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Crouching Tiger, Hidden Dragon: Proxy Battles over Peer-to-Peer Movie Sharing

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In the words of Jack Valenti, Peer-to-Peer video sharing engages the movie industry in a "furious battle" in which "file stealers" threaten to annihilate America's "greatest trade export and an awesome engine of growth, nourishing the American economy."[1] To an extent, Internet digerati agree.[2] Peer-to-Peer, they suggest, has changed the landscape of information control and ownership. The genie – Peer-to-Peer technology – is out of the bottle; and the content industry, as we know it, seems beyond help.

As is often the case in heated public debates over core governance challenges in a networked world, both sides paint the picture almost exclusively in black and white. They have strong incentives to do so. Stark contrast, binary choices, and extreme alternatives will best energize one's support base and reach out and draw in the vast majority of the public that does not yet mind or care.[3]

For all the rhetoric though, Valenti's "furious battle" is a battle over proxies, and it is sharing this quality with a number of other core arguments over Peer-to-Peer and video. In the following, these proxy battles provide the red thread to analyze the Peer-to-Peer and video debate.

Agency: Who is to Blame?

In principle the Internet provides bootleggers with a global distribution mechanism that is difficult to control. Peer-to-Peer offers an added service layer that makes – again in principle – locating infringers hard and searching

E.M. Noam and L.M. Pupillo (eds.), *Peer-to-Peer Video*, doi: 10.1007/978-0-387-76450-4_12,

for and downloading movie files easy. In practice, however, sharing video files on the Internet is more difficult. First, DVD quality movies are around 3–4 GB in size. Downloading such a file is next to impossible for the 14% of current Internet users in the USA who are still utilizing dial-up connections.[4] Users with a broadband connection, just over 86% of US households by December 2007, need 1–10 hours (depending on the speed of their broadband connection) to complete the file transfer. Looking 3 years into the future, average broadband speeds to homes in urban areas will have reached 20 Mbit/s in cable and DSL networks, possibly reducing download times to an hour.[5] As bandwidth increases, however, so does the amount of data that needs to be transferred if consumers desire to download movies in next generation high definition quality.[6]

Second, most broadband connections provide asymmetric bandwidth for upload and download. Thus, a typical broadband user may be able to download at 3 Mbit/s, but as a peer of a Peer-to-Peer network only is able to offer her files to others at a significantly lower speed of 1 Mbit/s. Because of network topologies, asymmetric bandwidth is unlikely to go away soon, especially in cable networks. This triples minimum download times.

Third, these calculations presuppose perfect uptimes of the server from which the file is downloaded, servers having high capacity broadband connectivity and overall minimal network congestion. None of these conditions are present in current Peer-to-Peer networks. Despite some changes to the underlying file sharing protocols to make sharing of large files easier, as best exemplified by the BitTorrent protocol, such files take longer to download and thus are more vulnerable to peer servers going offline.

Fourth, it is currently very hard to differentiate between high quality and low quality, between playable and corrupt movie files when searching on Peer-to-Peer networks. The movie industry could use this to its advantage, only following the music industry successful lead: Joining Peer-to-Peer networks, rights holders have swamped networks with thousands of low quality or non-playable files.[7] This defensive move may not be popular among downloaders, but is – if used appropriately[8] – perfectly legal. It could easily be employed by the movie industry as well. By diluting the ratio of high quality movie files among the sea of useless bits on Peer-to-Peer networks, improvements in Peer-to-Peer download speeds can thus be offset. As long as identifying and eliminating decoys is more costly than producing them, the strategy pays off. And as long as Peer-to-Peer networks maintain their own openness for users to join, they also remain vulnerable to such flooding strategies.

In sum, downloading video files through Peer-to-Peer networks currently is time-consuming and requires repeated human intervention. Bandwidth will have to increase by orders of magnitude and Peer-to-Peer networks

will have to find better ways to identify file quality and to improve download integrity before Peer-to-Peer may turn into a suitable consumer distribution channel for video content that rivals movie theatres, video stores, or nascent legal download services in terms of ease, convenience, and overall transaction cost.

