing: invest in harm creation rather than harm reduction because the existence of harm improves the inventor’s negotiation position ex-post when the technology proves to be socially harmful. This, for example, is consistent with Napster’s plan to first have huge user-base – or in other words, start by causing record companies a lot of harm – and then strike a deal with the label companies.¹¹ The inducement doctrine which the Court announced in *Grokster* can be understood as a legal tool to curtail such socially perverse investment in harm creation. As the framework shows, the inducement doctrine would not go further to encourage inventors to take cost effective measures to reduce the harm.¹² The inducement theory prevents inventors from actively creating harm, but it still fails to make them invest ex-ante at the efficient rate – or at any rate - to mitigate expected harm.

On the normative side, the Article builds on the framework and proposes a superior rule of liability to the aforementioned classic four. It suggests that rather than choosing an unchanging rule of allocating and protecting the entitlement, the legal system may do better by letting courts choose and allocate the entitlement after the values of the parties’ investments in value creation and harm reduction have materialized and uncertainty has resolved.¹³ Much of the divergence from social optimality (respecting ex-ante investment decisions) under legal rules that are fixed is that they allow the protected party to extract value even in scenarios where the protected party’s investment has proven socially wasteful. If courts could prevent this from happening, the parties’ ex-ante incentives to invest would approach those socially optimal.

To implement this prescription doctrinally, courts can either use their power to find inventors liable for direct or indirect infringement, or they can absolve liability using the fair use doctrine. Courts should find inventors liable in cases where the introduction of the technology is inefficient ex-post, namely when the technology creates little or no value and imposes great harm on authors. This was arguably the case in the *Napster* and *Grokster* litigations. Courts should absolve inventors from liability in cases where the technology unleashes great economic value and the value of the works of authorship turns out to be very small. This was arguably the case in the *Sony* litigation.

The hard question still remains what to do when the release of both the technology and the work of authorship is efficient ex-post. This would be the case when the eventual harm is small relative to the values of the parties’ projects. In this case the Article proposes four ways of allocating the entitlement, each following the aforementioned ex-post choice of rule suggestion, and where each one follows the basic Calabresi and Melamed four. These four modified Calabresi and Melamed rules are shown to be each superior to their classic counterpart. Examining the relative advantages and

¹¹ [Cite: See JOSEPH MENN, *ALL THE RAVE* ____ (2003)].

¹² As the Supreme Court explained in *Grokster*, however, the inducement doctrine does not impose liability merely based on the technology’s architecture or merely based on the inventor’s failure to take steps that would reduce the incidence of infringement.

¹³ I say may because of the potentially greater litigation costs that the proposal involves. For more on litigation costs, see *infra* note 79.

disadvantages of these four modified rules, the Article supports the one based on vesting a property right in inventors. It is suggested that protecting the inventor with a property right, while keeping the inducement doctrine in place, is the right way to go. The disadvantage of this rule, however, is that inventors would invest suboptimally in harm reduction. This deficiency should be dealt by Congress, which should, once a technology matures, regulate its use and manufacture as to minimize the interference, as Congress has often done.¹⁴

How should courts evaluate if the technologist should operate or not? Although predicting the future is hard, Courts should focus on the costs and benefits charted in Part III below. The more a new technology adds value to consumers, the more it reduces the costs of production and distribution, and the more new authors and types of works are entering the market, the more courts should tend to exempt the new technology company from liability. At the same time, the more authors are existing markets, the more markets for existing works are contracting, the more courts should find liability.

Legislatures' decision is different. Their ex-ante decision is of lesser moment, because any ex-ante allocation of the entitlement is subject to a potential fair use defense (abstracting away from the stickiness of default rules, driven in part by the cost of bringing and defending suits). However, ex-post, after a technology has matured and more information is available, legislators can mandate the taking of certain precautions, since, as was mentioned, the technologist will not invest adequately in harm reduction. After the technology has matured somewhat, it is possible to regulate its use, as was the case with the VCR¹⁵ and with OSP liability.¹⁶

II. THE RECURRING COLLISIONS BETWEEN COPYRIGHT OWNERS AND TECHNOLOGICAL INNOVATORS

Over more than a century, a recurring pattern has emerged respecting the way technological change has affected copyright law and copyright-dependent industries. First, the industry would operate under a certain business model, relying on available technology. Second, a new technology would be developed and disrupt that business model. Third, a conflict would arise in which incumbents in copyright industries would try to eliminate, or minimize, any adverse effect of the technology on their business. They would generally file lawsuits charging those who develop or use the technology with copyright infringement, and they would also turn to Congress to favorably legislate that would prohibit, limit or otherwise regulate the use of the technology. Lastly, the battle would end one way or another, and the industry would settle into a new status quo. The following captures several iterations of that cycle over the past century.

A. Cycles of invention and collision

¹⁴ See, e.g., 17 USC 1201(k) (mandating technological design changes in VHS analogue cassette recorders).

¹⁵ See 17 U.S.C. 1201(k) (mandating the use of macrovision technology in VCRs).

¹⁶ See 17 U.S.C. 512 (regulating OSP provision of caching, hosting, searching and routing activities).

By the late nineteenth century, music publishers' made money by selling sheet music to instrument players. In the late nineteenth century, a new technology disrupted that business model: recorded music. Technologies such as the mechanical piano player allowed automated playback of pre-recorded musical compositions. Publishers feared that the growing popularity of the technology would decrease sheet music sales.¹⁷ Owners of copyrights in musical compositions sued for copyright infringement, arguing that the perforated rolls of paper inserted into mechanical piano players were infringing copies of the musical compositions therein. In *White Smith* (1908), the Supreme Court held that a pianola roll fell outside the statutory term "copy".¹⁸ The following year, Congress overturned. It allocated to copyright owners the exclusive right to make so-called "mechanical" copies, but protected it with a liability rule. The operative meaning was that, under certain conditions, record companies could still make pianolla rolls but had to pay copyright owners a statutorily determined fee. This compulsory license remains in place to this day, and is the basis of many transactions in the industry.¹⁹

By the turn of the twentieth century, authors of literary works enjoyed the exclusive right to "dramatize" their works, namely adapt them for theatrical performance, as well as the exclusive right to perform such dramatizations in public. But that business model was destabilized by a new technology – motion pictures. Movies allowed a new and inexpensive way to depict action, and one that audiences flocked to watch. Producers of the era felt free to based their movies on prior novels without asking permission from copyright owners. Such owners feared that film adaptations would cut into the value of their works. In the leading case on point, Harper & Brothers, publishers of the novel *Ben Hur*, and Klaw and Erlanger, copyright owners of the dramatization right, sued Kalem, producer a movie based on the original novel, for copyright infringement. They argued that the film's public performance infringed on their dramatization and public performance rights. In *Kalem* (1911), the Supreme Court agreed.²⁰ Congress agreed, and in 1912 the Copyright Act was amended to include photoplays.²¹ Similarly, the

¹⁷ Copyright owners saw recorded music as an existential threat not only to the industry, but also to society. The Authors and Composers' Copyright League wrote in a public letter that without changes to the copyright act "authors and composers, not receiving any royalties on records, and their royalties on sheet music decreasing from year to year, will have no incentive to write or compose." Hearings Before the Comms. On Patents of the S. & H.R. on Pending Bills to Amend and Consolidate the Acts Respecting Copyright, 60th Cong. 255 (1908) (model letter to Congress in statement of John J. O'Connell) reprinted in 5 Legislative History of the 1909 Copyright Act pt. K, at 257 (E. Fulton Brylawski & Abe Goldman eds., 1976). Composer John Phillip Sousa testified before Congress that "[when] I was a boy ... in front of every house in the summer evening you would find young people together singing the songs of the day or the old songs. Today you hear these infernal machines going night and day. We will not have a vocal chord left. The vocal chords will be eliminated by a process of evolution, as was the tail of man when he came from the ape." Arguments Before the Comms. On Patents of the S. & H.R., Conjointly, on the Bills S. 6330 and H.R. 19,853, to Amend and Consolidate the Acts Respecting Copyright, 59th Cong. 24 (1906) (statement of John Phillip Sousa), reprinted in 4 Legislative History of the 1909 Copyright Act pt. H, at 24 (E. Fulton Brylawski & Abe Goldman eds., 1976).

¹⁸ *White-Smith Music Publishing v. Apollo Co.* (1908).

¹⁹ It is worth noting that many today transact in the shadow of this statutory license.

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²¹ See 27 CONN. L. REV. 53.

Copyright Act of 1976 states that copyright owners enjoy the exclusive right to make a derivative motion picture version.²²

By the 1920s, copyright owners of musical compositions and music publishers (to whom composers usually assign the rights) would profit from either selling sheet music or from the newly minted statutory compulsory license for sound recordings. The 1920s saw radio evolving into a mass communication medium. Initially radio broadcaster would not pay composers for playing their works. A nascent organization at the time, the American Society of Composers, Authors and Publishers (ASCAP) brought a test case in which the Sixth Circuit held radio broadcast of copyrighted works to be a public performance for profit and thus infringing on copyright owners' exclusive rights.²³ On the other side of the controversy were users of the new technology, broadcasters, who lobbied Congress to free radio broadcasting from copyright liability. Bills for that purpose did not make it into law, however,²⁴ and broadcasters started taking licenses from ASCAP. In 1941, the Justice Department brought an antitrust action against ASCAP that resulted in a consent decree.²⁵ As later modified,²⁶ the decree required ASCAP to grant blanket licenses to all copyrights in its collection under non-discriminatory terms, required it to charge reasonable fees, and allowed users to challenge such fees before a court. While authors were initially protected by a property rule, subsequent antitrust action changed their protection to a liability rule. The prices currently charged by ASCAP are negotiated in the shadow of the possibility of licensees asking a court to reduce arguably excessive fees to a reasonable level.

By the late 1930s, publishers of academic journals would profit by selling copies to libraries. In a privately ordered "gentlemen's agreement", the parties agreed that libraries could, under certain circumstances, make and deliver copies to patrons-researchers under the fair use doctrine.²⁷ Libraries acted under these guidelines for the following two decades. But in 1959, the Xerox corporation started selling its famous photocopier commercially. Xerography changed the economics of photocopying, by allowing cheap and easy reproduction of any document. Aided by the new technology, library photocopying expanded in volume and reached a scale that publishers no longer felt was acceptable or fair. In particular, publishers were concerned that widespread use of the technology by libraries would reduce substantially the number of subscriptions taken.²⁸ In 1968, Williams and Wilkins, a publisher of

²² See 17 U.S.C. § 106(2) (granting authors the exclusive right to make derivative works); 17 U.S.C. § 101 (defining a "derivative work" to include the making of a "motion picture version").

²³ See *Jerome H. Remick & Co.*, 5 F.2d 411 (6th Cir. 1925).

²⁴ See S. 2600, 94th Cong. (1924). See also *To Amend the Copyright Act: Hearings Before a Subcomm. Of the Comm. On Patents on S. 2600*, 68th Cong., 9-14 (1924).

²⁵ See *U.S. v. Am. Soc'y of Composers, Authors & Publishers*, 1940-1943 Trade Cas. (CCH) ¶ 56,104 (S.D.N.Y. 1941).

²⁶ See *U.S. v. Am. Soc'y of Composers, Authors & Publishers*, 1950 Trade Cas. (CCH) ¶ 62,595, at 63,751 (S.D.N.Y. 1950).

²⁷ Libraries' conduct was the result, among other things, of an informal "gentlemen's agreement" reached in 1937 between representatives of publishers and libraries, and which charted guidelines for acceptable library photocopying. For the agreement, see 2 J. Documentary Reproduction 31 (1939).

²⁸ The problem was important enough to be included among the subjects that Congress and the Copyright Office studied carefully in the twenty years leading to the enactment of the Copyright Act of 1976, the major copyright law reform since the Copyright Act of 1909. Publishers' fears are mentioned therein. See, e.g., Borge Varmer, *Study*

medical journals, sued the National Institutes of Health and the National Library of Medicine that would routinely photocopy, bind and deliver copies of articles to doctors and researchers around the country. Since many libraries had similar practices, it was clear to all that this was a test case that would determine photocopying practices across the country. In a 4-3 decision, the U.S. Court of Claims held the NIH's practice was fair use, which the dissent characterized as "the Dred Scott decision of Copyright Law".²⁹ The publisher appealed the decision to the U.S. Supreme Court, which heard arguments, but eventually affirmed by an equally divided vote without issuing an opinion. At that time, Congress was considering how to regulate library photocopying in the forthcoming revision of copyright law. Aware of the suit, libraries and publishers lobbied for and against codifying the Williams and Wilkins holding, respectively. Congress eventually passed section 108 of the Copyright Act of 1976 that regulates library photocopying and gives libraries the right to make photocopies in narrowly described circumstances.³⁰

By the late-1940s, copyright owners of musical works and movies would profit, among other things, from royalties paid by TV broadcasters. In the late 1940s, a new technology – cable TV – emerged and threatened that business model. Among other things, cable TV, which started as a way to serve remote communities, captures over the air signals and retransmits them by cable to users. The issue then was whether cable operators needed to pay for the right to retransmit copyrighted content. In other words, it was about whether cable retransmission rested within or outside of copyright owners' bundle of exclusive rights.³¹ Copyright owners feared loss of advertising revenue under the theory of audience fragmentation.³² Initially, the FCC issued regulations that largely limited cable operators ability to carry distant signals. The issue reached the Supreme Court in *Fortnightly* (1968) that held that cable retransmission was not public performance under the Copyright Act, and thus did not infringe on authors' copyright. It reached it in *Teleprompter* (1974) that held that cable TV's importation of remote signals was non-infringing. Congress overrode the Supreme Court in the Copyright Act of 1976 by instating a compulsory license for retransmission.³³ Rather than being set by statute, these rates were to

No. 15, Photoduplication of Copyrighted Material by Libraries 63-64 (May 1959), in Copyright Law Revision, Studies Prepared for the Subcommittee on Patents, Trademarks, and Copyrights of the Committee on the Judiciary, U.S. Senate, 86 Cong., 2d Sess., Pursuant to S. Res. 240 (1960) ("it has been pointed out that the widespread photocopying of technical journals might so much diminish the volume of subscriptions for the journals as to force the suspension of their publication").

