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Indirect Copyright Liability and Technological Innovation

Peter S. Menell*

ABSTRACT

Over the past decade, numerous scholars and commentators have asserted that the indirect copyright liability standards applied in the Napster, Aimster and Grokster decisions, among others, significantly chill technological innovation. This article examines this critical conjecture and offers both a broader framework for assessing the relationship between indirect copyright liability and technological innovation and some suggestive empirical results. The conceptual analysis demonstrates that the question of whether indirect copyright liability chills technological innovation inherently requires consideration of a broader range of social balances, market mechanisms and roles for mediating institutions. Several countervailing forces, such as the relatively modest capital requirements associated with the technology at issue, the nature of the many established research environments, the philosophical and cultural orientation of many digital technology researchers, various liability-insulating institutions, the ability of investors and technology companies to manage risk and the importance of technological advance in fields unaffected by copyright liability, suggest that the effects of indirect copyright liability on innovation in replication and distribution technologies will be less dire and more complex than the conjecture suggests. Moreover, the Chilled Innovation conjecture downplays the beneficial effects of indirect copyright liability on the development of balanced technologies (those that tend to balance incentives to create copyrighted works with advances in information dissemination) while ignoring the adverse effects of broad immunity, which fosters deployment of parasitic technologies that tend to drive out balanced technologies. To the extent that the Chilled Innovation conjecture has force, it is not at the basic research and development stages of the innovation pipeline, but rather at the commercialization stage – which is where in the innovation process such effects are most appropriately focused. This limits the choking of innovation in its infancy. The article also offers a partial test of the Chilled Innovation conjecture by examining academic research and patent data. The findings indicate that the Napster-Aimster-Grokster trilogy does not appear to

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have derailed technological innovation in the peer-to-peer field. Following the Supreme Court's 2005 Grokster decision, Business Week boldly titled its "newsmaker" interview with Professor Lawrence Lessig "10 Years of Chilled Innovation." Professor Lessig predicted that the decision would gravely hamper innovation in digital technology. The effects of copyright liability—and in particular, indirect copyright liability—upon technological innovation have been seen, since at least the time of the Supreme Court's Sony Betamax decision, as one of the most important drivers of copyright law and policy. By immunizing manufacturers of any technology that is "merely . . . capable of substantial noninfringing use" from contributory liability, the Sony decision came to be viewed as the "Magna Carta" of both "product innovation" and the "technology age." The decision has taken on almost mythic proportions, leading one reporter to comment that "[c]onsumer electronics and computer makers see [the Sony] ruling as having protected the development and sale of everything from Apple Computer's iPod to an ordinary PC." The notion that indirect copyright liability "chills," "harms," "stifles," "forestalls," "blocks," and "disproportionately

3. See id. ("[T]his intent standard... will invite sorts of strategic behavior that will dramatically increase the cost of innovating around these technologies") (ellipses in original).
5. Id. at 442.
7. See John Borland, File Swapping vs. Hollywood, CNETNEWS.COM, Jan. 25, 2005, http://news.cnet.com/2100-9588_22-5548781.html. It is difficult to see how the Sony decision could have "protected the development and sale of [the] ordinary PC" given that the "ordinary PC" was developed and commercialized several years before the Supreme Court's 1984 decision. See James L. Rowe Jr., IBM to Sell Personal Computer in Fall, WASH. POST, Aug. 13, 1981, at D12; Andrew Pollack, Big I.B.M.'s Little Computer, N.Y. TIMES, Aug. 13, 1981, at D1. The IBM personal computer was actually introduced just a few weeks before the Ninth Circuit ruled that Sony was contributorily liable for copyright infringement. See generally Universal City Studios, Inc. v. Sony Corp. of America, 659 F.2d 963 (9th Cir. 1981). Yet no copyright owner brought suit against IBM (or any other personal computer manufacturer) for contributory copyright infringement. The Supreme Court did not reverse the Ninth Circuit's decision for more than two years. See Sony, 464 U.S. 417.
8. See Matthew Fagin, Frank Pasquale & Kim Weatherall, Beyond Napster: Using Antitrust Law to Advance and Enhance Online Music Distribution, 8 B.U. J. SCI. & TECH. L. 451, 500 (2002) (stating that "[i]nnovation in the technologies of distribution will decline markedly if potential new innovators are chilled by a threat of legal action") (hereinafter cited as "Beyond Napster").
dampens" technological innovation has gained relatively widespread acceptance in legal scholarship and popular media, although the evidence to support this claim is relatively sparse.

The causal relationship that Professor Lessig and others draw reflects plausible logic. If those who develop technology that can be used to infringe copyrights are exposed to potentially crushing liability—the common examples of entities that have met such a fate being Napster, MP3.com's MyMP3 music locker service and ReplayTV's digital video recorder—one would expect that digital technology innovators would, certainly at the margin, invest their energies elsewhere. It is that sort of anecdotal evidence upon which Professor Lessig bases his prediction.

What you're going to see is innovation that's channeled in ways the copyright owners can agree to, or channeled in ways that avoids any kind of possibility of this kind of litigation. That has already had its effect in the Valley, and already money has shifted into places which will avoid any conflict with the copyright holders. Why buy a lawsuit when you can buy a new innovation that doesn't get you a lawsuit? And you don't even see it—you don't even know what you don't get because people are afraid.

At the same time, however, there is no shortage of evidence suggesting that digital innovation and commercialization that contribute to copyright infringement are far from retreat. The image of computer programmers, entrepreneurs and venture capitalists cowering in fear at the threat of indirect copyright liability does...
not match the common perception of Silicon Valley. Each month brings new digital technologies—iPod, image search engines, MySpace, YouTube, Facebook, Google’s Book Search, BitTorrent, iPhone, Twitter, Kindle 2.0—many of which could be (and have been) portrayed as facilitating copyright infringement. Similarly, hackers seem undaunted in their quest to crack digital rights management technologies as soon as they emerge. There is ample evidence that copyright liability has spurred all sorts of technological innovation—technologies aimed at limiting copyright infringement in digital networks (such as digital rights management and content identification (filtering)) as well as means of evading copyright restraints in cyberspace (such as anonymity features and darknets).