Why then is Jack Valenti talking about an epic battle that is fought over video Peer-to-Peer? Why is not only he predicting doom and gloom, but why is the entire movie industry taking Peer-to-Peer so seriously? After all, being confronted with new technologies is not a novel situation. Technologies have challenged copyright holders in the past. Neither is it the movie industry's only piracy worry. Millions of bootleg DVDs are offered at Moscow's Red Square, Bangkok's Pantip Plaza, and Seoul's Namdemeung night market. Bootleg factories churn out tens of thousands of pirated high quality DVDs every day. Still, for the movie industry, these illegal markets in developing countries may not be worth their effort. But why is Peer-to-Peer?

Perhaps it is the fear of the slippery slope, the angst that the genie of Peer-to-Peer once out of the bottle cannot be controlled. Perhaps it is the painful memory of recent battles lost. Or perhaps it is the perceived ill fate of the music industry caused by Peer-to-Peer and a sense that video is next that keeps the adrenaline pumping. Whatever it is, it entices the Motion Picture Industry Association (MPIA) to fight this battle against a proxy without a sustained analysis of whether it in fact is the agent of change or at least provides – from the perspective of rights holders – a suitable chokepoint to stop or slow change.

Yet, stopping Peer-to-Peer networks is neither the only nor necessarily, as we have seen, the most effective (let alone efficient) chokepoint to interdict digital piracy. Other technologies are equally useful tools in reconfiguring the dissemination of information – from PCs and hard disks, to camcorders, DVD players and analog-to-digital converters.[9]

Perhaps it is not even technology that is the culprit. Philip Evans and Thomas Wuerster have described how in our networked times elements of existing value chains are eliminated or reconfigured,[10] but for them the agent of change is not technology. Only technological determinists[11] would imbue technology with a capacity to change society. Rather, Evans and Wuerster see digital technology as having facilitated (but not originated) the creation of a specific digital mindset, of a sense of "being digital,"[12] requiring from businesses a fundamental reevaluation of existing business models and value chains. This mindset accepts and embraces user's ability to acquire, process, and store massive amounts of information at low cost. It encourages in John Seely Brown's terms information *bricolage*, the re-combination by users of information elements into something new, and

their ensuing dissemination.[13] Thanks to this digital mindset, technical developments have lowered some barriers of information creation and distribution, while other limitations of a Habermasian renaissance of public discourse remain largely unaffected.[14] This is not technology's fault, but the result of the digital mindset interacting with technology, and forming its very unique social reality.[15] Thus it is dangerous to attribute causality and agency too quickly, to look for simplistic reasons, and easy solutions, especially ones that give preference to engineering fixes over organizational, structural, or societal adaptation.

Hollywood is not the first sector to be transformed by the consequences of the digital mindset. Licensing online download services after resisting for years, the music industry may have finally understood that fundamental changes are necessary. Instead of glitzy High Street shops and elaborate distribution structures, digitized music available for legal downloaded eliminates the need for costly intermediaries. The music industry's new mantra is permitting limited sharing in return for a relatively weak protection against wider distribution. It required undoing a cornerstone of the music industry's past success: the album as a relatively arbitrary bundle of songs. Individual high quality songs at an affordable price rather than expensive albums provide a legal, easy to use one-stop alternative to illegal Peer-to-Peer downloads. By reconfiguring their value proposition, the music industry took a significant risk in offering songs individually rather than providing them in a prefab bundle. So far, it seems to pay off.

The movie industry will have to be similarly innovative. Their product, however, is not one that can be easily unbundled. Perhaps the opposite strategy might hold potential. Bakos and Brynjolfsson have shown that owners of large amounts of content rights – Hollywood's majors for example – can improve their competitive position by massively bundling products.[16] With hard disk storage prizes plummeting, a disk filled with 300 movies – either blockbusters or certain genres – may turn out to be the movie majors "next big thing." A decade ago, John Malone's hard disk jukebox for movies on demand was ahead of its time. Today it might be reborn as a consumer product. Customers could gain immediate access 24/7 to a sizeable movie library without having to either search endlessly in Peer-to-Peer networks, or run to the closest video rental store.