²⁹ *Williams & Wilkins Co. v. U.S.*, 487 F.2d 1345, 1387 (Ct. Cl. 1973) (Nichols, J., dissenting).

³⁰ Section 108 limited its protections to libraries that are open to the public, and to photocopying of relatively limited portions of works, to copies made for preservation, to the replacement of damaged, lost or stolen copies, or to copies for researchers if a copy could not be obtained at a fair price. The section also allowed libraries to place photocopying machines for unsupervised patron use as long as a copyright law warning is displayed. As a part of the Digital Millennium Copyright Act of 1998, Congress allowed library photocopying in a few more narrowly tailored circumstances, such as the making of up to three copies of a work to replace damaged, lost or stolen copy, and for doing the same in cases where an existing storage medium became obsolete.

³¹ See, e.g., U.S. Cong. House Comm. On the Judiciary Subcomm. On Court, Civil Liberties and the Administration of Justice Hearings, 92d Cong. (1972) (statement of Jack Valenti) (arguing that cable retransmission of content is a "terrible injustice" and a "huge parasite" that free rides off "copyright owners of copyrighted material").

³² See, e.g., *U.S. v. Southern Cable Co.*, 392 U.S. 157, 160 n.4 (detailing concerns regarding fragmentation in the San Diego Market); Wu, at 314.

³³ 17 U.S.C. § 111.

be determined and from time to time by a dedicated government body. The system remains in place to this day, although the name and composition of that body have changed thrice over the years.³⁴

By the mid-1970s, movie studios' business model consisted of licensing their copyrighted movies to broadcast television after box-office revenues faded. In 1975, a new technology disrupted that business model. The video tape recorder allowed consumers to record programming and watch it at a later time. Movie studios feared that consumers would use the technology to fast forward through commercials, which would mean that advertisers would pay less to broadcasters, which would then lower the royalties they pay to the studios. Copyright owners saw recorded music as an existential threat not only to the industry, but also to society. In a legislative hearing, Jack Valenti, then head of the MPAA, famously testified that the industry was "facing a very new and a very troubling assault ... from a thing called the video cassette recorder and its necessary companion called the blank tape. ... the VCR is to the American film producer and the American public as the Boston Strangler is to the woman home alone." Soon after the Betamax was on sale, two movie studios - Universal and Disney - sued various links in the technology's distribution chain: Sony, the innovator, its ad agency, retailers and a nominative consumer. The district court held that Sony was not liable for copyright infringement. The Ninth Circuit reversed, finding Sony liable. The Supreme Court reversed again, holding that Sony was not liable for copyright infringement because while the Betamax may facilitate copyright infringement by some consumers, it is a product that was widely used for legitimate, non-infringing purposes. The industries adapted to that holding quickly. Many consumer electronics companies started manufacturing VCRs, video rental stores mushroomed across the U.S., and revenues from videostore rentals became the movie industry's number one revenue source, greatly surpassing box-office and broadcast TV revenue. In 1998, Congress mandated the incorporation of macrovision technology into analogue VCRs.³⁵

In the 1970s and 1980s companies started to manufacture computer games, first as arcade machines and later for home use. Two cases that relate to enhancement devices of computer games game out differently in courts of appeals. In *Midway v. Arctic*, the Seventh Circuit decided that enhancement devices in arcade machines that sped up a computer game created an infringing derivative work.³⁶ In *Galoob v. Nintendo*, however, the Ninth Circuit analyzed the liability of the manufacturer of a game enhancement device called the Game Genie. The Game Genie was to be inserted between a home user's game console and game cartridge, and would allow added functionality such as increasing the speed with which a game character could move or allowing it to have added "lives". Nintendo sued Galoob arguing that the Genie violated its exclusive right to make derivative works. The Ninth Circuit disagreed that the Game Genie created any derivative works, and that if it did, the use was protected under the fair use doctrine.³⁷

³⁴ Initially, the 1976 Act created the Copyright Royalty Tribunal that operated until 1993. Then, its functions were performed by the Copyright Arbitration Royalty Panel. In 2004, these functions were transferred to the Copyright Royalty Board. See 17 U.S.C. ch. 8.

³⁵ See 17 U.S.C. 1201(k).

³⁶ See 704 F.2d 1009 (1983).

³⁷ See *Galoob v. Nintendo*, 964 F.2d 954 (1992).

By the late 1990s, record labels and movie studios' business model consisted substantially of selling music CDs and renting out movie DVDs through music and video stores. In 1999, a new technology disrupted these business models. Internet peer-to-peer networks – which have improved technologically over time - allowed people around the world to easily search and exchange digital files. The record and movie industries feared that many consumers would obtain content through illegal P2P networks rather than authorized retailers. Copyright owners saw recorded music as an existential threat not only to the industry, but also to society. In a legislative hearing in 2002, Jack Valenti, then chairman and CEO of the MPAA, submitted a testimony to Congress titled “A Clear Present and Future Danger” in which he urged Congress to fight movie thievery in order to protect “America’s greatest export trade prize.”³⁸ Interviewing with the New York Times a few short months after 9/11, Valenti likened the MPAA’s efforts to oppose illegal file-sharing to the war on terror.³⁹ In a series of cases, record labels and movie studios sued various file sharing networks on the theory of indirect liability: end users were infringing copyrights, the file sharing networks facilitated such grand-scale infringement and profited from it.⁴⁰ One of these cases, *MGM v. Grokster*, reached the Supreme Court in 2005. The Ninth Circuit held for Grokster in 2004. Copyright owners turned to lobby Congress, and an inducement bill, that would have made Grokster’s conduct actionable, was pending. In 2005 the Supreme Court reversed the Ninth Circuit, and found the file sharing network liable. Legislative activity regarding the bill stopped after the decision, which held inducement actionable conduct.

In the early 2000s, movie studios made money by renting out DVDs. In early 2000s, ClearPlay and Family Shield came out with a novelty DVD player that would allow users to watch a filtered, cleaner version of movies. Users would enter regular DVDs into the specialty player, but would also insert a proprietary file (via a USB stick, for example) containing tags to the movie. Such tags and meta data would instruct the DVD player to mute sound, skip scenes, darken part of the screen etc’ as to present a cleaner version of the movie. Users were able to select the desired level of filtering of sex, profanity and violence through the main menu, and the player would filter accordingly.⁴¹ Eight movie studios and the Directors Guild of America sued the company in 2002 for allegedly infringing on their exclusive right to make derivative works. While the trial was pending, Congress passed the Family Entertainment and

³⁸ Submitted to the United States House of Representatives Committee on Appropriations, Subcommittee on Commerce, Justice, State, and Related Agencies, April 23, 2002, available at: <http://www.politechbot.com/docs/valenti.movies.testimony.042302.doc>.

³⁹ See John Logie, A copyright cold war? The Polarized Rhetoric of the peer-to-peer debates, *First Monday*, Vol. 8, number 7 (July 7, 2003), available at <http://firstmonday.org/htbin/cgiwrap/bin/ojs/index.php/fm/article/view/1064/984>.

⁴⁰ See *Napster* (9th Cir 2001); *Aimster* (7th Cir 2003).

⁴¹ For more details, see <http://www.clearplay.com/>. The company currently also sells the filters online, for use with computers.

Copyright Act of 2005 that specifically exempted that technology.⁴² The case was then immediately dismissed as moot in light of the amendment.⁴³

By the first few years into the 21st century, book publishers were doing their traditional business. In 2005, their business was disturbed by Google Books. Pursuant to an agreement, Google digitized the contents of five university libraries, and later of additional ones. It made the content of public domain works available freely online. As for books still under copyright, however, Google allows users to search their content but then shows them a limited snippet view of text before and after the sought after term. In late 2005, two copyright infringement suits were filed against Google for unauthorized duplication of copyrighted works. One was a class action by the Authors' Guild of America and another by five major publishers. Google's line of defense was fair use. In 2008, Google reached a private settlement with the plaintiffs. If approved, the settlement will reconfigure the publishing industry and would give substantial market power to Google and to a new former entity, the Book Rights Registry and would be binding on all authors because of the nature of the class action nature of the complaint. The settlement is yet to be approved, but is currently criticized by many, including the DOJ.

B. Taking Stock

The case studies above provide a rich array of data points that exemplifies and illuminates the recurring conflict between copyright owners and inventors of new technologies that interact with creative content. Although each case has its own peculiarities and twists, collectively they exhibit several unifying themes. First, authorship policy and innovation policy seem to inevitably collide in our modern technological times, and it seems that they will keep colliding as long as there is technological advance in the ways in which we use, process, copy, manipulate and distribute information.

Second the collisions above are between plaintiff copyright owners and defendants who are technological users. Copyright owners may be authors themselves – either individual or corporate (such as Universal Studios and Disney in the Sony case). But copyright owners may be other those subsequent to authors in the chain of production, such as trade groups (Authors' Guild of America in Google, ASCAP in Herbert (radio)), trade and lobbying organizations and lobbyists (RIAA and MPAA), or assignees or licensees of authors' rights (music publishers in Apollo, TV broadcasters in Fortnightly and Teleprompter, journal publishers in Williams and Wilkins). On the technology side we may find those who have invented a new technology, but also other parties who otherwise assist and participate in its deployments. For example, defendants additional to Sony Corporation of America were its ad agency and retailers who sold the Betamax VTR. Sometimes, it may be the users of the technology, such as the NIH and NML in the photocopying case, Cable TV operators (Teleprompter, Fortnightly) or end users (Sony, Grokster). The fact that we do not necessarily find the author and the inventor herself in the

⁴² See 17 U.S.C. § 110(11).

⁴³ See [Cite]. ClearPlay also faced a patent infringement claim from Nissim, which was also settled by ClearPlay taking a license for several patents. See <http://www.allbusiness.com/legal/legal-services-litigation/5162156-1.html>.

lawsuit does not change the nature of the tradeoff. Even if the plaintiff is not the author but rather her licensee or assignee, the more the law favors the transferee of the author's copyright, the more valuable the author's alienable right, the more money the author would be able to charge for parting with it, and hence the greater her incentive to create. Conversely, although the defendant may not be the innovator herself but rather a retailer selling the technology (such as a Betamax retailer) or user (such as a library engaging in in-house photocopying), the less liability is imposed on the defendant, the more likely the defendant to purchase the technology and the greater her willingness to pay for it, and thus the greater the incentive to come up with the technology.

Third, in all lawsuits above the legal cause of action has been in copyright law. Sometimes the charge has been direct copyright infringement. For example, in *White-Smith* (piano rolls), *Williams and Wilkins* (xerox) and *Sony* (VTR) plaintiffs argued that their exclusive right to make copies has been infringed. In *Galoob* (Game Genie) and *ClearPlay* (filtering DVD player) plaintiffs argued that their exclusive right to make derivative works has been infringed. In *Fornightly* (Cable TV) plaintiffs argued that their exclusive rights to distribute the work has been infringed.⁴⁴ In *Kalem* (movies) and *Remick* (radio broadcast), plaintiffs argued that their exclusive right of public performance was infringed. In other cases, the charge has been one of secondary infringement. In some cases, the charge has been based on contributory infringement (*Sony VTR*), or on a variant thereof – the inducement theory (*Grokster* p2p, *Kalem*). In others the charge has been one of vicarious liability (*Grokster*, *Napster*). Sometimes the charge has been based on some other copyright theory of liability, as in the case of *Diamond Rio* (the AHRA). But regardless of the particular section in the Copyright Act, it has been copyright law, the body of law determining authors' rights, that served as the cause of action against technological innovators and users.

Fourth, the way society has dealt with such chronic conflict has been haphazard, unsystematic, unpredictable and ad-hoc. Each time the conflict arose, the solution that emerged was simply the accidental ending point of tussles in courtrooms and congress. Sometimes courts found the technology non-infringing (e.g. the VCR, recorded music, cable TV, and xerox technologies), but other times it was found infringing (e.g. P2P, broadcast radio). When the technology won in court, sometimes the battle ended there (e.g. VCR), but in other cases it continued in Congress (e.g. recorded music, cable TV, xerox). In cases where Congress overrode the judicial outcome, it sometimes subjected the technology to a compulsory license (e.g. recorded music, cable TV), but sometimes it chose to thinly slice what uses of the technology would be legal and which ones would be infringing (e.g. in the case of library photocopying). When copyright owners won in court, that sometimes remained the last word (e.g. p2p), but in other cases the technology fared better later (broadcast radio, where copyright owners' property right to set price is subject to court supervision pursuant to an antitrust decree with the Department of Justice).

While the problem is important and recurring, solutions have been arbitrary and unpredictable. This entails real costs to authors, inventors, and the public, and Courts and congress have no clear or

⁴⁴ [Check].

systematic idea or approach of how to deal with the problem. Part IV attempts to provide such a systematic framework of analysis. But before we get there, we will have to examine the effects that new technologies have on works of authorship, which is the goal of part III.