The development and commercialization of these technologies suggests that the cloud of liability has not throttled the digital innovation pipeline. This conclusion makes intuitive sense as well. The upside of developing the next “killer app” is massive and well-publicized. Many teenagers today dream less of “Be[ing] Like Mike [Michael Jordan]” than of becoming the next Larry and Sergei, Shawn, or Mark. Certainly, these are the role models of many university computer science


22. Larry Page and Sergei Brin founded Google.


24. Depending on the idolizer’s age, Mark could refer to Mark Andreesen (founder of Netscape
and business school majors. In the case of several of the next generation technologies and business models—YouTube, imeem and Google Book Search—technology firms pushed ahead with services that raised copyright liability risks and copyright owners in fact sued. But even here, the threat of liability did not deter the innovators/commercializers. In all three of these cases, the litigation channeled technology in ways that did not so much squelch innovation as it balanced competing societal interests and policies and fueled other areas of technological advance. The effects on technological innovation and development were complex, but it would be difficult to conclude that innovation or commercialization was dampened. In at least one case (YouTube), the litigation spurred innovation in content identification technology.

Thus, the effects of indirect copyright liability on technological innovation are more complex than simple intuition or discussions with venture capitalists (who have a vested interest in immunity from indirect copyright liability) seem to indicate. Now that we are nearly a decade into Web 2.0 (and several years past the Grokster decision), the time is ripe to undertake systematic analysis of the relationship between copyright liability and technological innovation in the digital age. This essay begins that task.

and angel investor), Mark Cuban (co-founder of Broadcast.Net, which he sold to Yahoo! for $5.7 billion during the dot-com boom, see Kara Swisher and Evan Ramstad, Yahoo! Plans to Buy Internet Broadcaster--Purchase of broadcast.com Valued at $130 a Share, Or About $5.7 Billion, WALL ST. J., Apr. 1, 1999 at A3), or Mark Zuckerberg (founder of Facebook).

25. imeem, launched in October 2004, is a social media service where users interact with each other by watching, posting, and sharing content of all digital media types, including blogs, photos, audio, and video.” See imeem, WIKIPEDIA.ORG, http://en.wikipedia.org/wiki/lmeem (last visited Apr. 10, 2009).

26. Under increasing pressure from copyright owners, YouTube launched and has further developed a content identification system to reduce posting of copyrighted materials without authorization. See Ellen Lee, YouTube Introduces Tool that Scans for Copyrighted Material, S.F. CHRON., Oct. 16, 2007 at B1; Associated Press, For YouTube, A System to Halt Copyright-Infringing Videos, N.Y. TIMES, Jul. 18, 2007 at C6. It has integrated this feature with its licensing program, which enables copyright owners whose works are contained in user-uploaded videos to share in a portion of advertising revenue. See Content Management, Monetize, Track, or Block Your Content—It's Automated, and It's Free, http://www.youtube.com/t/contentid (last visited Apr. 10, 2009). As a settlement to a lawsuit brought by music copyright owners, imeem licenses from music copyright owners and shares some of its revenues. See Joseph Menn, Universal to Let Site Play Songs in Ad Deal, L.A. TIMES, Dec. 10, 2007 at C1; Alex Veiga, Warner Music Settles Imeem Suit, SAN MATEO CITY TIMES, July 13, 2007; Alex Veiga, Warner Music Sues Social Networking Site Imeem over Copyright, S.F. CHRON., May 15, 2007. As part of a proposed settlement of the lawsuits by authors and publishers over its Book Search technology, Google has agreed to fund the development of a Book Rights Registry and share advertising revenue with copyright owners. This proposal would also allow Google the ability to provide greater online access to many in-copyright books. See Miguel Helft & Motoko Rich, Google Strikes Deal to Allow Book Scans, N.Y. TIMES, Oct. 29, 2008, at B1.

27. Web 2.0 refers to a “second generation of web development and design, that facilitates communication, secure information sharing, interoperability, and collaboration on the World Wide Web. Web 2.0 concepts have led to the development and evolution of web-based communities, hosted services, and applications; such as social-networking sites, video-sharing sites, wikis, blogs, and folksonomies.” See Web 2.0, WIKIPEDIA.ORG, http://en.wikipedia.org/wiki/Web_2.0 (last visited Apr. 10, 2009).
I. FRAMING THE ANALYSIS

According to what I will call the “Chilled Innovation” conjecture, indirect liability cases of the past decade, most notably, the Supreme Court’s Grokster decision,28 as well as lower court decisions involving Napster,29 Aimster,30 ReplayTV31 and MyMP3.com,32 have chilled technological innovation (or pose a grave risk of having such an effect). This perspective reflects three often implicit premises: (1) that unfettered technological innovation is unambiguously good for society; (2) that the relationship between copyright liability and technological innovation is uni-dimensional, that is, a greater risk of liability for infringing activity is inversely related to the quantity of technological innovation; and (3) that immunity from indirect copyright liability would better promote technological innovation, as well as freedom of expression and social welfare more generally, whereas the status quo or additional judicial or legislative efforts to address digital copyright enforcement challenges through either expansion of liability or regulation, would further chill or adversely distort technological innovation (and undermine freedom of expression). All three propositions, while plausible, deserve scrutiny.

In framing this inquiry, we need to address two important threshold questions: (1) what is meant by “technological innovation”? and (2) what is meant by the notion of “chilling” technological innovation?

Turning to the first question, in its most general usage, “technological innovation” encompasses everything from the first occurrence of an idea, sometimes referred to as “conception” or “invention,” to its development in products or services (sometimes referred to as innovation) to its dissemination or commercialization (“diffusion”) in the real world.33 It will be useful to determine where along this spectrum inhibiting effects occur. The further upstream the effects, the potentially greater the impacts. For example, if the technology never emerges in an experimental form, then society may never know what was possible and the advance cannot be further developed by others. By contrast, if the chilling impacts occur toward the commercialization end of the spectrum, then businesses can compete to commercialize the technology in different ways and judges and policymakers are better able to judge the value of the innovation as well as the options for balancing the range of social impacts. Chilling of certain models of

30. In re Aimster Copyright Litigation, 334 F.3d 643 (7th Cir. 2003).
commercialization may well be socially desirable if they pose serious risks to content creation (or other valued social activities). As Professor Justin Hughes has observed:

One of the early arguments in defense of Napster was that the original Napster had to be saved to pursue the promise of P2P technology. In retrospect, that argument was clearly wrong; it was always more posturing than reasoning - a bit like saying in 1885 that if you could not build a particular ten story building at the corner of Adam and LaSalle Streets all skyscraper technology would have been stymied.