These and similar ideas are ways for the movie industry to survive – not the simple battle against a proxy, but the far more complex one of the digital mindset. For Hollywood, to reduce the issue to one over a particular technology (Peer-to-Peer) is to wage battle against a proxy – and not a very convincing one – and to show a blind eye to arguably more pertinent challenges it faces.

Object: What's to Tax?

Illegally sharing movies online will, economists tell us, persist as long as the overall cost – cost of the good itself plus associated transaction cost – involved in legally obtaining a movie is higher than the cost of getting a high quality copy of the same movie through Peer-to-Peer networks. Ronald Coase has famously emphasized the importance of transactional costs.[17] As the cost of a movie on Peer-to-Peer networks for consumers approaches zero, three levers remain: to lower the cost of obtaining the movie legally, to reduce the associated transaction cost, and to increase the transaction cost of getting the movie illegally. Of these three potential strategies, the main focus in the public debate has been on the transaction cost components.[18]

IP rights holders have long argued for increasing the cost of bootlegging through stricter enforcement and tougher punishment through criminal and civil action. Legal academics like Mark Lemley and Anthony Reese[19] have similarly suggested that more frequent criminal prosecution of Peer-to-Peer participants may result in the desired deterrent effect.[20] Lemley and Reese also suggest setting up a "quick, cheap arbitration system" that would permit rights holders to get "limited relief against abusers"[21] and point to the mandatory arbitration system for domain names under the UDRP[22] as an example of such a quick, cheap, and limited system.[23]

Technically, the cost of illegal sharing of files can be increased by making it more error-prone, time-consuming, and inconvenient. For example, offering significant numbers of decoys over Peer-to-Peer networks can be combined with bogus download requests that consume bandwidth of Peer-to-Peer servers. Charles Nesson suggests a mix of both better enforcement and such technical "speed bumps."[24] Digital rights management (DRM) technologies similarly promise to stem piracy. In their weak form, they make copying harder for the average user. While not dissuading the determined expert hacker (or simply the knowledgeable power user), they make it more time-consuming for typical users to share protected digital information with others, and thus serve the purpose of increasing transaction costs of illegal activity. Some have suggested strong DRM systems, in which even a master hacker could not unlock copyrighted information. Rights holders have lobbied for such systems. Even bills have been introduced to Congress mandating the use of DRM technology; a scenario Jonathan Zittrain has labeled "total control."[25]

Yet, perfect DRM remains an illusive target, both for technical and political reasons. Technically, any digital information will need to be transformed into analog form in order to be experienced by human beings:

it has to be displayed on a screen, for example. At what Eugene Volokh has termed the "unencrypted moment"[26] digital information protected by DRM has to be decrypted before being displayed or converted into audible sound. At that moment it is vulnerable to be copied in unencrypted, unprotected form.[27] Once content has been taken out of the protected confines of DRM it is once again open for anybody to use and share. Politically, the challenge is strong DRM's linkage to user surveillance: DRM needs to continuously check and evaluate user activity. Such an invasion of privacy is difficult to sell to consumers, at least as long as they have a choice when buying equipment on the market place. On the other hand, a legal mandate for DRM built into technical equipment may sound too much like Orwellian total surveillance to be politically feasible.[28]

This suggests that the best strategy of regulation is one narrowly tailored to the individual act of copying (or consumption). It ensures that free riding and other undesired spillovers of copyright protection regimes are kept at a minimum. Users of copyrighted information – and only they – should pay. But "narrow-tailoring" entails knowing a lot about each and every individual transaction. As with strong DRM, this may not only be problematic in terms of privacy, it also increases the required transactional overhead, thus potentially defeating its own purpose. In other words, the narrower a copyright regime is tailored to avoid over and under-inclusiveness, and thus to reduce overall transaction cost, the smaller the individual transaction. Reducing the transactional value increases the relative share of transactional cost associated with that transaction if the transaction costs do not decrease proportionally as well, which is unlikely. The problem is that our copyright regime requires us to know much about what is hard to know: how, when, and by whom information goods are used. This being a fundamental feature of the system, there is no easy way around.