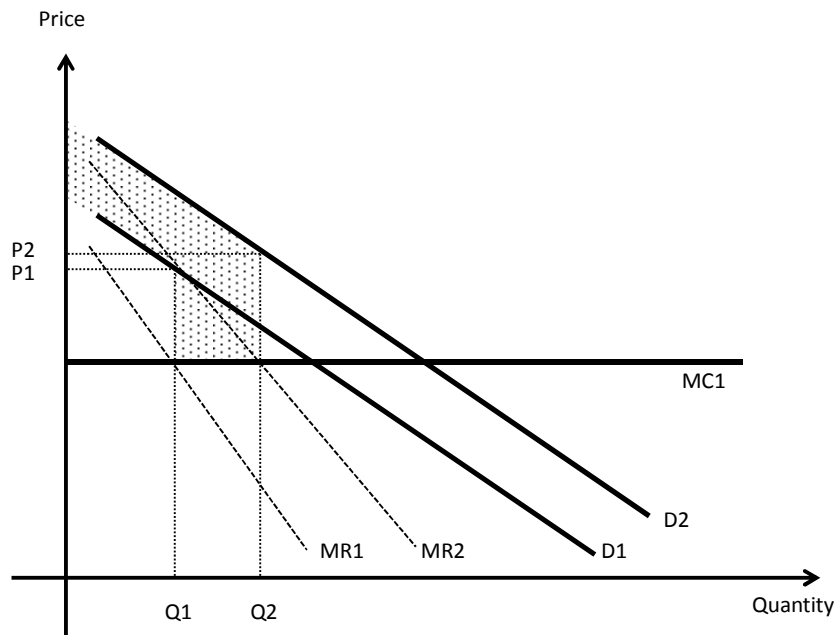
III. THE EFFECTS OF NEW TECHNOLOGIES ON MARKETS FOR WORKS OF AUTHORSHIP

New technologies have two major effects on markets for creative works. First, technologies may increase consumer demand for expressive works.⁴⁵ This is so because technologies often offer some new functionality, previously unattainable. As such, new technologies often allow users to interact in new ways with existing works. Consumers utilize these new technologies because they value the added functionality. For example, VCRs allow consumers to time shift, namely to record programming that they are unable to watch at the time of broadcast and watch them at a later, convenient time. Assuming that an average consumer draws a certain value from being able to watch TV programming in real time, they would attribute an additional value to the ability to time-shift such programming. They should thus be able and willing to pay more for content they can time shift relative to content they cannot. A second reason that a new technology may increase the value that consumers are willing to pay for identical content is that it may reduce consumer's transaction costs, such as reducing the time needed to get to an actual physical store to consummate the transaction. Transaction costs, of course, are a part of the overall price a consumer pays for content, and are additional to the tender price.

Graph 1 below shows this effect graphically. It depicts the market for copies of a certain creative work. The marginal curve is denoted MC1. The demand curve is denoted D1, and the marginal revenue curve is denoted MR1. D1 is downward sloping since, as is customary to assume, there are no perfect substitutes for copyrighted works. The quantity supplied would be the profit maximizing one, Q1, denoting the point on the quantity axis straight below the intersection of MR1 and MC1. The new technology causes an upward shift in the demand curve to D2, denoting the fact that consumers draw added value from the work once the set of activities each can engage in respecting the work has been expanded to include a new use. Subsequently, we get a new marginal revenue curve, MR2, and a greater quantity of copies supplied, Q2, which is straight below the intersection of MR2 and MC1. The greater quantity is a result of consumers' willingness to pay more for access to the work because of the availability of the new technology. The efficiency gain attributable to the new technology, respecting this particular work, is denoted by the dotted area in Graph 1.

Graph 1 – The Effect of Value Increasing Technologies on Markets for Copies

⁴⁵ See Kevin M. Lemley, *The Innovative Medium Defense: A Doctrine to Promote the Multiple Goals of Copyright in the Wake of Advancing Digital Technologies*, 110 Penn. St. L. Rev. 111 (2005) (highlighting this effect); Fred Von Lohmann, *Fair Use as Innovation Policy*, Berkeley Tech. L.J. (2008) (same); Adrienne J. Marsh, *Fair Use and New Technology: The Appropriate Standards to Apply*, 5 Cardozo L. Rev. 635 (1984) (same); Robin A. Moore, *Fair Use and Innovation Policy*, 82 NYU L. Rev. 944 (2007) (same).

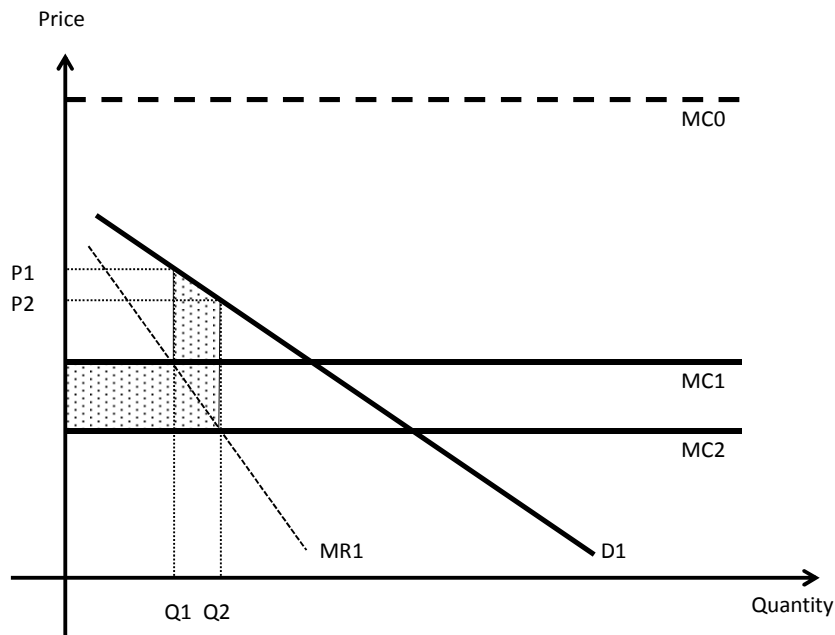


Additionally, on the supply side, new technologies may reduce the cost of serving copies of works of authorship by providing a less expensive way to supply creative content.⁴⁶ For example, in a pre-VCR world, broadcasters may need to transmit each program at different times of the day or different days in the week in order to allow consumers a reasonable chance to view them. However, in a world where the average consumer owns a VCR, broadcasters need broadcast each program fewer times - and at the limit only once - because they can rely on customers' time shifting abilities. In this way the cost of providing consumers with access to the work has dropped down, and this allows broadcasters to transmit a greater number of titles per available bandwidth.

Graph 2 below shows this effect graphically. This time while the demand curve D1 remains constant, the technology causes a downward shift of the marginal cost curve from MC1 to MC2. Subsequently, the quantity supplied increases from Q1 to Q2, which is straight below the intersection of MR2 and MC2. The greater quantity is a result of sellers declining marginal cost of supplying copies to consumers, such that consumers with lower valuations will purchase a copy. The efficiency gain attributable to the new technology, respecting this particular work, is denoted by the dotted area.

Graph 2 – The Effect of Cost Reducing Technologies on Markets for Copies

⁴⁶ See Tim Wu, *Copyright's Communications Policy*, 103 Mich. L. Rev. 278, 294 (2004) (highlighting this effect). Wu notices this effect while studying conflicts between incumbent and new communication technologies. In contrast, the focus of this Article is on the author/inventor trade-off and on the disparate ex-ante incentives with which different legal rules would endow the parties.



Third, new technologies can have the aforementioned two effects simultaneously, as the example of the VCR makes clear: new technologies can both increase consumer demand for works of authorship and reduce suppliers' provision cost. As is clear from the separate analyses of each event, an increase in quantity supplied would ensue in case where they are both at work.

The aforementioned effects do not just mean that new technologies may increase the dissemination of already created works. Perhaps more importantly, new technologies may increase the number of works of authorship created as well as the number of individuals who choose to become authors. This outcome would be more significant and noticeable if either one of the two aforementioned effects, or their joint effect, were substantial. This outcome is shown graphically in Graph 2 above in the case of a cost reducing technology. Assume that initially an author contemplates writing a work that she predicts would have a D_1 demand curve and whose marginal cost of provision is MC_0 . Since MC_0 lies above the demand curve, investment is inefficient and the author would not invest in this work of authorship. Once a new technology is introduced, and the marginal cost curve drops to MC_1 , investment – at least when the initial cost of creation is not very high – becomes desirable. For example, before the invention of VCRs, movies had to generate a certain box office return in order to be produced. But the VCR allows studios to reap added income from video rentals. Additionally, in a pre-VCR world, only a small number of movies could be featured on television and enjoy the added, ad-based income. With the invention of VCRs, movies can garner greater profits and more of them have a decent chance of being featured on television. One may thus expect the number of movies produced to increase, as indeed happened with the explosion of movies that are made primarily with an eye towards home audiences.

The aforementioned analysis takes us one step towards resolving the author-inventor trade-off. It translates the effects that new technologies have to effects in the market for works of authorship, thus enabling us to measure the costs and benefits for authors and inventors using one common denominator. It will thus be assumed in the next Part, which conducts the aforementioned trade-off, that the respective values of works of authorship and new technologies are commensurable – they both relate to the size of markets for works of authorship.

IV. A DESCRIPTIVE MODEL: UNDERSTANDING THE TRADE-OFF BETWEEN AUTHORS AND INVENTORS

C. The Basic Insight: Ex-Post Rights and Liabilities Affect Ex-Ante Investments

The suggestion that ex-post rights affect ex-ante investments should be unremarkable to anyone slightly familiar with intellectual property law. As students usually learn in an introductory class, copyright law and patent law grant to authors and inventors exclusive rights in their works of authorship and inventions. Copyright owners and patent owners have exclusive market advantages respecting their creations: they are the only ones who may sell their embodiments, for example.⁴⁷ Under the terminology in this Article, these exclusive rights, and correlative liabilities on third parties, arise *ex-post*, after the intellectual work has been finalized. These ex-post market advantages are the carrot, or prize, that the legal system holds out to authors and inventors in order to give them incentives to create, i.e. to undertake ex-ante investments. These investments are sunk ex-ante, namely along the route leading from conception to completion of the intellectual work. What follows below is the working out of this old idea in greater detail, while building on advancements in the general law and economics literature of the last fifty years.

Ronald Coase's early work is famous for the argument that when transaction costs are zero, the legal rule does not matter for efficiency.⁴⁸ Under frictionless bargaining, the entitlement will pass to the party that values it the most.⁴⁹ Assume, for example, that pollution benefits factory by \$1M but harms its neighbors by \$2M. If the neighbors have the right to clean air, they would use their power to enjoin factory from polluting. If factory enjoys a right to pollute, then the neighbors would buy that entitlement from it for an amount ranging between \$1M and \$2M according to the parties' bargaining power. Assuming equal bargaining power, the neighbors will pay \$1.5M for the entitlement. Either way, the efficient outcome – no pollution – will follow, as is shown by the overall value of \$2M under either legal rule.

Still, even under zero transaction costs, different legal rules may still yield different distributional outcomes. If the law allocated to the neighbors a right to clean air, then they would end

⁴⁷ Copyright law's bundle of rights includes mainly the exclusive rights to make copies, make derivative works, distribute, and publicly perform and display. See 17 USC secs. 106, 501. Patent law's exclusive bundle includes mainly the exclusive rights to make, use, sell, offer to sell and import the invention. See 35 USC secs. 154, 271.

⁴⁸ See Ronald H. Coase, *The Federal Communication Commission*, 2 J.L. & Econ. 1 (1959); Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. & Econ. 1 (1960).

⁴⁹ Ronald H. Coase, *The Problem of Social Cost*, 3 J.L. & Econ. 1 (1960).

up with their full valuation of clean air, \$2M, and the factory with zero. When the factory starts out with an entitlement to pollute, however, the neighbors have to pay for it, and will end up with a value of \$0.5M (their enjoyment value of \$2M less the contract price of \$1.5M) and the factory with \$1.5M. The two legal rules that the example just used are now commonly called property rules, following Calabresi and Melamed's seminal 1972 taxonomy.⁵⁰ Other rules in Calabresi and Melamed's framework would yield the efficient result yet a different distribution. Were factory initially protected with a liability rule, the neighbors would pay it \$1M – the harm it would suffer if it could no longer pollute. The efficient result – no pollution – would materialize, and the party will each end up with a value of \$1M.

Since the case of zero transaction costs was seen as less troubling from the perspective of economic efficiency, the law and economics literature following Coase has focused on the more realistic scenario of positive transaction costs. For example, Calabresi and Melamed's paper suggested that the law should allocate entitlements in a way that would maximize efficiency.⁵¹ Subsequent related literature has largely followed suit.⁵² Under the terminology used here, this approach has focused on the case of *ex-post* positive transaction costs. In other words, it largely imagined two parties with economic activities of fixed values, and tried to determine which initial allocation of the entitlement would tend to yield the efficient outcome. It abstracted away from the possibility that the value of the parties' economic activities may depend on *ex-ante* investment decisions, namely those they may take before they meet at the negotiating table. This scenario, alas, is the paradigmatic one in intellectual property law.

Advancements in contract and organizational theory over the last thirty years – arising from the context of holdup by contractual parties, studied prominently by Oliver Hart – have augmented Coase's analysis with a related insight that is particularly salient in the intellectual property context. There are cases in which initial, yet uncoordinated, investments by different parties affect the eventual value of an economic activity. If the parties' *ex-ante* investments are non-contractible – namely they cannot condition their investment on an eventual reward or a corresponding investment by another party – then the rules that determine the allocation of the eventual value flowing from the economic activity *ex-post* – such as the law and the parties' relative bargaining power – may affect the parties' propensity to invest efficiently *ex-ante*. Stated another way, the way in which the pie is divided affects the extent to which parties will invest to increase its size.

To demonstrate this insight in terms of the example above, assume that the neighbors, when they build their neighborhood initially, can decide whether to invest in adding a communal garden which

⁵⁰ Guido Calabresi & Douglas Melamed, Property Rules, Liability Rules and Inalienability: One View of the Cathedral, 85 Harv. L. Rev. 1089 (1972)

⁵¹ Guido Calabresi & Douglas Melamed, Property Rules, Liability Rules and Inalienability: One View of the Cathedral, 85 Harv. L. Rev. 1089 (1972). Calabresi and Melamed, however, did not limit their analysis to the advancement of economic efficiency.

⁵² See, e.g., Ian Ayres & Eric Talley, Solomonic Bargaining: Dividing a Legal Entitlement To Facilitate Coasean Trade, 104 Yale L.J. 1027 (1995); Louis Kaplow & Steven Shavell, Property Rules versus Liability Rules: An Economic Analysis, 109 Harv. L. Rev. 713 (1996).

will have any value only if the air is clean. If they invest zero and do not plant the garden, then their valuation of clean air is as stated above, \$2M. They can invest \$100K, however, which will raise their enjoyment of clean air by \$150K (to a total of \$2.15M). Assume that while transaction costs are zero at the time when pollution is an actual possibility, transaction costs are prohibitive *ex-ante*, at the time the neighbors have to make their investment decision. This may be the case, for example, if the neighbors know that a factory will relocate near them within a few years, but they cannot tell at the time of investment which factory will relocate and when, and to which one of many potential locations it will move. Under these assumptions, the choice of the legal rule will affect whether the neighbors will invest efficiently *ex-ante*.