That Napster is gone * * * but we now have a much wider understanding of the possible legal - and beneficial - applications of P2P technology. This knowledge reinforces what prudence already told us: [a] we can separate the concept of P2P technology from the particular software applications that are developed, and [b] we can separate the particular software applications that are developed from the particular uses to which they are put. The wide range of existing P2P projects that are not based on music piracy shows us that the technology can be separated from the business plan.

BitTorrent has already shown itself to have a wide range of non-infringing uses, ranging from Etree's BitTorrent site which promotes the distribution of large, high-quality non-MP3 files from "trade friendly" bands to File Soup's offering of open source software and authorized media files. Companies with heavy internal file and video transfer requirements are also using commercial P2P services in-house or as a means to "to pass off much of their distribution costs - largely in the form of Net bandwidth charges - to their customers." Further afield, we will see P2P telephone service (VOIP morphing in VOP2P) and P2P radio services. It looks like there will be P2P applications that record companies themselves are willing - or even want - to use. 34

Turning to the second question—what does it mean to "chill" technological innovation—the implication underlying the assumption that Grokster will chill technological innovation is that any distortion of technological innovation, at least in the copyright context, is undesirable. The larger social context and dynamics are crucial and should not be overlooked. It is useful to begin by describing a broader theory of innovation and its regulation. While technological progress often furthers society's interests, it can also lead to undesired and unintended consequences. For this reason, tort law, government regulation and industry self-regulation seek to constrain and channel technological innovation in socially desirable ways. Every

34. Justin Hughes, On the Logic of Suing One's Customers and the Dilemma of Infringement-Based Business Models, 22 CARDOZO ARTS AND ENT. L.J. 725, 751-52 (2005) (footnotes omitted). The BitTorrent sites to which Professor Hughes referred are still in operation and many others have been developed. See generally BitTorrent (protocol), WIKIPEDIA.ORG http://en.wikipedia.org/wiki/BitTorrent_(protocol). These range from sites making content available for free, such as Norwegian Broadcasting Corporation's online distribution portal, See Erik Solheim, Norwegian Broadcasting Corporation Sets Up its Own Bittorrent Tracker, NRKBETA.COM, Mar. 8, 2009, http://nrkbeta.no/norwegian-broadcasting-corporation-sets-up-its-own-bittorrent-tracker, to proprietary business models such as Blizzard Entertainment's system for distributing content for its World of Warcraft game. See Blizzard Downloader, WoWWiki - Your guide to the World of Warcraft, http://www.wowwiki.com/Blizzard_Downloader.
major industry—from automobiles to pharmaceuticals, telecommunications and building materials—faces ex ante regulation and potential tort liability for the adverse impacts of technological advances. Tort law, government regulation and industry self-regulation all affect the path of technological innovation. The effects of these regimes on technological innovation are manifold. They aim to discourage products that pose undue health or safety risks, environmental degradation and anti-competitive impacts while encouraging the development of technological advances that promote health, safety, environmental protection and competition.35

Like other technologies, promising advances in information technologies can have undesirable, unanticipated, and unintended effects. For example, the internet has the great virtue of nearly eliminating the costs of distributing information. But other features of this distribution platform, especially the difficulty of preventing unauthorized distribution of copyrighted works, have significantly eroded creators’ ability to generate returns on their investment in researching, writing, producing and other costly aspects of authorship. Even though the internet offers alternative appropriation means (such as download and subscription services), the net impact of this distribution platform on some content creation activities may well be lamentable.36 There is a risk that in throwing out the distribution “bathwater,” we


36. See David Carr, United, Newspapers May Stand, N.Y. Times, Mar. 9, 2009, at B1; Philip Meyer, The Vanishing Newspaper: Saving Journalism in the Information Age (Univ. of Missouri Press, 2004); Eric Alterman, Out of Print: The Death and Life of the American Newspaper, New Yorker, Mar. 31, 2008, at 48 (observing that “we are about to enter a fractured, chaotic world of news, characterized by superior community conversation but a decidedly diminished level of first-rate journalism. The transformation of newspapers from enterprises devoted to objective reporting to a cluster of communities, each engaged in its own kind of ‘news’—and each with its own set of ‘truths’
jeopardize some content "babies." Copyright protection and regulation can serve to balance these effects, but care must be taken to avoid other unintended consequences, such as chilling desired innovation.\textsuperscript{37}

Regulation of information technology is somewhat more complex than regulating innovation in other industries due to the potential adverse impacts on free expression.\textsuperscript{38} But impacts can go in multiple directions. Technologies promoting the free flow of expression can, in some circumstances, undermine well-functioning institutions that generate and disseminate expression. Often the challenge lies in modifying established institutions and fostering new institutions to promote balanced technological evolution and flourishing of creative expression.

Copyright law plays a key role in establishing such a technological balance in media markets. With a liability regime derived from tort law\textsuperscript{39} and increasingly embodying administrative regulatory elements,\textsuperscript{40} copyright protection provides the principal legal infrastructure for promoting various forms of artistic creativity by affording authors rights to prevent the unauthorized reproduction, adaptation, distribution, performance and display of their works, subject to various limitations and exceptions. Just as tort law seeks to protect individuals and property from harm by others, copyright law protects the intellectual property of copyright owners against infringements by others. Congress enacted copyright law to promote creative works and there is certainly substantial evidence to indicate that enforcement of copyright law supports the development and dissemination of much creativity.\textsuperscript{41} The purpose of this line of research is to examine the effects of copyright liability on the rate and direction of technological innovation.

The development of broadcast communication technology illustrates some of the "regulatory" effects of copyright enforcement. Early in the development of commercial radio, musical composition copyright owners called upon the courts to prevent public performance of their works without authorization. In Jerome H.
Remick & Co. v. General Electric Co.,\textsuperscript{42} the court found that the defendant’s broadcast of plaintiff’s copyrighted musical composition constituted copyright infringement, despite the fact that such a holding conferred a measure of “control” over the nascent radio broadcasting industry. That case established that radio broadcasters would be required to obtain copyright licenses if they were going to build the popularity of their medium using copyrighted content.\textsuperscript{43} This decision led to the creation of institutions for monitoring broadcasts and compensating artists, most notably, the ASCAP blanket license, which has fostered both commercial broadcasting and the creative arts.