Recently, commentators in the USA have suggested an alternative approach. Instead of purchasing a particular information good (actually consumers often buy a license to use), consumers would pay for information media (blank media) and access (bandwidth). In return, they would gain the right to access through the network and store on the media whatever copyrighted information they like. This is a distant relative of Lawrence Lessig's information commons.[29] Information goods would not become unprotected parts of the great information commons, as they do when copyright expires. Neither is it an extension of fair use. Fair use permits some specific use of protected information goods based on overall societal welfare. Instead, the suggested alternative systems are premised on the continuous protection of information goods. Consumers still pay for using information goods, only the mechanisms of payment changes: Consumers

are not charged for the use of the information itself, but rather for a proxy they utilize to experience information goods. Such systems are simply, as proponents concede, mandatory license schemes.

Lemley and Reese among others have written about such a system of levies. Terry Fisher and Neil Netanel are eloquent advocates of similar systems. Netanel calls for a "non-commercial use levy,"[30] Fisher for an "alternative compensation system."[31] Each of them suggests a robust revenue stream for rights holders, and promises it to be easier to administer for rights holders and more transparent to consumers than systems using information goods to charge users. The idea to tax a surrogate like blank media and access rather than pay for copying an information good itself is not new. Continental European nations, like Germany, have had such systems for decades. Netanel suggests that the Europeans have not gone far enough.[32] Fisher, too, suggests a much more comprehensive system. The beauty of such a system is that the levy is placed on something that can be easily tracked, counted, and assessed – access and media for example – at comparatively low transaction cost. On the other hand, these systems have to address at least two important questions.

First, collecting a levy is only a first step. The collected monies then need to be disbursed to the rights holders, but using what formula? Continental European schemes use survey data and statistical methods to calculate appropriate shares for rights holders. Quite obviously such methods work best for the most popular information goods, for which useful tracking data is available. They do not work well for infrequently used information goods, for which survey data is lacking. As the use of information goods often is following a power log distribution function, most of the levy is allocated to the rights holders of the most popular information goods. The remainder – called the "long tail"[33] – cannot be distributed that easily and such schemes have to be augmented with a method for disbursing some monies to the vast majority of rights holders of rarely used information goods.

Given this lack of precision, clearly resulting in over- and under-inclusiveness, it is not surprising that advocates of such alternative systems have suggested elaborate tracking systems for information goods – not to calculate the levy but the amount to be disbursed to individual rights holders. However, if such an elaborate tracking system is created, with all the transactional cost involved, to offer precise disbursement of license fees, why not use it to collect the fee in the first place? It would eliminate the imprecision of collection. The result would be a system very similar to DRM described above. Proponents of an alternative levy system may suggest that users still prefer flat fee and subscription models to paying for

individual transactions. If that is the case (and it implies some consumer irrationality), markets will offer it and there would be no need to mandate such a system through regulation.[34] The core issue, however, remains and proponents of alternative mechanisms would have to address how to disburse the monies collected, yet avoid mandating a more costly and less efficient DRM surrogate.

Second, any system that uses a proxy by definition is imprecise when collecting fees. The effect may not be severe, though, as long as the surrogate that is taxed tracks usage of information goods by individual consumers fairly well.[35] Taxing blank media, for example, will penalize those that use it to backup their own data on it. Yet, consumers buying blank media most extensively, arguably, are the ones that use them to store music, video, and other information goods on it. Similarly, with bandwidth, the faster a user's connection to the Internet, the more copyrighted information she will arguably be receiving. The issue is to identify the most appropriate proxy to collect the levy. Implementing any regime that will add a levy onto a good or service will be resisted by the affected businesses. They will argue that their products are penalized to pay a third party – the rights holders. Because of the inherent re-distributional effect, such systems are politically difficult to enact, at least in the United States.