From a social perspective, planting a garden is efficient. Regardless of who holds the entitlement initially, if the neighbors and the factory can transact costlessly *ex-post* then no pollution will ensue. If so, reaping a social benefit of \$150K *ex-post* is worth investing \$100K *ex-ante*. However, whether the neighbors will invest at the efficient rate depends on the legal allocation of the entitlement. If the neighbors enjoy a property right to clean air, they will plant the garden knowing that they will reap the returns - \$150K - in full. In this case, the neighbors private cost/benefit calculus aligns with the social one, and they will make the right investment decision *ex-ante*.

If the law allocates to the factory the right to pollute, however, things will be different. In this case, the neighbors will not be able to internalize the fruits of their investment fully. Rather, they will have to split them with factory *ex-post*. In the final negotiations, the neighbors' value of clean air will be \$2.15M and Factory's value of pollution would be \$1M. Assuming equal bargaining power, the parties will meet mid-way. The neighbors will buy the entitlement for \$1.575M. From the neighbors' private perspective, investing \$100K *ex-ante* does not make sense because it yields a private return of only \$75K. As mentioned above, the result relies on the assumption that the neighbors initial investment is non-contractible, such that it is already sunk at the negotiation table. In this example, then, the neighbors will not invest at the socially efficient rate when the entitlement is allocated to the factory, but will invest optimally in value creation if the entitlement is allocated to them.⁵³ This example demonstrates the larger point that party's initial investment decision in enhancing the value of an asset depends on the extent to which that party will share eventually in the value enhanced.

The Article relates more closely to two bodies of work. The first is by Suzanne Scotchmer who over the last two decades analyzed extensively how the division of surplus between sequential generations of patentees affects their incentives to come up with basic inventions and with improvements to existing patents.⁵⁴ Scotchmer's framework assumes frictionless *ex-post* bargaining,

⁵³ Note that Coase's insight remain true if the parties can transact costlessly before any investments are sunk. In such a case, regardless of the legal allocation of the entitlement, the parties will invest together as one economic agent, and will split the net profits according to their bargaining power.

⁵⁴ See, e.g., Suzanne Scotchmer, *Innovation and Incentives* (2004); Suzanne Scotchmer, *Protecting Early Innovators: Should Second-Generation Products be Patentable?*, 27 *Rand J. Econ.* 322 (1996); Jerry Green & Suzanne Scotchmer, *On the Division of Profit Between Sequential Innovators*, 26 *Rand J. Econ.* 20 (1995); Suzanne Scotchmer, *Standing on the Shoulders of Giants: Cumulative Research and the Patent Law*, 5 *J. Econ. Persp.* 29

views property rules and liability rules as setting the parties' relative bargaining power in ex-post negotiations, and analyzes potential distortions in different patentees' investment decisions.⁵⁵ The second body of work is by Lucian Bebchuk.⁵⁶ Adding to the general literature on property rules and liability rules, Bebchuk examines how the four entitlements affect victims and injurers' incentives to make ex-ante investments. Like Scotchmer, Bebchuk assumes frictionless ex-post bargaining, and views the law as setting the parties' ex-post bargaining power. In presenting the basic set-up below to illuminate the nature of the trade-off between authors and inventors I shall follow Bebchuk's framework that is particularly useful since it relates explicitly to investments in harm reduction, an issue that has been at the center of the debate over the liability of inventors to authors for copyright infringement.

The set up below thus adapts Bebchuk's analysis to the context of the intersection of authorship policy and invention policy. It will map scholarly views and courts' holdings against the framework presented. Yet, the set-up below differs from Bebchuk's in that it allows for active investments by inventors to enhance the magnitude of the harm caused to authors. Whereas Bebchuk's model would predict no investment by inventors that are protected by a property rule to reduce the interference (or harm to the author), the model here predicts that such inventors would invest intentionally to increase the interference (harm to the author), knowing that this may strengthen their bargaining power in the ex-post negotiations. In addition to illuminating the nature of the trade-off, the larger payoff of building on Bebchuk's framework comes in the next Part in which I make a recommendation for a new rule of liability.

D. Basic Set Up

Imagine that it is January 1, 2010. We live in a simple world where there is one author, one technologist (inventor), and a stock of available works of authorship in the public domain. On this day, the author and the inventor contemplate investing in a work of authorship and in a new technology of copying or dissemination, respectively. Importantly, the author invests in the work of authorship under an existing business model and existing technology of dissemination.⁵⁷ The route leading from

(1991). Scotchmer's influential framework was also applied to the question at hand. See Robin A. Moore, Fair Use and Innovation Policy, 82 NYU L. Rev. 944 (2007) (same). Moore's analysis, however, does not focus on the potential for interference between the two creators, does not recognize meaningfully the adverse effect that the technology may have on authors, and does not illuminate efforts regarding interference reduction.

⁵⁵ See, e.g., Mark Schankerman & Suzanne Scotchmer, Damages and Injunctions in Protecting Intellectual Property, 32 Rand J. Econ. 199 (2001).

⁵⁶ See Lucian Bebchuk, Property Rights and Liability Rules: The Ex-Ante View of the Cathedral, 100 Mich. L. Rev. 601 (2001); Lucian Bebchuk, Ex Ante Investments and Ex Post Externalities, Harvard Olin Discussion Paper No. 397 (2002), at http://papers.ssrn.com/sol3/papers.cfm?abstract_id=297091.

⁵⁷ As mentioned previously, the term author, as used here, includes authors and assignees or copyright owners (who may buy the authors' copyrights or get an assignment of some or all rights, such as publishers). This lumping is justified since publishing, promotion and dissemination of content are and have historically been an important part of the production chain; since it is widely recognized that the copyright system does and should incentivize these crucial aspects of authorship; and since these intermediaries and their investments have played an important role in the tussles between copyright owners relying on old technologies of dissemination and the inventors of new technologies of dissemination. For these tussles, see generally Tim Wu, Copyright's

conception to being ready to market a finished creation would take each a year to complete. As the process of authorship and invention is long, and as future market conditions are hard to predict, each cannot know the future value of their work with certainty. They can merely attach probabilities to possible eventual values of their investments. In other words, they have an idea of the amount they'll make in expectancy, but cannot predict it perfectly. We shall designate the value that the work of authorship and the technology are expected to have when eventually marketed as V_A and V_T , respectively.⁵⁸

These expected values are not a given, but are rather a function of the parties initial investment decisions. The two creators must invest time, effort and sweat in order for their creations to acquire value. The more they invest *ex-ante* in 2010, i.e. before their works are released to the market, the greater the value of their creations will be *ex-post*, i.e. when put on the market on January 1, 2011. However, each additional investment, or effort, each party will make will yield a decreasing marginal value. Each of the parties will rationally invest in enhancing the expected value of its creation up to the point where its expected private return on investing a marginal dollar will fall to one dollar. At this point, each party will stop investing in enhancing the value of its creation. As we shall see below, the parties' incentive to invest *ex-ante* would often diverge from social optimality. We shall designate their respective investments in enhancing the value of their creations x_A and x_T .

The parties are aware that if both put their creations on the market, an interference between their activities will ensue.⁵⁹ The interference is the result of simultaneous operation: if either the Author or the Technologist were not to market their respective creations, no *ex-post* interference would be suffered. The size of the interference denotes the degree to which the market value of the work of authorship will decline when marketed simultaneously with the technology relative to in the case where the work of authorship would have been released to a market devoid of the new technology. This may happen, for example, because the technology may allow consumers, who would otherwise pay for the work, to obtain free access to it. It may also happen because the author would have to incur a new expense *ex-post*, such as forsaking an old technology of dissemination and moving to a new one or taking self-help measures *ex-post* to soften the adverse effect of the technology. *Ex-ante*, the author

Communications Policy, 103 Mich. L. Rev. 278 (2004). Authors benefit from selling, assigning or licensing their rights to other market players – such as publishers, music publishers, movie studios, collective rights organizations etc'. These intermediaries invest under an existing technology, and may be hurt by the new technology. The more they profit, the more they can pay authors. In this paper, however, I consider all in the chain stemming from the author as one firm, and abstract away from agency by intermediaries. The investments by author that are studied here are those that are specific to the older technology of dissemination.

⁵⁸ In the stylized example, the value of the technology, V_T , stems from enhancing the value of works in the public domain. It is assumed that the value of the particular work of the author is negligible relative to the value of the technology.

⁵⁹ I use the word interference because it is value neutral. The term "harm" may be more intuitive, but may also convey the sense that the inventor causes the harm to the author. Such a term may imply that the author is a victim that has a pre-existing right not to be harmed, whereas the question here is whether the author should have such right.

and the inventor cannot predict perfectly the size of the interference. They can only assess its magnitude probabilistically. We shall designate the expected magnitude of the interference I .

The expected value of the interference is not fixed. Rather, the author and the inventor can each invest *ex-ante* independently to reduce its expected magnitude. For example, the inventor of a VCR may invest *ex-ante* in incorporating a technology that would not record programs that are broadcast with a certain designated signal,⁶⁰ thus reducing the magnitude of the *ex-post* adverse effect on authors. The author could also invest *ex-ante* to the same end. For example, authors of computer software may sell their wares with physical dongles, such that downloaded copies over P2P networks would not be usable; authors of sound recordings could embed metadata in the digital files sold online that would identify the customers who would buy them and then upload them on P2P networks, which would deter digital piracy. We shall designate such *ex-ante* investments by the author and the technologist in reducing the expected magnitude of the interference by γ_A and γ_T . We shall also assume that the inventor can also invest in order to increase the magnitude of the interference, namely spend money *ex-ante* to exacerbate the adverse effect that the technology would have on the author. For example, the developer of P2P software could create a related website where users could easily find and download the ten most popular songs of the month, or it could encrypt network communications and hide users' IP addresses. Such *ex-ante* investment would exacerbate the adverse effect on the work of authorship stemming from the introduction of the technology.⁶¹

The author and the inventor cannot communicate in 2010, namely when they make their *ex-ante* investments. This is commonly the case in reality because of various *ex-ante* transaction costs. The author and the inventor may not know the identity of the other party *ex-ante*, but will know it *ex-post*, once they observe the other party's creation on stores' shelves or in advertisement on January 1, 2011. The author may not know *ex-ante*, for example, which of many potential inventors will eventually come up with the new technology, and the inventor may not know which of several individuals will come up with the work of authorship. Even if they knew each other's identity, Arrow's disclosure paradox may prove insurmountable: each may fear that negotiations would disclose the nature of the creation to the other party, and thus may risk its market success. Other *ex-ante* transaction costs are possible as well.⁶²

⁶⁰ Such was the Macrovision technology, first introduced in 1983. See e.g. http://en.wikipedia.org/wiki/Rovi_Corporation. Similarly, the FCC mandated the digital TVs must recognize such a "broadcast flag" but the D.C. Circuit ruled that it had no authority to do so. See *American Library Association v. FCC*, 406 F.3d 689 (D.C. Cir. 2005).

⁶¹ The model assumes that the investments in value enhancement and interference reduction are independent. In practice, however, they may interact. For example, an investment in interference reduction – such as eliminating the fast forward button on a VCR – may simultaneously reduce the value of the technology. As will be shown below, however, the model's predictions are consistent with much observable data, and thus render it useful as a model that simplifies for us life's complexities.

⁶² Although in reality *ex-ante* transaction costs are not always insurmountable, that fact is not crucial for the model. When *ex-ante* transaction costs are zero, before any investment is sunk, then the legal rule will have no effect on efficiency. All that we need for the model's predictions to hold is that at least some investments have to be made before the parties meet. This is certainly the case in reality, where each party – the author and the

On January 1, 2011 the author and the inventor have completed their respective creations. At this point uncertainty resolves and the parties know the exact value that their respective works will have on the market and the size of the would-be potential interference. The author and the inventor can now transact costlessly, having equal bargaining power.⁶³ They will reach the efficient result in light of the realized values of V_A , V_T and I , their equal bargaining power, and the legal allocation of the entitlement. Although the efficient result will ensue, as we know the legal rule will affect the distribution of value between the parties.⁶⁴ As we shall see below, the prospect of different allocations of value *ex-post* will entail different incentives to invest by the parties *ex-ante*.

E. Three Possible Ex-Post Scenarios

Since *ex-post* transaction costs are assumed to be zero, the parties will reach the efficient result. That efficient result would depend on the relative magnitude of the realized value of V_A , V_T , and I on January 1, 2011. If V_A is the smallest value of the three then the efficient result would be for the technology to be marketed and for the author not to market the work of authorship through the old technology. We shall designate this case as Scenario T since only the technologist should operate. Scenario T would happen when either $V_A < V_T < I$ or $V_A < I < V_T$. Remember that the interference I is suffered only when the new technology is marketed and, at the same time, the author is marketing her work using the old technology. If one of the parties stops to operate in the market then no interference would actually be suffered. In the two cases above comprising Scenario T the interference I is greater than V_A and it is therefore socially advantageous to prevent the greater loss I by forsaking a smaller value, V_A . Regardless of the nature of the entitlement and its initial allocation, the parties would reach the efficient result in Scenario T and the author would shut down. In Scenario T, the efficient result will obtain and the total value realized *ex-post* will therefore be V_T .

Scenario T would materialize, for example, when marketing the new technology would be clearly efficient, but marketing the work of authorship under the old dissemination simultaneously would not make sense. An example for this scenario is the advent of the MP3 format and MP3 players.⁶⁵ MP3 technology arguably unleashes big economic value by compressing the size of digital files and allowing easy portability of sound recordings. With the availability of MP3 players, the marketing of sound recordings using the old technology – pressing music CD-ROM and marketing them through brick

inventor – have to sink costs just to become an author and an inventor, potentially many years before they contemplate investing in a particular work of authorship and invention.

⁶³ The assumption of equal bargaining power is not crucial to the model's predictions, which will generally hold even if one assumed a different relative bargaining power. In the case of authors and inventors, there is no reason to believe that one party or industry has an overwhelming bargaining power relative to the other.