ASCAP’s enforcement campaign against broadcasters undoubtedly “chilled” the early broadcasting industry’s growth and increased its costs initially, but the long-term effects were salutary for broadcasters, consumer electronics manufacturers, and composers alike. The licensing of music supported a growing community of professional songwriters and musicians. With blanket licensing and monitoring in place, the radio industry channeled a share of advertiser payments to music publishers and composers of the most popular musical compositions. It successfully shaped and harnessed a marketplace to reward, attract investment for, and encourage composers capable of commanding an audience. The flourishing of musical creativity in turn expanded the marketplace for broadcasting, recording technology, and consumer electronics. When viewed through this broader lens, copyright law did not chill innovation. Rather it fostered symbiosis—the establishment of a healthy ecosystem for musical creativity that reinforced and expanded the markets for and innovation in broadcasting, recording technology, and consumer electronics.

This dynamic symbiosis suggests that scholars, policymakers and jurists need to be cautious about presuming that copyright enforcement “chills” technological innovation. Furthermore, they need to be sensitive to the larger normative effects. “Chilling” of some technological innovation may well promote the larger policy goals. It might also produce a fertile ecosystem for technological innovation over a lengthy time horizon. For example, in the short run, the ASCAP lawsuits and threats of enforcement undoubtedly frustrated the nascent radio broadcasting industry. It raised start-up costs for broadcasters and likely discouraged some investment—at least in broadcasting business models built on unauthorized distribution of copyrighted works. But over time, the imposition of liability produced a healthy and dynamic ecosystem in which technological innovation and musical creativity thrived.

Similarly, the issue of concern today is not whether peer-to-peer technology,
digital video recorders, user-generated content video sharing services or book search technology will be developed, but how they will be deployed and what duties and safeguards should be put in place to balance the competing effects. In each of these contexts, copyright enforcement affects technological innovation, business solutions (including licensing), social norms and custom (such as the promulgation of User Generated Content principles44) and institution formation (such as collective rights organizations). For example, the YouTube litigation promoted development of content identification technology as well as licensing. The Google Book Search settlement, if approved, will produce greater access to many in-copyright materials, expanded licensing, and the development of the Book Rights Registry, a collective rights organization that will support authors and publishers.

Thus, the concept of “chilling” innovation offers too narrow a framework to address the multiple policy goals and complex dynamics in play. Given the practical and political limitations on legislative action’s capacity to address the changes rapidly unfolding in the online media sphere, courts will inevitably play a significant role in shaping the digital marketplace.45 The contours of indirect copyright liability and various legislative and judicial safe harbors will be the principal battlegrounds. Therefore, understanding the multi-faceted relationship between indirect copyright liability and technological change is critical to achieving desirable balance.

The purpose of the present inquiry is to evaluate the Chilled Innovation conjecture on theoretical and empirical grounds. If the conjecture proves valid, then society would need to compare the benefits of copyright protection against the adverse technological impacts, and assess the ramifications of alternative copyright policies. If the conjecture proves weak on further examination, then its corollary attack on copyright protection loses force.

II. EXAMINING THE CHILLED INNOVATION CONJECTURE

The Chilled Innovation conjecture derives from the use of indirect copyright liability lawsuits against enterprises that distribute hardware and software “tools” that facilitate copyright infringement. It has taken on particular significance in the digital age for several reasons.46 First, the internet permits widespread distribution of copyrighted works at essentially zero cost. Second, the costs of detecting copyright violations and enforcing copyright protection against those who directly infringe can be high, if not prohibitive. This is particularly true for peer-to-peer technology, where users can operate with relative anonymity and privacy concerns

45. Cf. Fred von Lohmann, Fair Use as Innovation Policy, 23 BERKELEY TECH. L.J. 829, 831 (2008) (noting “the important and underappreciated role [that the fair use doctrine plays in] technology and innovation policy, particularly in that it draws investment to technologies that are complementary goods to copyrighted works”).
46. See Reducing Infringement Without Restricting Innovation, supra note 9, at 1373-78; Menell, supra note 37 at 108-29.
complicate identification of infringers and proof of infringement.\textsuperscript{47} This has produced unprecedented levels of unauthorized distribution of copyrighted works and other forms of copyright infringement. Consequently, copyright owners increasingly make the strategic choice to target enterprises that facilitate unauthorized distribution and use of their works rather than the direct infringers. The scope of copyright liability includes not only those who directly infringe copyright protections but also those who contribute to, induce, or vicariously benefit from the infringing acts of others. The recording industry, for example, initially focused its attention on file-sharing networks that facilitated copyright infringement. Film and television content owners sued ReplayTV, the maker of a digital video recorder (DVR) device that facilitated commercial skipping and the transmission of recorded programming (premium channel programs) to others.\textsuperscript{48}

The Chilled Innovation conjecture rests on a relatively straightforward prediction—that those who create and distribute technologies with potential to facilitate infringement will seek to avoid the risk of indirect liability, resulting in reduced technological innovation overall. As noted in one article, “[i]nnovation in the technologies of distribution will decline markedly if potential new innovators are chilled by a threat of legal action.”\textsuperscript{49} Proponents of the conjecture assert that these effects will manifest both directly and indirectly. Entrepreneurs will be discouraged from entering into socially advantageous businesses and investors (such as venture capitalists) will shy away from funding socially advantageous technologies that pose a risk of indirect copyright liability. Furthermore, such indirect copyright liability lawsuits will skew the development of information technologies in undesirable ways.

Thus far, relatively little effort has been made to explore the sources of information technology innovation, examine intra- and inter-industry dynamics, or measure the real world effects of indirect copyright liability on technological innovation empirically. The following sections explore these issues.

A. THEORETICAL BASIS: SOURCES AND DRIVERS OF INFORMATION TECHNOLOGY INNOVATION

The Chilled Innovation conjecture focuses on technologies relating to the replication and distribution of copyrighted works. These can range from hardware

\textsuperscript{47} See Capitol Records, Inc. v. Thomas, 579 F.Supp.2d 1210 (D.Minn., 2008) (holding that actual dissemination of copyrighted sound recordings, rather than making them available for dissemination through an online peer-to-peer file sharing application, was required to establish “distribution” within meaning of the Copyright Act); RIAA v. Verizon, 351 F.3d 1229 (D.C. Cir. 2003) (holding that the § 512(h) subpoena provision is limited to online service providers’ that store materials and not those serving users of peer-to-peer technology); see generally Nimmer on Copyright, § 12B.09[B] (discussing privacy concerns affecting ferreting out infringement on the internet).