⁶⁴ Although *ex-post* transaction costs are nothing to be taken lightly, they have been studied extensively elsewhere. The analysis here will follow the common assumption in the relevant literature of abstracting away from them in order to focus attention on the parties' *ex-ante* investments. Such *ex-ante* investments are at the heart of intellectual property law and policy generally, and particularly so with respect to the trade-off between authors and inventors. In enhancing our understanding of the trade-off between encouraging *ex-ante* investment by authors and inventors, however, it is not suggested that *ex-post* transaction costs are unimportant.

⁶⁵ For the case on which this example is based, see *RIAA v. Diamond*, 180 F.3d 1072 (9th Cir. 1999).

and mortar stores – may no longer be worth the related costs. The efficient result would arguably be the one we have observed over the last decade, namely shutting down (or substantially scaling back on) the older technology of dissemination authors have used, or in other words the closing of many brick and mortar music stores.

But Scenario T is not exclusively limited to cases where the old technology of dissemination need to be shut down. It may also represent cases where the old work of authorship need not be marketed once the new technology of dissemination is introduced. This is because of the synergy between content and the channel of dissemination. Economic theory predicts that when two complementary and unique products are provided by one party – here content and dissemination - the resultant price is expected to be lower than if the two unique complements were provided by different parties.⁶⁶ In the face of a new technology of dissemination, profits the original author (who merged content provision and distribution) may fall, and make the dissemination of the old content via the new channel of distribution – now owned by a different party – inefficient.

Other times, the realized values may come out differently. If V_T happened to be the smallest of the three on January 1, 2011, then the efficient result would be for the inventor not to release her technology to the market. We shall designate this eventuality as Scenario A, since only the author should operate. Scenario A would happen when either $V_T < V_A < I$ or $V_T < I < V_A$. Again, since the interference I will not be suffered if one of the parties is removed from the market, it is socially advantageous to prevent the greater loss I by forsaking a smaller value, V_T . In Scenario A, the efficient result will obtain and total value realized ex-post will therefore be V_A .

An example for Scenario A may be the technology in Grokster and its effect on authors. Assume that the technology adds little or no new functionality as a new technology of dissemination and at the same time imposes a great adverse effect on authors. In such a case, it would be efficient for the technology not to be introduced.

Lastly, it may be that the interference I would be of the smallest magnitude, in which case the efficient result would be for both the author and the inventor to operate, and for the interference to be borne. We shall designate this eventuality as Scenario TA, since both the technologist and the author should operate. Scenario TA would happen when either $I < V_T < V_A$ or $I < V_A < V_T$. Since the interference I is smaller than the value of the technology and from the value of the work of authorship, it makes sense socially to allow both activities to exit simultaneously. In Scenario TA, the efficient result will obtain and the total value realized ex-post will therefore be $V_A + V_T - I$.

An example for Scenario TA may be the introduction of the Sony Betamax VTR. It is possible that the introduction of the VTR made people skip ads and as a result TV stations revenue, and consequently the royalties they were willing to pay movie companies, were diminished. Arguably, any such adverse affect was very small. If so, the efficient thing was for the Betamax to be sold on the market and for movies to still be disseminated through broadcast television.

⁶⁶ See Suzanne Scotchmer, *Innovation and Incentives*, p. ____.

For expositional clarity, we shall assume that Scenarios T, A and TA will materialize with a 0.25, 0.25 and 0.5 probabilities, respectively, that the parties know these probabilities when they sink their investments *ex-ante*,⁶⁷ and that these probabilities are independent of these investments. Although enhancing the values of V_A and V_T and decreasing the value of I may change the relative size of these values and therefore change the probabilities with which Scenarios T, A and TA take place, we shall abstract away from that possibility, assuming that this does not happen or that the effect is immaterial. We shall assume that the relative probabilities of the three scenarios are determined primarily by factors beyond the parties' control (such as unpredictable trends and preferences among the consuming public). While the parties cannot affect through their investments which of the scenarios would materialize *ex-post*, their investments nevertheless affect the values of V_A , V_T and I within whatever *ex-post* scenario that happened to materialize.

There is good reason to believe that this assumption is not greatly off the mark. In the particular context of technologies that interact with content, scenarios T, A and TA correspond to the possibilities that the technology would be a revolutionary success (in which case investments under the older technology of dissemination would be a waste), a total failure (and thus its introduction harmful and inefficient), or, lastly, of some positive value, respectively. Whether a technology falls into which one of these three categories is often affected by factors that are beyond authors and inventors control and are hard to predict *ex-ante*. A technology may or may not reach certain a certain tipping point – i.e. pass a certain threshold of consumer adoption – that would turn it from a commercial failure to a moderate success, or from a technology that enjoys niche-market success to one that enjoys a universal one. The same can be said for works of authorship. Even when a technology, for example, is likely to succeed, it may be unclear which of one of several competing formats – such as Beta vs. VHS or HD-DVD vs. Blu-ray – will eventually carry the day. The same may be said as to the eventual success of any one out of several works of authorship.

F. Socially Optimal Levels of Investment

How much should each of the parties invest *ex-ante* in enhancing the eventual value of its creation and in reducing the eventual interference? To answer this question we will need to calculate the social return on the parties' investment. This will be calculated by multiplying the probability of each scenario with the eventual social value to be obtained under it, and adding the three products. Accordingly, the expected social return on the parties' investments is $0.5 * [V_A + V_T - I] + 0.25 * V_A + 0.25 * V_T = 0.75V_A + 0.75V_T - 0.5I$. This calculation stands for (the probability of Scenario TA) * [social value realized under Scenario TA] + (the probability of Scenario A) * [social value realized under Scenario A] + (the probability of Scenario T) * [social value realized under Scenario T].

To wit, the expected social value of investment in enhancing the value of the technology is not the full V_T but only $0.75 * V_T$. This is so because the technology is enjoyed socially only in 0.75 of the

⁶⁷ The exact probabilities are immaterial to the analysis. The predictions do not depend on the actual probabilities chosen, only on the fact that each scenario may happen with a positive probability.

cases, namely in Scenarios TA and T. With a 0.25 probability – namely if Scenario A materializes *ex-post* – the technology is not marketed at all, and in this case the *ex-ante* investment in enhancing its value would bear no fruit. Similarly, only in seventy five percent of the cases – Scenarios TA and A - investment in enhancing the value of the work of authorship would be worthwhile. From a social perspective, any investment in enhancing the value of the work of authorship (e.g. that relates to enhancing its value through an old technology of dissemination) would be a waste in scenario T, since the new technology would replace the old in the market. The inventor and the author should thus each invest *ex-ante* in enhancing the value of their respective creations only up to the point where the return on the marginal dollar invested in terms of increasing the value of the creation just falls to \$4/3 or \$1.33.

Similarly, the interference I is suffered only with a 0.5 probability, namely only if Scenario TA materializes *ex-post*. Any *ex-ante* investment in reducing the magnitude of the interference would bear no fruit with a 0.5 probability, namely in Scenarios T and A. The author and the inventor should thus each invest *ex-ante* to reduce the value of I only up to the point where the marginal dollar invested yields a \$2 reduction.

G. Mapping the Trade-Off: Ex-Ante Investments under Property Rules and Liability Rules

Since the marketing of a technology simultaneously with that of a work of authorship creates a harmful effect, the operations of the author and the inventor conflict. The law must decide who should shoulder the interference. Our policy objective is to induce the parties to invest *ex-ante* in enhancing the value of their respective creations and in reducing the magnitude of the interference at the socially optimal rate. Since we know that the *ex-post* division of the social surplus between the parties will affect their *ex-ante* incentives to invest, we will need to first determine what such *ex-post* division would be. In our analysis, we shall assume that when the parties meet on January 1, 2011, they can observe the values V_A , V_T , and I and transact costlessly under equal bargaining power in the shadow of law.

As for the relevant law, we shall consider the disparate distributions of value that the four classic Calabresi and Melamed entitlements will entail in the *ex-post* negotiations. These four rules are used because they are four major ways in which the legal system allocates and protects entitlements, ranging over many bodies of law, including intellectual property law. Injunctions and damages are the major available remedies for copyright infringement. Moreover, these four classic rules are very close to various major suggestion made in the literature concerning the trade-off between authors and inventors. Understanding the operation of such four ideal types would help us understand the nature of the trade-off they involve, help us see their relative advantages and disadvantages, and this would be instrumental in devising what is arguably a superior legal rule later in the paper.

Three major rules can be derived from the literature and case law regarding the allocation of the entitlement and its protection. First is the Sony rule. Under Sony, no copyright liability would be imposed on the manufacturer of new technologies if the technology is capable of “substantial non-infringing use”. At least as understood by many, the Sony standard does not require that most users of the technology use it for a legitimate purpose, nor even that the most frequent use is non-infringing.

Rather, all that it requires is one use legitimate use for the technology that is not a trivial use. And the Sony standard does not even require that the use be a current, observable one. Rather, it only requires that the technology be merely capable of one such use. Applying this permissive standard, the Ninth Circuit imposed no liability on the Grokster P2P file-sharing network.

A second major standard of liability discussed in the literature is the one suggesting that the Technologist should be held liable for the harm its technology is causing the Author.⁶⁸ The reasons are essentially two: imposing liability on the Technologist would cause her to take precautions to reduce the harm to Author, and the imposition of liability would factor this harm into product prices, and thus better reflect the social cost of the Technology.⁶⁹

Implicit in the second approach is the notion that if the technology is indeed value enhancing, then the Technologist would still make positive profit after paying the Author for its harm. The imposition of liability can thus weed out inefficient technologies. If a technology causes more harm than it does good, then having to pay for the harm it causes, the Technologist would not develop it. However, the proponents of the second approach abstract away from the point that plaintiff in copyright cases can often choose to collect statutory damages that lie in the range of \$750 - \$30,000 at the court's discretion. Even if a court chooses the lowest possible amount, \$750, this is still 750 times higher than real harm causes for songs that sell for \$1 on iTunes. It is thus clear that the implementation of the second approach under current copyright law would in effect give Authors a veto power on the development of the Technology. The technology would in reality have to get Author's consent before introducing the technology. Indeed, many who filed briefs in Grokster objected to vesting such veto power over technological innovation in the hand of copyright owners.

These three rules map quite well onto three of Calabresi and Melamed's rules. The Sony rule – at least in the permissive reading it has been given by many, including the Ninth Circuit in Grokster – gives, in effect, a property right to the Technologist to develop the technology. The second approach, imposing on Technologist the duty to compensate Authors for actual resultant harm is like giving the Author the entitlement protected by a liability rule. The third approach, which would subject Technologist to a prohibitively high level of damages vests, in effect, a property right in the Author. Below, I shall chart what will happen under each of these three rules, and will add the fourth Calabresi and Melamed rule protecting the Technologist with a liability rule.

⁶⁸ Such a view is implicit in, e.g., [cite; Brief of Amici Curiae Kenneth J. Arrow et. in Support of Petitioners (Jan. 24, 2005), available at 2005 WL 176441].

⁶⁹ Indeed, this latter reasoning was advanced by a group of law professors in an amici brief in the 9th Circuit in Grokster. Brief in Support of Reversal By Amici Curiae Law Professors and Treatise Authors Neil Boorstyn et. al, MGM v. Grokster, at 2003 WL 22753868. They quote the following passage approvingly from *Polygram Int'l Publ'g, Inc. v. Nevada/TIG, Inc.*, 855 F. Supp 1314, 1325 (D. Mass. 1994):

When an individual seeks to profit from an enterprise in which identifiable types of losses are expected to occur, it is ordinarily fair and reasonable to place responsibility for those losses on the person who profits ... The law of vicarious liability treats the expected losses as simply another cost of doing business.

In what follows, I shall consider the division of surplus ex-post under each rule (taking into account that each of the Scenarios TA, T and A may materialize under each legal rule), and will examine what ex-ante incentives each legal rule will dictate for the parties.

Author protected by a property rule.

Scenario TA. Protected by a property rule, Author can threaten shutting down the Technologist with an injunction. Author's threat point (reservation price) is thus V_A , the value it would reap acting alone. However, it is efficient that the Technologist operate too, increasing total value by $V_T - I$. With equal bargaining power, the parties will realize and split this gain from trade. Author will end up with $V_A + 0.5 * [V_T - I]$, and the Technologist with $0.5 * [V_T - I]$.

Scenario A. In this case, total value is maximized *ex-post* when Author would act alone, and the new technology would not be marketed. If Technologist tried to operate, Author would issue an injunction. In this case, there are no potential gains to be had from trade, because it is efficient that Author alone operate. In other words, in order for Author to allow Technologist to operate, Author would demand at least I , the value by which Author's revenue would decline as a result of the technology's operation. Since $V_T < I$, the Technologist would not be willing to pay even I , not to mention an amount greater than I . Rather, the Technologist would rather not introduce the technology and thus minimize its loss. Under this scenario, Author would end up with V_A ; technologist with zero.

Scenario T. In this case, total value is maximized when Technologist alone operates. Since Author is protected by a property right, Author can threaten issuing an injunction. Author's threat point in the negotiations would be V_A , the value Author would reap if it operated alone. The gains from trade are $V_T - V_A$, which the parties will realize and share equally under the assumptions of frictionless bargaining and equal bargaining power. Author will end up with $V_A + 0.5 * [V_T - V_A] = 0.5V_A + 0.5V_T$; Technologist will end up with $0.5 * [V_T - V_A]$.

Summing up. When the law protects the author with a property right, the author's expected profit would be $0.5 * (V_A + 0.5 * [V_T - I]) + 0.25 * V_A + 0.25 * [0.5V_A + 0.5 V_T] = 7/8V_A - 0.25I + 3/8V_T$. This calculation was reached at by calculating the cumulative sum of the products of the probability of each scenario and the value that the author would end up in that scenario, namely, (the probability of Scenario TA) * (the author's payoff under Scenario TA) + (the probability of Scenario A) * [the author's payoff under Scenario A] + (the probability of Scenario T) * [the author's payoff under Scenario T]. Similarly, the Technologist will earn an expected value of $0.5 * (0.5 * [V_T - I]) + 0.25 * 0 + 0.25 * (0.5 * [V_T - V_A]) = 3/8V_T - 0.25I - 1/8V_A$.

Note that the payoff to each party depends on the sum of three factors: a portion of the value of that party's work (which value the party can affect through ex-ante investment), a portion of the interference, and a portion of the value of the other party's creation (which value the party cannot

affect through ex-ante investment). Since we focus here on the optimality of each party's ex-ante investment decisions, we shall omit from the analysis below references to such third factor.⁷⁰

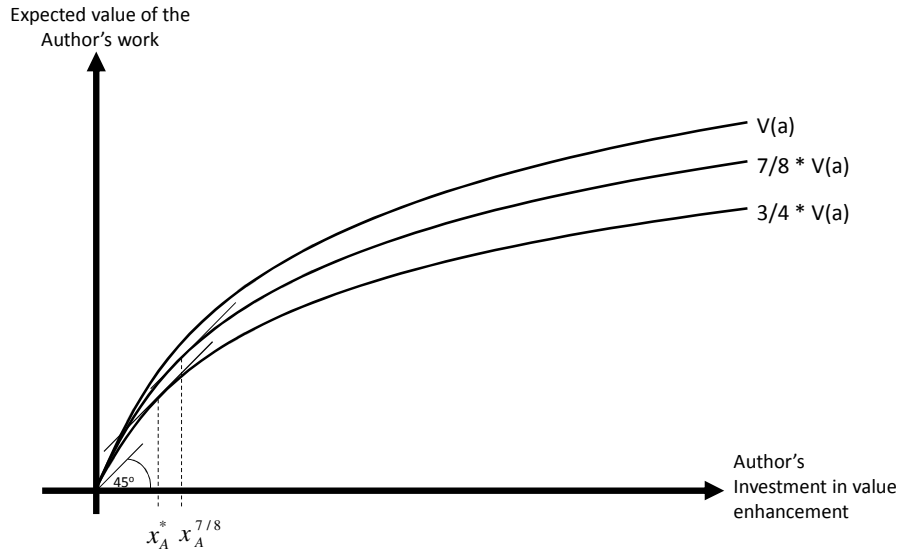
Were the author protected with a property rule, it would invest in value creation excessively. As calculated just above, the Author would enjoy the full value of her investment in 7/8 of the cases, while her work would add social value only in 3/4 of the cases, as explained earlier under the discussion of socially optimal investments. One would remember that in a quarter of the cases, i.e. in Scenario T, the investment in V_A would yield no social value. The Author would thus invest in enhancing the value of her work excessively, as measured against the socially optimal rate. The Author would invest in enhancing the value of her work up to the point where investing one dollar would increase V_A by \$8/7, instead of investing only up to the point where investing one dollar increased enhanced it by \$4/3. The source of this distortion stems from Scenario T. Because of the property right protection the Author is granted legally, the author gets to enjoy a part of the value of its work of authorship in Scenario T, even though society gets no benefit from it. Therefore the Author invests in enhancing the value of its work excessively. A similar logic explains other ex-ante investment distortions discussed below, and I shall therefore not repeat it.

This effect of excessive investment relative to social optimality can be demonstrated as follows:

Graph 3 – Author's Investment in Enhancing the Value of His Work⁷¹

⁷⁰ The third factor, which factors into a party's calculus a negative or positive portion of the value of the other party's creation (a value that it cannot affect through ex-ante investment) affects the profit in the industry, and thus may distort optimal industry size. Industry size, further, shall be affected by distortions respecting the first two factors from social optimality. Since the analysis of optimal industry size is not the focus of the present paper, I shall not compare the various legal rules based on the degree to which they distort industry size beyond noting this affect. See also discussion infra note 45 (at the end of discussion on property right in author).

⁷¹ This graph is illustrative of the effect of the distortion in investment. The proportions if the graphs are not accurate.

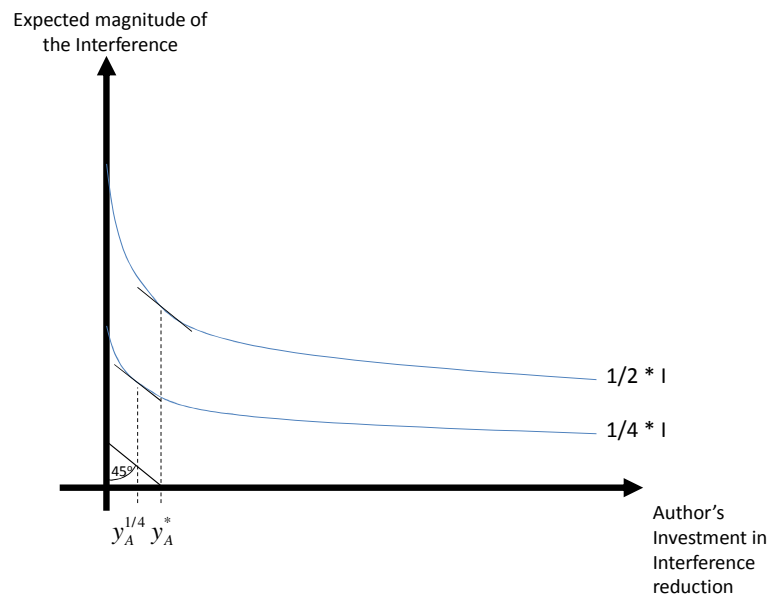


Additionally, the author would invest inadequately in interference reduction. Protected by a property rule, the author expects to suffer the interference only with a probability of 0.25, whereas society bears half the interference in expectancy. Thus, the author would invest inadequately in interference reduction as compared to the socially optimal rate. The author would invest only up to the point where the marginal dollar invested ex-ante would reduce the interference by \$4, instead of investing more and up to the point where a similar marginal investment reduced the interference by \$2.⁷² The inadequate investment in interference reduction can be shown graphically as follows:

Graph 4 – Author's Investment in Reducing the Magnitude of the Interference⁷³

⁷² A third effect

⁷³ This graph is illustrative of the effect of the distortion in investment. The proportions if the graphs are not accurate.



In contrast, the technologist would invest in value creation inadequately. As a rational actor, the Technologist would invest up to the point where its expected private return on spending one dollar in enhancing the value of the technology would just fall to one dollar. Since under a property rule protection for the Author the Technologist is reaping only $3/8$ of the value of the technology, the Technologist would invest only up to the point where investing one dollar would enhance the value of V_T by $\$8/3$ or $\$2.67$ instead of investing more, up to the point where such investment would enhance the value of V_T by $\$4/3$ or $\$1.33$, which would be the socially optimal rate. In addition, the technologist would invest in harm reduction inadequately, up to the point where investing one dollar would reduced the interference by $\$4$ instead of investing further to the point where such investment reduced the interference by $\$2$, which would be the socially optimal rate.⁷⁴

⁷⁴ Another distortion, related to these two aforementioned investment distortions (in value enhancement and interference reduction), is that protecting the Author with a property rule would make the authorship vocation more profitable than it truly is from a social perspective. Profits in the authorship industry would be excessive for three reasons. The first two are those discussed above, namely because the private returns to the Author on enhancing V_A are greater than the social returns, and because the private returns to Author from reducing the interference are less than the social returns such that the Author is spending on interference reduction less than the socially efficient rate. In addition, profits in the Authorship industry are supra-competitive because the Author is able to extract a portion of the fruits of the Technologist's labors. In Scenarios TA and T combined, the Author is able to extract from the Technologist a total of $3/8 * V_T$. As a result, compared to social optimality firms and resources would leave the technological innovation industry (and other industries) and enter the authorship industry. This would mean that the size of the authorship industry would be excessive, and that the size of the technology sector would be inadequate, relative to social optimality. This third distortion exist under all four rules. When the entitlement is allocated to the Author, under either a property rule or a liability rule, the size of the Authorship industry is excessive and the size of the Technology industry is inadequate. When the entitlement is

The logic of the calculations above, the method in which they are made will repeat itself below, but once clarified, I shall omit repeating it.

Author protected by a liability rule.

Scenario TA. When the Author is protected by a liability rule, the Technologist can operate while paying the former I , which under that rule would be the harm that the technology causes the author. Since in this scenario it is efficient for both to operate, the Technologist would choose to pay I to the Author and operate. The author will end up with V_A , while the technologist will end up with $V_T - I$.

Scenario A. In this case it is efficient only for the Author to operate. It would not be efficient for the Technologist to operate and pay either V_A or I to the author only in order to keep a smaller V_T . The Author would operate and realize a value of V_A , the Technologist would not launch the technology and end up with zero.

Scenario T. In this case, total value is maximized ex-post when the Technologist alone operates. When the Author is protected by a liability rule, the Technologist has to pay the Author the harm caused by the conflicting use. In Scenario T, one would remember, the interference I is greater than V_A . However, the Author can minimize her harm by simply not operating. In this case, Author's loss would be capped at V_A . Assuming that courts would impose on Author the duty to mitigate harm, the Technologist can operate by paying merely V_A to Author, the harm from not being able to market the work of authorship under the old technology. In the ex-post negotiations, since the parties share similar information and are aware that the Technologist is going to operate, the Author would indeed not market her work of authorship, but would be paid its value, V_A by the Technologist. The Author would then choose not to introduce the work rather than do so and suffer the greater harm, I . Author would end up with V_A , Technologist with $V_T - V_A$.

Summing up. Protected with a liability rule, the Author's expected return on investment is therefore $0.5 * V_A + 0.25 * V_A + 0.25 * V_A = V_A$. The Technologist's expected return is $0.5 * [V_T - I] + 0.25 * 0 + 0.25 * [V_T - V_A] = 0.75V_T - 0.5I - 0.25V_A$. Thus, Author would invest excessively in value creation, up to the point where the return on investing one dollar ex-ante would just fall to yielding one dollar ex-post (rather than \$1.33). The Author would invest zero, a highly inadequate amount, in interference reduction (instead of investing up to the point where investing one dollar would reduce harm by \$2) since her return does not depend on the magnitude of the Interference. The Author is not expected to invest in Interference reduction because the liability rule insures her in effect against suffering any portion of the Interference.

allocated to the Technologist, the reverse is true. A full analysis of the magnitude of the distortion is beyond the scope of the present Article.

The Technologist, by comparison, would invest optimally both in value creation and harm reduction. The liability payments to Author would act as a transfer which would not distort its investments decision in value enhancement and interference reduction from those optimal.⁷⁵

Technologist protected by a property rule.

Under this rule, the law allows the Technology to operate. Note that because of the unidirectional nature in which harm flows in the real world, the Technologist will never need to issue an injunction in order to assert its property right. This is so because the Author can never inflict harm on the Technologist. When an Interference materializes, it is always suffered by the Author. Thus, even if the Technology creates an overwhelming harm to the Author, the Technologist's threat point in the negotiation is going to be V_T , since the Technologist can always reap that value using its legal right to operate.

Scenario TA. When the Technologist is protected by a property rule, it can operate while not minding any adverse effects on the Author. The Technologist will operate and capture the value of its investment, V_T . The Author will still introduce its work as it would be cost effective for it to do so even while internalizing the smaller interference, I . Author would end up with $V_A - I$. There will be no further trade, as the parties will already have done the efficient thing.

Scenario A. In this case it is efficient only for the Author to operate. The Technologist may operate and realize a value of V_T , which would be his threat value. However, the Author and the Technologist would realize they can maximize their joint value if Author acts alone and the new technology is shut down. They would agree for the Technologist not to introduce the technology, and to have Author alone market its work of authorship using the pre-existing technology. As one would remember, Scenario A comprises of two sub-scenarios, and the division of value between the parties would depend on which of them materialized.

If $V_T < I < V_A$, then the Author's threat point in the negotiations would be $V_A - I$. Without an agreement, in other words, both would operate and the author would suffer the interference I . The gains from trade would be $I - V_T$, as doing the efficient thing, namely shutting down the Technology and thus losing a value V_T would allow the parties to cooperatively avoid the Interference and realize the greater value I . The parties will share this gain equally for eventual values of $V_A - I + 0.5 * [I - V_T] = V_A - 0.5I - 0.5V_T$ (Author) and $V_T + 0.5 * [I - V_T] = 0.5V_T + 0.5I$ (Technologist).

⁷⁵ As hinted above, such transfer payment affects the optimal size of the respective vocations (or industries more generally). The size of the Authorship industry would be excessive because authors would get a private return on investment that is greater than the social rate because they get a higher portion of V_A and do not have to spend on Interference reduction or suffer it when it happens. As a mirror image, the size of the Technology sector would be too small because technologists would have to virtually provide free insurance to Authors against suffering the Interference, and would also have to suffer an Interference that is unnecessarily greater than it should be (compared to what would have happened had Author invested efficiently in its reduction).

This sub-scenario deserves special attention. Were it to materialize, the greater the interference, the greater – rather than the smaller – the inventor’s payoff. As is unique to the model in this paper, assuming that the technologist can take investment decisions to increase the magnitude of the interference – or the harm suffered by author – the fact that this sub-scenario may materialize would cause the inventor to make such harmful investments. Such investments are perverse because whereas it is socially desirable that the parties invest *ex-ante* to reduce any potential interference between their activities, the inventor, protected by a property rule, would make investments to the contrary.

If $V_T < V_A < I$, however, then the Author’s threat point would be zero because absent agreement the Author will shut down rather than introduce the work and suffer a greater loss of I . In this case the gains from trade would be $V_A - V_T$, which the parties would share. The Author would end up with $0.5V_A - 0.5V_T$, and the Technologist with $V_T + 0.5 * [V_A - V_T] = 0.5V_A + 0.5V_T$.

Assuming for expositional purposes that each of these two sub-scenarios is equally likely to happen,⁷⁶ the Author’s expected return in Scenario A would be $0.5 * [V_A - 0.5I - 0.5V_T] + 0.5 * [0.5V_A - 0.5V_T] = 0.75V_A - 0.25I - 0.5V_T$. The Technologist would expect $0.5 * [0.5V_T + 0.5I] + 0.5 * [0.5V_A + 0.5V_T] = 0.5V_T + 0.25I + 0.25V_A$.