\textsuperscript{48} More recently, television content owners have sued Cablevision over its virtual digital video recorder service. See Cartoon Network LP, LLLP v. CSC Holdings, Inc., 536 F.3d 121 (2d Cir. 2008).

\textsuperscript{49} See Fagin, Pasquale & Weatherall, supra note 8, at 500. See also “Copyright As Entry Policy,” supra note 12 at 452 (“There is little reason for an outsider to innovate in distribution if it will be blocked at the moment that it needs content.”).
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(such as photocopiers, VCR technology, DVD technology, and MP3 players) to software and services (such as peer-to-peer technology, image search, and video hosting). Such innovation comes from several principal sources: universities and other academic, governmental and independent research entities; independent innovators (entrepreneurs); established technology companies; media enterprises (off and online); content creation companies; and intra- and cross-industry collaborations. Funding for such research, product development and commercialization comes from a wide variety of sources: the research enterprises themselves; industry organizations; investors (including venture capitalists); cross-industry consortia; and government agencies.

The determinants of innovation vary substantially across the spectrum of sources. For example, university researchers, government research laboratories, and think tank research entities—what might be called the academic/governmental/think tank research complex—tend to focus on the upstream (conception, early development) end of the innovation spectrum. Their funding—principally university coffers, government grants, and philanthropic organizations—is far removed from copyright litigation. The researchers are professors, professional scientists, engineers, programmers and graduate students. These innovators tend to have little knowledge of, or concern for, the risks of indirect copyright liability. They are motivated to experiment and push the boundaries of knowledge wherever it takes them. They are typically judged by the extent of their breakthroughs and not commercial viability or exploitation, although a growing number aspire to spin their research out into a commercial venture. By the nature of their projects, researchers in academic, government or think tank settings are largely insulated from exposure to copyright liability. The culture of this research community reflects a strong belief in the "freedom to tinker." To the extent that researchers in this sector pay attention to copyright debates, many are motivated to develop software architectures and tools that liberate tinkering, broadly defined. There is a significant subculture that opposes any limitations

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51. In addition, Congress carved out a safe harbor for nonprofit educational institutions, as well as an exemption from the anticircumvention provisions of the DMCA for encryption research. 17 U.S.C. § 512(e), § 1201(g).

52. This ethos is reflected in the "Freedom to Tinker" blog, started by Professor Ed Felten and hosted by Princeton's Center for Information Technology Policy. See Freedom to Tinker, www.freedom-to-tinker.com (last visited Apr. 11, 2009). The blog focuses on "issues related to legal regulation of technology, and especially on legal attempts to restrict the right of technologists and citizens to tinker with technological devices." See id.
(including copyright) on the free flow of information. Thus, it seems unlikely that
the standards for indirect copyright liability would exert much restraining effect on
this important class of researchers. To the contrary, there is reason to believe that it
could in fact spur work-arounds should liability chill internet freedoms.

There can be little question that the academic/governmental/think tank research
complex has contributed significantly to the major technological advances in
replication and distribution of information over the past several decades. Researchers in these entities laid the groundwork for digital computers, programming languages, networked computing, telecommunications infrastructure, the internet, search engines, peer-to-peer software and social networking. Many of the great innovators of the past several decades—the founders and chief innovators of Google, open source software, Netscape, Napster and Facebook—developed their prototypes in such institutions. Thus, a large segment of the innovation pipeline and the innovator community operates in an environment quite far removed from, if not exogenous to, effects of indirect copyright liability.

A second major research community—open source and “free software”
programmers—also operates largely outside of the influence of indirect copyright
liability. Researchers in this community, which overlaps with the
academic/governmental/think tank research complex as well as open source
enterprises (including Red Hat, Mozilla, Apache) and a growing number of
mainstream commercial ventures (including IBM, Google and Sun Microsystems),
reflect a business culture that pushes against restrictions on the free flow of
information in computing environments. Open source software traces its origins to
the early 1970s, and the culture of collaborative research on computer software that
was then pervasive in many software research environments. In an effort to
perpetuate that model in the face of increasingly proprietary software, Richard
Stallman, a researcher in MIT’s Artificial Intelligence Laboratory, established the
Free Software Foundation (FSF) to promote users’ rights to use, study, copy,
modify and redistribute computer programs. Given the conflict with the default
bundle of rights conferred by copyright law, FSF developed the GNU General
Public License (GPL), an innovative licensing agreement designed to prevent
programmers from building proprietary limitations into “free” software. Following
the development of Linux, an open source UNIX-compatible operating system, in
the early 1990s, open source technology became widely used throughout the
computing world. In the process, it spawned a large community of computer
programmers and service organizations committed to the principles of open source
development. The growth and success of Linux has brought the open source
movement into the mainstream computer software industry. Today, a variety of
vendors, such as Red Hat, Caldera, Debian, Apache and Mozilla, support and
distribute open source software, and it has tens of millions of users worldwide.

53. See generally Yochai Benkler, The Wealth of Networks: How Social Production
Transforms Markets and Freedom (2007); Steven Weber, The Success of Open Source
(2004); Yochai Benkler, Coase’s Penguin, or Linux and the Nature of the Firm, 112 Yale L.J. 369
~esr/writings/cathedral-bazaar (last visited Apr. 11, 2009).
IBM, Sun Microsystems, Google, Hewlett-Packard, and a growing number of mainstream computer software, web infrastructure and consumer electronics businesses promote open software products and services. The free software/open source software model thrives regardless of the *Grokster* decision.

A third research community—that might characterized as hackers—reflects a libertarian/anarchist spirit. Given the philosophical and cultural leanings of this community, such researchers may well be affirmatively motivated by expansion of indirect copyright liability to develop tools to make copyright enforcement more difficult.

A fourth community—the principal focus of the Chilled Innovation conjecture—consists of independent innovators and the venture capitalists that might support them. The mechanism emphasized by Chilled Innovation proponents is that investors, which include venture capitalists and companies, will be discouraged from funding innovation projects that risk indirect copyright liability. Even this narrow focus on just one segment of the innovation ecosystem overlooks important innovation drivers and other countervailing forces.