Scenario T. In this case, total value is maximized when the Technologist operates alone. The Author would not release its work using the old technology because it would suffer a greater harm, I . There are no gains to be had from trade, and the Author would end up with nothing, Technologist with V_T .

Summing up. The author’s expected profit would be $0.5 * [V_A - I] + 0.25 [0.75V_A - 0.25I - 0.5V_T] + 0.25 * 0 = 11/16V_A - 9/16I - 1/8V_T$, the Technologist’s would be $0.5 * V_T + 0.25 * [0.5V_T + 0.25I + 0.25V_A] + 0.25 * V_T = 7/8V_T + 1/16I + 1/16V_A$. The Author would thus invest inadequately in value creation and excessively in harm reduction. The Technologist would invest excessively in value creation and – most surprisingly – negatively (or perversely) in interference prevention. This latter result means that rather than investing at the socially optimal rate in Interference reduction, and as different from investing for that purpose at a lower rate or even not investing at all, which would be unfortunate, the inventor will rather have a socially perverse incentive. A property rule protection would give the inventor a positive incentive to invest in exacerbating the magnitude of the resultant Interference, or harm, suffered by the Author. The Technologist would take active action to induce uncompensated enjoyment of copyrighted works by end users, because doing so would reinforce the inventor’s

⁷⁶ This assumption is immaterial regarding the eventual direction of the investment. As far as Author is concerned, in Scenario A optimality calls for investing in V_A up to the point where investing one dollar would increase V_A by one dollar, and for not investing in interference reduction at all. As long as each of the two possible sub-scenarios happen with some probability, Author would be induced to invest suboptimally in value creation and excessively in harm reduction. As far as Technologist is concerned, optimality calls for him to invest neither in value creation nor in harm reduction, but it would invest excessively in value creation and negatively in harm reduction, namely – would invest purposefully to create an Interference.

bargaining position in Scenario A. In other words, a property rule protection encourages the investment in technologies that produce no or relatively little social value yet inflict a lot of harm on authors. This prediction of the model is consistent with the plans of Napster’s Shawn Fanning and with the developers of Grokster to first succeed (or, in other words, cause label companies a lot of harm), and then reach a deal with them.⁷⁷

Technologist protected by a liability rule.

Under this rule, the Author can prevent the introduction of the technology by paying the Technologist V_T .

Scenario TA. In the TA scenario, it is efficient for both to operate. The Technologist would operate and enjoy its V_T . The Author would operate and suffer the interference for an overall value of $V_A - I$. Author would not make the Technologist shut down because it would rather suffer the smaller I than pay the greater V_T .

Scenario A. In this case it is efficient only for the Author to operate. The Technologist could operate and reap V_T . However, since V_T is smaller than V_A and I , the Author would choose to pay the Technologist V_T and by doing so keep the technology from being introduced. The Technologist would end up with V_T and Author with $V_A - V_T$.

Scenario T. In this case, total value is maximized when Technologist alone operates. One it does, the Author would not pay V_T to the Technologist. It would rather not market its own work, at a loss of V_A , which is smaller than V_T . Author would end up with zero, the Technologist with V_T .

Summing up. The author’s expected ex-post revenue would be $0.5 * [V_A - I] + 0.25 [V_A - V_T] + 0.25 * 0 = 0.75V_A - 0.5I - 0.25V_T$, the Technologist’s would be $0.5 * V_T + 0.25V_T + 0.25V_T = V_T$. Thus, Author would invest optimally in value creation and in harm reduction. Technologist would invest excessively in value creation and zero in harm reduction.

The size of the Authorship industry would be too small, as authors would in effect insure technology companies against Scenario A, namely against the possibility that their investments would turn out to be socially inefficient. Further, Authors would have to suffer an interferences that are unnecessarily large (since Technologist would not take cost effective measures to reduce them). As a mirror image, the size of the technology sector would be excessive.

H. Conclusion

Table 1 – Summary of Investment Distortions under Calabresi and Melamed’s Four Entitlements

Ex-ante	Author’s investment	Author’s investment	Technologist’s	Technologist’s
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⁷⁷ [Cite: See JOSEPH MENN, ALL THE RAVE ____ (2003)].

investments Rule	in value	in interference reduction	investment in value creation	investment in interference reduction
Author Property Rule (~Economists' brief, statutory damages available)	Excessive	Inadequate	Inadequate	Inadequate
Author Liability Rule (~Economists' brief)	Highly excessive	Highly inadequate (zero)	Optimal	Optimal
Technologist Property Rule (~Sony)	Inadequate	Excessive	Excessive	Perverse (negative)
Technologist Liability Rule	Optimal	Optimal	Highly excessive	Highly inadequate (zero)

V. OFFERING A NEW RULE OF ALLOCATING THE ENTITLEMENT

The aforementioned four rules are not only ideal types, but also correspond to actual suggestions by scholars who have thought hard about the problem before us. Many have before proposed various alternative rules of protecting and allocating the entitlement that are primarily geared, and offer various advantages, in cases of positive ex-post transaction costs. However, our inquiry, which is focused on ex-ante investment, new rules of allocating the entitlement are worth studying, and indeed can be shown, under certain assumptions, to be strictly superior to Calabresi and Melamed's four.

In the analysis above, ex-ante incentives were analyzed under the assumption that the legal allocation and protection of the entitlement is fixed and unchanging. Often, however, courts can observe ex-post the realized values of the parties' investments and of the eventual interference (or the resultant harm to authors attributable to the technology). In this case they can declare the allocation and type of the entitlement accordingly. In such cases, the four Calabresi and Melamed rules can be converted to four corresponding rules that are each superior.

The four corresponding rules have the following in common. First, if a court observes that scenario A materialized then the court would allocate the entitlement to authors. In this case, it does not matter whether the court will do so under a property rule or under a liability rule, since the result would be the same – the entitlement would stay with authors. Second, if a court observes that scenario T materialized, then the court would allocate the entitlement to inventors (and again, it is immaterial whether under a property rule or a liability rule). Lastly, the four rules would differ when a court observe that scenario TA materialized. In that case, both authors and inventors should operate, but the entitlement has to be allocated to one of them in some way. In this case, each ex-post modified, alternating rules would each allocate the entitlement differently – to either Authors or Inventors, under

either a property rule or a liability rule. What would be the ex-ante effects of such four modified, alternating rules?

Social Calculus

How much should the parties invest in value creation and interference reduction? The expected social benefit from the parties investment is as before, namely: $0.5 * [V_A + V_T - I] + 0.25 * V_A + 0.25 * V_T = 0.75V_A + 0.75V_T - 0.5I$. Thus, each of the author and the inventor should invest up to the point where investing one dollar increases the value of their respective creations by \$1.33, and each should invest in interference reduction up to the point where investing one dollar would reduce the expected interference by \$2.

Ex-Post Divisions of Value

How will the parties fair ex-post? This will depend on who holds the entitlement. Does the technologist have the right to introduce the technology, or does the author have the right to be technology-free? As our baseline we shall adopt the four classic Calabresi and Melamed rules.

What will happen under scenario A? All alternating rules will assign the entitlement to Author. Regardless of whether they do so under a property rule or a liability rule, the parties will not trade the entitlement, and the Author will end up with V_A , the Technologist with nothing.

What will happen under scenario T? All alternating rules will assign the entitlement to the Technologist. Regardless of whether they'll do so under a property rule or a liability rule, there are no further gains to be had from trade. Author will end up with nothing, Technologist with V_T .

As suggested, the four rules would differ respecting the entitlement's allocation if ex-post scenario AT materializes.

Author protected by the proposed alternating property rule.

Scenario TA. Protected by a property rule, Author can threaten shutting down the Technologist with an injunction. Author's threat point is thus V_A , the value it would reap acting alone. However, it is efficient that the Technologist operate too, increasing total value by $V_T - I$. Having equal bargaining power, the parties will realize and split this gain from trade. Author will end up with $V_A + 0.5 * [V_T - I]$, and the Technologist with $0.5 * [V_T - I]$.

Summing up. The author's expected profit would be $0.5 * \{V_A + 0.5 * [V_T - I]\} + 0.25 * V_A + 0.25 * 0 = 3/4V_A - 0.25I + 1/4V_T$. Technologist will earn an expected value of $0.5 * [0.5 * [V_T - I]] + 0 + 0.25 * V_T = 1/2V_T - 0.25I$. Author would invest optimally in value creation, as under this rule there would be perfect alignment between Author's private return and the social return on investments in enhancing the value of the work of authorship. Author's investment in harm reduction, however, would be inadequate: since the Author would suffer only a quarter of the Interfernece while society suffers half of it, Author would invest only up to the point where the return on investment in interference reduction

just falls to \$4. The Technologist would invest inadequately in enhancing the value of the Technology, only up to the point where the return on investment falls down to \$2, and also inadequately in interference reduction, only up to the point where the return falls down to \$4.

Author protected by the proposed alternating liability rule.

Scenario TA. When author is protected by a liability rule, the Technologist can operate while paying the former I, or the harm caused to Author attributable to the technology. Since in this scenario it is efficient for both to operate, the Technologist would choose to operate while paying I to the Author. The author will end up with V_A , while the technologist will end up with $V_T - I$.

Summing up. The author's expected profit would be $0.5 * V_A + 0.25 * V_A + 0 = 3/4V_A$, the Technologist's $0.5 * [V_T - I] + 0.25 * 0 + 0.25 * V_T = 0.75V_T - 0.5I$. Thus, Author would invest optimally in value creation, but would not invest at all in Interference reduction (as Author does not suffer any portion of it). The Technologist, by comparison, would invest optimally both in value creation and harm reduction.

Technologist protected by the proposed alternating property rule.

Scenario TA. When Technologist is protected by a property rule, it can operate while not minding the effects on Author. Technologist would operate and reap the value of its investment, V_T . The Author would introduce its work while internalizing the interference, and would end up with $V_A - I$.

Summing up. The author's expected profit would be $0.5 * [V_A - I] + 0.25V_A + 0.25 * 0 = 3/4V_A - 0.5I$, the Technologist's would be $0.5 * V_T + 0.25 * 0 + 0.25 * V_T = 3/4V_T$. If so, the Author would invest optimally in value creation and interference reduction. The Technologist would invest optimally in value creation, and not at all in interference reduction.

Technologist protected by the proposed liability rule.

Scenario TA. When Technologist is protected by a liability rule, the Author can prevent the introduction of the Technology by paying the Technologist V_T . In TA scenario, it is efficient for both to operate. The Technologist would operate and enjoy its V_T . The Author would operate and suffer the interference for an overall value of $V_A - I$. Author would not pay V_T to shut down the Technology because it would rather suffer the smaller I.

Summing up. The author's expected ex-post revenue would be $0.5 * [V_A - I] + 0.25 * V_A + 0.25 * 0 = 0.75V_A - 0.5I$, the Technologist's would be $0.5 * V_T + 0.25 * 0 + 0.25V_T = 0.75V_T$. Thus, the Author would invest optimally in value creation and in harm reduction. The Technologist would invest optimally in value creation and nothing in harm reduction.

Conclusion – Ex-post alternating rules

Table 2 – Summary of Investment Distortions under the Four Proposed Alternating Entitlements

Ex-ante investments Rule	Author's investment in value	Author's investment in interference reduction	Technologist's investment in value creation	Technologist's investment in interference reduction
Alternating Author Property Rule	Optimal	Inadequate	Inadequate	Inadequate
Alternating Author Liability Rule	Optimal	Highly inadequate (zero)	Optimal	Optimal
Alternating Technologist Property Rule	Optimal	Optimal	Optimal	Highly inadequate (zero)
Alternating Technologist Liability Rule	Optimal	Optimal	Optimal	Highly inadequate (zero)

What these modified rules all have in common is that under them the parties would know, ex ante, that technological innovation will not be subjected to one pre-determined, fixed and unchanging rule of liability or property. Rather, the parties would know, ex-ante, that the rule of liability would be announced only ex-post, after the parties will have invested in enhancing the value of their respective creations and in harm reduction. Under the proposal, the parties will invest knowing that a court will protect authors if ex-post it finds that scenario A materialized. They will also know that a court will protect inventors if ex-post it finds that scenario T materialized. However, the four proposed alternating rules differ in what courts will do ex-post when scenario TA materializes. There are four possibilities among which society can choose. Knowing ex-ante that their investments will be governed by either one of the alternating Calabresi and Melamed rules, the parties will have superior incentives to invest compared to the four classic Calabresi and Melamed rules.

VI. PAYOFFS

A. Descriptive

1. Understanding the trade-offs

Although many, such as the Supreme Court in *Grokster*, saw that the question of secondary liability involves a trade-off between authors and inventors, they could not say much more descriptively about the exact workings of the trade-off. The framework here helps to rank order various standards of liability according to the ex-ante incentives they provide authors and inventors to invest in value enhancement and interference reduction.

Understanding the trade-offs involved enables us to predict what will happen if we choose any one of the rules. For example, why did *Grokster* employ its technology? Apparently it believed that it was protected by the Sony rule: it believed that since its file-sharing network was potentially capable of substantial non-infringing use, it would not be secondarily liable for users' infringing conduct. Indeed,

that was Grokster's major argument, and one which the district court and the Ninth Circuit accepted. Sony's rule, at least as understood by many and as applied by the Ninth Circuit, is very much pro-technology, and is not much removed from vesting a property right in technology companies. As Table 1 shows, one of the characteristics of such a legal standard is that the technology company will have perverse incentives to prevent harm, or in other words will have a positive incentive to induce copyright infringement. Indeed, as the Supreme Court found, that was exactly what Grokster did by encouraging users to use its network for infringement. Another characteristic of the rule protecting technology companies with a property rule is that copyright owners will invest in harm reduction excessively. Indeed, in the years leading to the Grokster decision, music companies have resorted to two protective measures – i.e. suing end-users and employing DRM – techniques from which they backed up after the Grokster decision. The model's predictions are thus at least generally consistent with observable facts.