Unlike pharmaceutical products or other capital-intensive research projects, the innovation that is potentially threatened by indirect copyright liability does not require substantial capital investment, especially during the formative stages. Innovators in many of these industries rarely need more than a microcomputer and an internet connection to develop and test prototypes. Many of the notable innovations—from Napster’s peer-to-peer system to the Google search engine, YouTube, and Facebook—were hatched and initially developed in the Web 2.0 equivalent of the Silicon Valley garage: a dorm room.

Start-up innovators are unlikely to be aware of, or deeply concerned with, the contours of indirect copyright liability. Programmers do not generally have training in copyright law, and their professional culture subscribes to the belief that anything is possible. To the extent that these independent innovators are aware of copyright law, they have little to lose from writing new computer programs. If their project fails to gain traction, they are unlikely to appear on the radar screen of content owners. If they do become known to content owners, they will likely welcome the light it shines on their application and programming prowess, which is often the goal for young entrepreneurs. Getting noticed and developing experience can be among the most difficult tasks for start-up ventures. Notwithstanding Napster’s failure to develop a revenue-generating model and its much-publicized flame-out following multiple lawsuits, many start-ups envy Shawn Fanning’s trajectory. He went from college student programmer to the computer science

54. See DOUGLAS THOMAS, HACKER CULTURE (2002).
56. See Anonymous P2P, WIKIPEDIA.ORG (last visited June 7, 2009) (noting that “interest in anonymous P2P has increased in recent years for many reasons, including distrust of governments, mass surveillance and data retention, and lawsuits against bloggers. Such networks may also appeal to those wishing to share potentially copyrighted files”).
equivalent of "rock star." Like other serial entrepreneurs, Shawn Fanning successfully parlayed experience, contacts, and notoriety that he gained from his initial flame-out into further opportunities and ultimate success.\(^5^7\) Furthermore, the rewards for developing the next great application can be enormous, as reflected in the $1.65 billion that Google paid for YouTube,\(^5^8\) an acquisition that occurred amidst allegations that YouTube faced serious copyright infringement exposure.\(^5^9\) Thus, indirect copyright liability would not appear to be a significant deterrent to dorm room inventors and other early-stage start-up enterprises. Other motivations appear to drive their innovations.

It is at the next stage in the entrepreneurial process that the Chilled Innovation proponents believe the dampening effects are most significant. The final stage of the innovation pipeline, commercialization, often requires significant capital investment that, according to the Chilled Innovation conjecture, might be deterred by fears of indirect liability. Yet even here, the amounts at stake vary significantly across ventures and often have more to do with the speed and scale of market entry than whether entry is possible. Web 2.0 ventures,\(^6^0\) which have attracted the most attention for facilitating piracy, tend to be less reliant on venture financing than the initial generation of dot.com businesses.\(^6^1\) These start-ups can often get off the ground efficiently by using open-source software, inexpensive hosting services, and web-based marketing. Nonetheless, the question remains: to what extent investors in ventures that face indirect copyright liability exposure will shy away from or alter their investment strategies?

There are several reasons to question the extent to which the threat of indirect copyright liability significantly dampens such investments. First, to the extent that investors do not become involved in the management of the companies that they

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60. WEB 2.0, supra note 27.

fund, the limited liability feature of corporation law insulates them from exposure beyond their invested capital. In *UMG Recordings, Inc. v. Veoh Networks Inc.*, the content owner plaintiff brought suit not only against a video sharing service but also its investors, alleging that through seats they were authorized to designate on Veoh’s Board, they were able to control decisions about content on the website, precautionary measures (methods used to filter available content), and the launch of software allegedly used to infringe. The court granted the investors’ motion to dismiss the complaint for failure to state a claim, noting that:

UMG’s allegations of “control” are based on the implied (but not sufficiently alleged) premise that the Investor Defendants agreed with each other to “operate” Veoh jointly, that their three director-designees were mere puppets who always voted pursuant to a master plan that the investors had devised, and that these director-puppets actually administered Veoh, bypassing whoever constituted “management.”

The court further noted that a shareholder who merely stands to profit from their investments through the sale of that enterprise to a potential acquiring company or through a public offering is “too far removed from the alleged infringement to be considered a ‘direct’ financial interest.”

Similarly, established technology companies can substantially reduce their exposure to indirect copyright liability by operating risky ventures through separately incorporated businesses. Alternatively, they might patent technological innovations that may pose risks and license the technology to other enterprises, thereby potentially gaining a layer of insulation from downstream use of their technology.

Research on the effects of tort law on technological innovation may shed some light on how innovation might be affected by liability concerns in this context. In the leading empirical study, Professors Kip Viscusi and Michael Moore found that product liability chills innovation only at very high levels of expected liability payouts. The authors found no negative correlation between low to moderate liability payouts and firms’ innovative activities.

A second strategy for investors to reduce the risk of indirect copyright liability is to encourage those ventures in which they invest to alter technology and business practices so as to reduce exposure for copyright infringement. Companies that fund innovation internally can also reduce their risk in this manner. Although proponents of the Chilled Innovation conjecture imply that such actions harm

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62. See Henry Hansmann & Reiner Kraakman, *Toward Unlimited Shareholder Liability for Corporate Torts*, 100 YALE L.J. 1879, 1879 (1991) (noting that limited liability has been the prevailing rule in the United States for more than a century); Anderson v. Abbott, 321 U.S. 349, 362 (1944) (observing that “limited liability is the rule not the exception; and on that assumption large undertakings are rested, vast enterprises are launched, and huge sums of capital attracted”).


64. See id. at *4.

65. See id. at *6.

66. See supra note 35, at 164-82. The study considers the relationship between insurance premiums for liability coverage (which are based on expected liability payouts) and the firms’ expenditures on research and development (as a proxy for innovation intensity). See also Rose-Ackerman, *supra* note 35, at 151; Barton, *supra* note 35, at 278-80.
innovation, induced effects could well spur innovation as well as contribute toward the larger systemic goal of promoting appropriate technology. For example, the risk of copyright liability pushed YouTube and Google into the development of content identification technology, a tool that YouTube will use to reduce unauthorized distribution of copyrighted works and the development of its content licensing business. Given the challenge of balancing the need for technological innovation with the socially beneficial goal of a well-functioning marketplace for copyrighted works, such adaptations may represent a step toward reconciling the two.

A third militating consideration in evaluating the effects of indirect copyright liability on venture funding and internal corporate research is that content owners do not sue every venture that exposes their copyrights to infringement by third parties; rather, they increasingly seek to develop mutually advantageous collaborative arrangements. Copyright enforcement suits impose significant cost upon and create significant exposure for the content industries. Even under the broadest interpretation, indirect copyright law doctrines leave substantial berth for technologies that have non-infringing uses. Thus, music copyright owners never pursued indirect copyright infringement actions against the makers of computers equipped with CD-ripping software, iPods or MP3 players. And even when copyright owners do sue, they may settle on licensing or other terms that enable the venture to go forward. The success of the iTunes licensing arrangement with music copyright owners as well as failed efforts to staunch copyright infringement has moved content owners toward a more cooperative approach to licensing. The pending settlement of the Google Book Search litigation further indicates a shift away from an aggressive enforcement strategy. Thus developers of new technologies for distributing content now have greater opportunity for cooperative solutions.

This is not to say that the risk of indirect copyright infringement liability does not enter into the minds of investors in ventures that may facilitate copyright infringement. But its effects on innovation and commercialization appear to be less significant and far more complex than the Chilled Innovation conjecture suggests. Google could have structured its acquisition of YouTube in a way that avoided any direct exposure for copyright infringement by keeping it as a stand-alone venture. The fact that it brought the venture in-house, thereby exposing the assets of Google

68. The recording industry did file suit against an early manufacturer of MP3 players but did not allege that the devices infringed copyright law. Rather, the lawsuit asserted that the devices were subject to a levy under the Audio Home Recording Act of 1992. See Recording Industry Ass'n of America v. Diamond Multimedia Systems Inc., 180 F.3d 1072, 1075 (9th Cir. 1999). The court ruled that the AHRA was limited to digital audio tape devices and did not extend to computer devices. Id. at 1080-81.
69. imeem, supra note 25 (discussing imeem licensing deals).
70. See Menn, supra note 26 (quoting a record label executive as saying, "[w]e're embracing the ad-supported business model. These are our crown jewels: on-demand, full-length tracks," and, "[i]meem is the largest deal we have struck to date").
to a claim of indirect copyright infringement, suggests that the risk was not as great as portrayed.

Furthermore, the Chilled Innovation conjecture also overlooks the adverse effects of widespread copyright infringement upon various fields of technological innovation and business opportunities. Napster and its progeny doomed many music distribution ventures that respected copyright protection, along with whatever technologies these ventures might have spawned.\textsuperscript{72} At the same time, the technical difficulties of addressing the unauthorized distribution of copyrighted works undoubtedly promote innovation in technologies aimed at detecting and curbing this problem. Thus, even viewing innovation through the narrow lens emphasized by Chilled Innovation conjecture proponents, the theoretical basis for their conjecture appears more mixed than they acknowledge.

More significantly, there appears to be a far more fundamental driver of technological development in the replication and distribution of copyrighted works: advances in collateral technologies.\textsuperscript{73} Many of the technologies from which content replication and distribution innovations derive—such as electronics, computer technology (including memory storage), network technology and materials science—are exogenous or substantially exogenous from indirect copyright liability exposure. Advances in these technologies provide the springboard for everything from video hosting to digital video recorders.

Take, for example, the technology that sparked the modern debate over indirect copyright liability: the videocassette recorder. The VCR grew out of advances in audio and video recording technology in the first half of the twentieth century.\textsuperscript{74} Initial demand for video recording technology came from content industries themselves: the motion picture production and television broadcasting industries.\textsuperscript{75} Ampex introduced VRX-1000, the first commercially successful videotape recorder, in 1956. These units were quite expensive (\$50,000) and the market was limited to television networks and the largest individual stations.\textsuperscript{76} Within a
decade, Sony, Ampex and RCA were offering a videotape recorder for home use for approximately $1,000. The device was difficult to use and its price tag substantially limited its adoption in the home marketplace. The replacement of open reel systems with self-contained cassettes, another collateral technology developed for audio and film recording, in the late 1960s and early 1970s, led to the first VCR device, introduced by Sony in 1969. This technology quickly displaced videotape systems that were in widespread use in television newsrooms, schools, and businesses. Thus, even before the VCR entered the consumer marketplace and copyright issues entered the picture, the technology was proven and substantially developed. Advances in consumer electronics (such as high fidelity stereo technology, magnetic tape, digital technology and manufacturing) during the next two decades would substantially drive down the costs and enhance the quality of VCRs and eventually lead to digital video recorders. These forces operate substantially outside of the dampening effects of indirect copyright liability because they are driven by markets unaffected or only minimally affected by copyright concerns.

The influence of advances in collateral technology can be seen throughout the technological advances relating to replication and distribution of information. Much of digital technology research serves markets that do not face significant exposure to copyright liability. As noted earlier, peer-to-peer technology is used in a wide range of applications that pose little or no such risk. Amazon.com, for example, has funded extensive research in peer-to-peer technology as part of its effort to develop a proprietary information storage and retrieval system for its internal use. Such innovation proceeds irrespective of indirect copyright liability. It reduces the costs for subsequent innovators, some of whom may be toeing the copyright liability line. But the availability of this growing reservoir of knowledge undoubtedly reduces the concern that innovation itself is being stymied. What this discussion suggests is that the inhibiting effects of indirect copyright liability would largely be limited to the commercialization stage of the innovation pipeline. But this is precisely where society should want it to operate. This is the place at which entrepreneurs, investors, company strategists, policymakers and jurists can better balance the risks and benefits of different commercialization paths.

B. EMPirical ANALYSIS

As Professor David McGowan has observed, copyright scholars often "contend one or another rule will advance or impede innovation," but such effects often cannot easily be measured. Proponents of the Chilled Innovation conjecture,
Nonetheless, they conclude that such harm "surely exists." As suggested earlier, the leap from effects on innovation to social harm is far more complex than this assertion suggests. But either way, measuring effects is a logical place to look for answers. Better understanding the effects can go a long way to assessing the Chilled Innovation conjecture and attaining a more sophisticated comprehension of this aspect of copyright law and policy.

One way of approaching this question is to look at the number of references to innovation-related keywords in both academic research and patent data over time as a rough measure of the level of innovation activity. By superimposing important events—such as the Napster, Aimster and Grokster decisions—on the time series, we can see whether there is any obvious impact.