2. Grokster: Understanding the Multiplicity of Briefs

In Grokster, the last major controversy in which the conflict between authors and inventors was discussed, dozens of *amici* suggested various legal rules that would determine inventors' liability for indirect copyright infringement. Some standards were author-friendly, some inventor-friendly. Author-friendly briefs cautioned against adopting an inventor-friendly standard, highlighting the adverse effects on authors' incentives to create. In a mirror image, inventor-friendly briefs cautioned against adopting an author-friendly standard, highlighting the adverse effects on inventors' incentives to engage in technological innovation. By and large, briefs on either side disregarded the costs of the standards they proposed, and did not suggest way to balance benefits and costs between authors and inventors. The briefs seem irreconcilable, as if they speak one past each other. The framework presented here explains the costs and benefits that different legal rules would entail to the related parties, and suggest a way to trade-off beneficial and harmful effects to each.

3. Reconciling Grokster and Sony

Following the Supreme Court's Grokster decision, many were puzzled why it came out differently from Sony. As Justice Breyer's opinion implies, there is reason to believe that Sony intentionally induced copyright infringement as much as Grokster did. For example, its ads promoted librarying of TV programming by end users, a use that the courts regarded as infringing (contradistinguished from "time shifting"). The framework here provides a possible explanation for why the decisions came out differently.

Although both technologies pass the lenient interpretation of Sony's staple article of commerce's doctrine, in the sense that both are potentially capable of substantial non-infringing use, the interference created by Grokster is likely greater than the real value unleashed by the technology. Although Sony created an interference too, the VTR unleashes substantial and real economic value, such as the ability to time shift.

The inducement rule, announced in Grokster, makes sense as a legal rule to curtail the perverse incentive that inventors would have if they are protected by a property rule. As the framework here

paper predicts, they would invest intentionally to harm authors. Indeed, Grokster, the technology company that believed its behavior was governed by the Sony standard, did just that. Augmenting the Sony standard with the inducement theory, which is what the Supreme Court did arguably in Grokster,⁷⁸ guards against perverse investment in harm creation. Still, the result of doing so is that inventors will investing nothing, or highly inadequately, in harm reduction. Not investing in harm reduction is still better than investing in harm creation, however.

4. The futility of achieving a technology-neutral copyright law

Until the 1909 Copyright Act, copyright law was, to a large extent, technology specific. What the 1909 Act drafters, and the 1976 Act drafters after them, tried to achieve is an act that would not be technology dependent but would rather withstand technological change. Accordingly, for example, the term “copies” is defined in section 101 is now defined to include material fixations “by any method now known or later developed”. Empirically, however, copyright law has not achieved that goal. Chapter 8 is a technology specific regulation regarding mask works; chapter ten is a technology specific regulation regarding digital audio tapes; chapter thirteen – the DMCA and anti-circumvention – was passed mainly pursuant to the DMCA. In addition, section 114 details specific rights in music; there is specific regulation regarding cable TV, satellite, digital public performance of music; and section 512 regarding OSP liability. The question is why?

The reason is that after a technology has been invented, various cost-effective precautions can be identified that are particular and technology specific. But these cannot be identified in advance. In advance, one may choose an approach that makes sense on average. But once the technology has been developed, and it is in a specific industry, in a specific setting, used by a particular business model, it is then possible, for example, to identify that relevant intermediaries, or third parties, that may cost-effectively minimize the technologies adverse effects by taking care.

B. Normative

What courts should do, as suggested above in Part V, is decide which party is going to be protected, and by which type of entitlement, in litigation, rather than adhere to one predetermined, fixed, allocation. The various distortions caused by fixed allocations of the entitlement stem from the fact that a party may see private return on investment even in scenarios where its investment does not yield social value. The four alternative rules discussed in Part V alleviate this problem.⁷⁹

⁷⁸ In footnote 12, the Supreme Court suggested that Sony’s rule remains good law absent intentional inducement.

⁷⁹ This is true assuming that litigation costs are zero or negligible relative to the social cost of the investment distortions. However, once one of the alternating rules has been declared, and the parties can observe the values of V_A , V_T and I , the court’s decision is predictable and the parties will settle, such that no, or little, litigation costs would actually be incurred. The current fair use standard, it should be remembered, is widely considered to

Doctrinally, it is suggested that courts do so using the fair use doctrine, an existing tool that allows courts to reallocate the entitlement in litigation despite its original allocation based on facts that the court finds respecting the allegedly infringing conduct. However, it is suggested that courts craft a new doctrine, termed here “secondary fair use”, since the questions to be asked under it are different from those courts ask today under the four factor fair use inquiry,⁸⁰ or under the Sony standard. The relevant questions to ask here regard the magnitude of V_A , V_T and I .

The genius of the Sony standard according to many, and at the same time the greatest problem associated with it according to others, is that it is forward looking. According to admirers, it makes courts look into technology’s promise and its future uses. According to critics, future telling is beyond courts’ ability, as the Sony case may suggest. Although in retrospect we now know that VHS (and later DVD-ROMs) rentals grew overtime to become the movie industry’s number one revenue source, exceeding box office revenue – such that an instruction to look into future uses seems attractive and wise - in the Sony litigation, not even the parties, who are assumed to have superior information to courts, could foresee such future use. If the parties themselves cannot tell the future, how could courts? The test suggested here is more feasible. All that courts should ask is whether the new technology allows new functionality. In the Sony case, for example, a court should ask how much value is added by the technology. This question could be answered by consumer surveys, for example. The more value added, the more a court should tend toward finding secondary fair use. A court should not predict in what way such added value would be realized in markets, i.e. should not predict the emergence of video rental stores.

But who should be allocated the entitlement if a court observes that scenario TA has materialized? How should a court choose among the four possible new allocations, whose effects are summarized in Table 2? Protecting authors with a property rule seems the inferior option as it sets three investment decisions at a non-optimal level. The three other allocations at least get three of the four investment decisions right. To be sure, the first option sets three investment decisions at an inadequate level, whereas the three remaining rules set the one investment decision they get wrong at a highly inadequate level. But assuming that getting the parties to invest in value creation is the more important investment decision, we should still tend against the first option.

How should courts choose between the three remaining alternating rules, all of which get three investment decisions right, and one remaining decision at a highly inadequate level? Protecting authors with a liability rule seems an unfavorable option because one of the remedies for copyright infringement is statutory damages that are often orders of magnitude greater than actual harm.⁸¹ If so, protecting

generate a great deal of uncertainty and litigation costs. There is good reason to believe that the proposed standard would rather add clarity and predictability to the fair use analysis and reduce these costs.

⁸⁰ See 17 U.S.C. § 107.

⁸¹ Statutory damages can be as high as \$150,000 per work. For example, sound recordings ordinarily sell for \$1 on iTunes. Even though they may also be as low as \$200 per work, that may still be 200 times the actual harm.

authors with a liability rule approaches protecting them with a property rule, an option that was already found disfavored.⁸²

What about protecting inventors with a liability rule? This type of protection would not be different from protecting them with a property rule. Remember that the only difference between rules is in scenario TA. In this scenario both should act. Regardless of whether the law protects the inventor with a property rule or a liability rule, there would be no further trade. The inventor would use its entitlement to introduce the technology, namely do the efficient thing. At this backdrop, the author would choose to operate and realize the value of the work of authorship, despite the smaller harm. There are no further gains to be made from trade, so this rule is not different from the proposed alternating property rule protection to the inventor.

The preferred rule, then, seems protecting inventors with a either a property rule or a liability rule. Although these rules get the parties to invest optimally in their respective creations, and the author in interference reduction, they still fail to induce inventors to invest ex-ante in minimizing the magnitude of the interference, i.e. the resultant harm to authors. This effect, however, can be mitigated after the technology is marketed for some time. Congress can and should step in with a technological mandate that would minimize the size of the interference when the technology is marketed. This can be done realistically, because Congress can observe the actual use of the technology. This was also actually done with a few technologies of copying and dissemination that became widely used and adopted.⁸³

C. Payoffs to More General Literature

So far, I have limited my analysis to the context of intellectual property. But the general model proposed in Part V above has some more explanatory power, as reviewed below.

1. Understanding Law's Indeterminacy

Classical legal thought treated law as a science, where each legal question was thought to have one right answer. The Legal Realists critiqued this view,⁸⁴ suggesting that law is often indeterminate and internally inconsistent. By and large, the Realists' view is the one accepted today. As Llewellyn famously observed, the law contains a long list of pair doctrines, each leading to a different result, and that

⁸² Still, as a theoretical matter, protecting authors with a liability rule would be the attractive rule to follow in cases where authors' investments in harm reduction are unimportant socially (perhaps because there's very little they can do ex-ante, when they do not have a clear idea of the technology), but the inventor's investment in harm-reduction is much more important (perhaps because there's a lot they can do in terms of technological design, for example). In this case, the right thing to do would be to allow judges the discretion, in infringement cases against technology companies for indirect liability, to reduce statutory damages to the level of actual damages. That, however, would require a legislative change, and protecting the author with a liability rule would seem to be a disfavored option until that time.

⁸³ See, e.g. 17 USC 1201(k) (technological mandate in VHS recorders); 17 USC 512 (containing a custom-made standard of liability of OSPs for online services: routing, caching, hosting and searching).

⁸⁴ See generally, William W. Fisher & Morton J. Horwitz, *American Legal Realism* ch. 6 (1990).

judges, and the parties, can choose which to adopt.⁸⁵ Why does the law fail to meet the scientific standard? Why does law seem inherently indeterminate?

The research above suggests one possible explanation. In many cases, real world outcomes depend on incentive decisions by the two parties in litigation, such as parties to a contract or a tort. In many cases, judges observe the behavior of the parties and decide the case in favor of the party who made the right investment decision and against the party who diverted from the socially desirable course of action. It is hypothesized that at least some of law's indeterminacy can be explained as an attempt by judges to observe parties' investment decisions, and choose the one doctrine that would result in the party who made the superior investment decision win. In such cases, the entitlement would be allocated by a judge in trial in a way that tends to induce desirable ex-ante investments.

2. The Relative Efficiency of the Common Law and the Civil Law

A respected literature under the heading of law and finance has argued over a decade now that legal origin matters, and that the common law is more efficient than the civil law.⁸⁶ At the same time, this basic argument has been criticized by many. The framework proposed in this Article suggests a prediction about whether and when common law might be more efficient than the civil law, and when the case might be the other way around.

Generally, judges in common law countries have more discretion, are more activist, and have a greater power to make law relative to their civil law counterparts. As was shown in Part V above, giving judges the discretion to allocate the entitlement during litigation is important to achieving efficiency in ex-ante investment decisions. A legal system that allows its judges discretion to do so is likely to be more efficient. Civil law is more rigid in the sense that the legislature sets the entitlement and judges have little discretion in application relative to common law judges. Although the legislature can allocate the entitlement, disputes tend to reach a court much faster than issues reach the attention of the legislature. Moreover, even if an entitlement should be allocated in a certain way on average, the common law allows parties to reach the efficient result in particular cases that do not follow the characteristic case. Lastly, judges have an advantage over legislatures in the sense that they can observe the facts pertaining to particular cases. Hence, it is hypothesized that the common law would be more efficient in scenarios of rapid technological and economic change, or in settings where it is particularly difficult or costly to allocate the entitlement ex-ante.

However, it is possible that civil law countries would tend to be more efficient. It is hypothesized that this might be the case in scenarios where the basic economic conditions do not change and

⁸⁵ Karl Llewellyn famously observed that for every canon of construction there is an opposing canon that would lead to the opposite legal result, and that judges are often free to choose which one to adopt. See Karl Llewellyn, Remarks on the Theory of Appellate Decision and the Rules of Cannons About How Statutes are to be Construed, 3 Vand. L. Rev. 395 (1950).

⁸⁶ The literature has started from a seminal paper, Rafael La Porta, Florencio Lopez-de-Silanes, Andrei Shleifer & Robert W. Vishny, Law and Finance, 106 J. Pol. Econ. 1113 (1998).

technological chance is relatively rare. In such cases, the benefits of predictability and the savings on litigation costs and risk may outweigh the potential for case-by-case allocation of the entitlement.

3. The Choice Between Rules and Standards

Scholars have long analyzed the differences between rules, i.e. clear and specific legal norms known in advance (such as that to be president, one has to be thirty-five years of age), and standards, i.e. flexible legal norms whose application to particular facts involves discretion (such as that contractual parties need behave “in good faith”). The literature has analyzed extensively the differences between these legal commands and the consequences for policy. For example, it was noted that rules are costlier to formulate but cheaper for judges to enforce and for individuals to interpret relative to standards.⁸⁷

This Article introduces another consideration relevant to the choice between rules and standards based on the affected parties ex-ante investments. When the nature of an activity is known, legislatures should allocate the entitlement using a rule according to the desirable conduct. For example, if pollution can be minimized substantially by a factory’s investment in smoke abators but the neighbors can do little to minimize harm, then the law should protect neighbors with a liability rule as to induce factory to invest optimally in minimizing harm. But in scenarios where the future is largely unpredictable, and when ex-ante investment by both parties is important, such as regarding the invention of technologies that interact with content (or cases of sequential innovation more generally), then standards become more attractive. As was shown in Table 2 above, the ability of a judge to flexibly allocate the entitlement using a standard – such as “fair use” – will achieve superior incentives to invest ex-ante relative to a predetermine, fixed rule.

4. Why Calabresi & Melamed’s Rule 4 Has Been Rarely Used?

As Table 2 above shows, Calabresi & Melamed’s rules 3 and 4 are identical as far as their effects on the parties’ ex-ante investment decisions are concerned. Clearly, judges devise remedies in order to induce parties to behave in a socially desirable manner. One possible explanation for the traditional non-use (and even non-recognition of rule 4 as a theoretical possibility prior to Calabresi and Melamed’s article) is that it is really no different from rule 3, at least as far as inducing efficient ex-ante behavior is concerned.

VII. CONCLUSION

The major goal of intellectual property law is to provide authors and inventors with optimal incentives to create works of authorship and to come up with new inventions, respectively. This article has studied the point where these two objectives interact and where promoting one would come at the expense of the other. It has offered a framework to show policy makers how different legal rules would trade-off these two objectives in cases where they conflict, and suggested a legal standard that courts can use in order to perform this trade-off in a desirable way.

⁸⁷ Louis Kaplow, Rules Versus Standards: An Economic Analysis, 42 Duke L.J. 557 (1992).