If the Napster, Aimster and Grokster cases were to have a chilling effect upon technological innovation in any field, its effect would most likely be in the area at issue in these cases: peer-to-peer technology. A related hypothesis linking the interplay of indirect copyright liability and innovation relates to induced innovation (innovation spurred by legal rules): what has been the citation trend for Digital Rights Management research?

For measuring journal citation counts, I used the Association of Computing Machinery (ACM) digital library. The ACM describes its organization as the "world’s largest educational and scientific computing society" providing the "computing field’s premier Digital Library." Figure 1 plots the frequency of articles in which the author selected the keyword "peer-to-peer" to describe the article. The time line shows a relatively steady increase in the number of articles using "peer-to-peer" as a keyword from 131 articles in 2001 to over 1,000 in 2008. Articles relating to peer-to-peer technology grew rapidly after the principal appellate court decisions Napster (2001) and In re Aimster (2003). The trend levels off in the year after the Grokster decision, but then picks up again in 2008.

80. See Reducing Infringement without Restricting Innovation, supra note 9, at 1390 ("[b]y the very nature innovation, it is hard to quantify [the] harm" to innovation caused by suing facilitators of copyright infringement).

81. Id.

82. See supra text accompanying notes 35-45.

83. The library portal can be found at http://portal.acm.org/dl.cfm. I used the “advanced search” feature to search by keyword and year in the all publications listed.

This data alone cannot prove that research intensity was unaffected by these judicial decisions. There is good reason to believe that the direction of research shifted in response to the changes in the legal environment. For example, scholars may have devoted greater effort to developing anonymous peer-to-peer networks or systems that are more attuned to excluding unauthorized materials. But it would be difficult to argue that academic research relating to peer-to-peer technology ground to a halt after these adverse decisions.

Figure 2 plots the frequency of articles in which the author selected the keyword phrase “digital rights management” to describe the article. The time line shows a generally upward trend throughout the period. These technologies were likely spurred by the growth in digital piracy as well as the anticircumvention provisions of the Digital Millennium Copyright Act.85

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The patent system provides another source of data relating to research intensity. Innovators have strong incentives to seek patent protection for their inventions and issued patents are an important repository of technological knowledge. In addition, since 2002, the U.S. Patent and Trademark Office (PTO) published patent applications 18 months after filing. This database provides another window into the rate at which technology advances, and what areas are particularly salient.

Figure 3 shows the number of patent applications and patents issued by year since 2002 that used the terms “peer-to-peer” and “digital rights management” in the abstract section of the document. Patent data is a relatively strong measure of research intensity given the nature and standards of the patent system. On the other hand, there is good reason to believe that this data undercounts advances in peer-to-peer technology because many researchers in the field—particularly open source programmers—oppose intellectual property protection, particularly on computer software. Nonetheless, there is no strong reason to believe that this factor changed significantly over the time period covered. The time lines show relatively strong and steady growth since 2002 in patent and patent applications relating to peer-to-peer technology. Patent applications relating to digital rights management also show strong and steady growth, although we see a slight dip in applications granted to the end of the period. This may well reflect the tightening standards for business method and abstracts patents corresponding to this period.
A second approach to measuring the impacts of indirect copyright liability on technological innovation would be to examine a range of case studies of technological evolution in various fields such as software and services (e.g., content search, peer-to-peer, content downloading and streaming, products, video sharing, blogging, social networking, file transfer, music lockers, and video games), products (e.g., portable storage and perception devices, DVR technology, and video game platforms) and research (e.g., encryption). By looking across a range of examples, it will be possible to assess whether, in what directions, and to what extent the trajectory of specific technologies were affected by actual or threatened litigation. Such a contextual approach will also be able to distinguish between direct and induced technological changes. This approach is inherently more subjective than keyword counts, but would encompass a wider range of variables. The results of this undertaking will be the subject of a subsequent article.

CONCLUSIONS

Beginning with the shutdown of Napster’s file-sharing network and culminating in the Supreme Court’s ruling that Grokster could be held liable for inducing infringement by users of its software network, there has been understandable concern that court decisions could choke internet-related innovation through overbroad application of indirect copyright liability. Such concerns tap into deeply held values and profound beliefs of our society: the role of innovation in driving social and economic progress, the belief in the unfettered search for knowledge, and freedom of expression. Numerous scholars have predicted serious adverse impacts on technological innovation.

This article has offered both a broader framework for assessing the relationship between indirect copyright liability and technological innovation and some suggestive empirical evidence. The conceptual analysis demonstrates that the question of whether indirect copyright liability inherently chills technological
innovation requires consideration of a broader range of social balances, market mechanisms, and roles for mediating institutions. In all fields, tort law, governmental regulation and industry self-governance seek to guide technological advance in a manner that achieves innovation but sometimes conflicts with social goals. Indirect copyright liability plays one of the key roles in effectuating such a technological balance in media markets.

Furthermore, the influence of indirect copyright liability upon technological innovation is multi-dimensional. Several countervailing forces—such as the relatively low capital requirements associated with the technology at issue, the nature of the many established research environments, the philosophical and cultural orientation of many digital technology researchers, various liability-insulating institutions, the ability of investors and technology companies to manage risk, and the importance of technological advance in fields unaffected by copyright law—suggest that the effects of indirect copyright liability on innovation in replication and distribution technologies will be both less dire and more complex than the Chilled Innovation conjecture suggests. The Chilled Innovation conjecture downplays the beneficial effects of indirect copyright liability on the development of balanced technologies (those that tend to balance incentives to create copyrighted works with advances in information dissemination) while ignoring the adverse effects of broad immunity, which fosters deployment of parasitic technologies that tend to drive out balanced technologies.

To the extent that the conjecture has force, it is not at the basic research and development stages of the innovation pipeline but rather at the commercialization stage. Given the need to balance competing social policies, this seems to be appropriate. It provides society with a view to what is possible while at the same time enabling entrepreneurs, investors, company strategists, policymakers, and jurists to balance the risks and benefits of different commercialization paths. A preliminary look at academic research and patent data indicate that the Napster-Aimster-Grokster trilogy has not derailed technological innovation in the peer-to-peer field.

The challenge of balanced technological evolution calls for less rhetoric and more scholarship about the relationship between the contours of copyright liability and technological innovation.