More than 200 years ago, Fichte's idea of authorship prompted continental Europeans to shift value from the medium to the content.[36] Under Netanel's and Fisher's alternative systems authors upstream would still be paid for their creations (thus leaving Fichte's idea in place) but downstream consumers shift back to paying for the medium. In an odd turn of events, should these alternative systems take hold, future policy battles would focus less on protecting creations and more on taxing proxies.

Aim: Copyright's Utility?

When searching for a policy lever to protect video, we first turned to Peer-to-Peer networks, only to learn that the challenge may not simply be the technology of Peer-to-Peer (or any other technology), but the more fundamental mindset of digitalization. This prompts a change of societal structures stemming from the analog world – of business models as well as regulatory frameworks. The suggested switch from charging for information goods to taxing surrogate products and services brings into play a different set of proxies – not the agent of change, but the object onto which we pin copyrights. The goal – ostensibly – is still to protect the rights holders. What needs to be done, Lemley and Reese write, is "to reduce

piracy enough that [the rights holders] can make a return on their investment."[37] Technology may change, agency may shift, rights may be altered and reshaped, but the overall aim making rights holders reap profits seems like the fixed star in this constellation.

Copyright's aim has been to foster and facilitate the artistic creations. It does so by protecting those that invest in creativity, whether authors who spend time and energy to create, or investors who spend money to finance creators. Influenced by Locke's theory of labor copyright differs fundamentally from continental European author's rights.[38] Unlike copyright, continental European author's rights are seen as society's recognition of the creative genius and acknowledge that the author and his/her creations are connected through an immutable band.[39] This band contains a commercial and a personal strand: authors may license others to use their creations, thus commercializing them. They also retain a bundle of personal (or often called "moral") rights, including to be named as author. Very much like other personal rights, these author's rights are not transferable.[40]

Copyright contrast has always been seen as a tool, as a means to an end, not an end in itself. Like property it can be traded and transferred at will. Lawrence Lessig said famously that copyright is a "creation of the state." Enacted to foster creativity and innovation – even the US. Constitution explicitly mentions the utility of copyright[41] – , Congress can alter and change copyright with great, albeit not complete latitude.[42] Hence, copyright itself turns out to be a proxy, a tool to a larger end: to maximize the utility of creativity by both fostering society's creative production and facilitating its use.

The issue, therefore, may be not just to discover the accurate agency and find the appropriate object to link copyright to. Instead, what may be necessary is to re-evaluate copyright and ask: Does it still fulfill its function sufficiently well? What alternative models to foster creativity and innovation and to facilitate their use can be conceived of, and how would such alternatives fare when compared with the existing regime? What would happen, for example, if copyright would be abolished? At first blush, one might think that rights holders would lose the ability to protect their creations from use, while free riders could use whatever information good they want. Yet, trademark law would still be in place. Disney Corporation could enjoin others from sharing information that would violate any of Disney's trademarks. The movie Pocahontas could be shared freely on Peer-to-Peer networks or burnt on DVDs and given out by anybody, but nobody except the Disney Corporation could call it Pocahontas. Descriptive terms would have to be used by third parties, which in turn increase the transaction cost (both for adding such a description on the supply side and for searching on the demand side), while the Disney Corporation and its

licensees could offer downloads using the well-known brand names protected by trademark law. The higher the transaction cost to find information without its brand name, the higher the price former rights holders could extract from consumers to use their information legally.

Or, to suggest another example, one could imagine Europeans abolish the commercial side of author's rights, but keep moral rights in place. Like in the trademark hypothetical, consumers could share information goods, but not claim authorship or change its content. Using information goods would thus still be constrained.

Each of these alternatives offers different constraints and different incentives for consumers: in the first scenario, users are free to combine information goods, to create new information bricolage, which could then be offered under a different label. In this important aspect, it may even encourage creative activity on the consumer rather than professional end of the spectrum. At the same token, professional content producers, like Hollywood's majors, may continue to protect their information goods through trademark law – at least to an extent. The moral rights scenario, on the other hand, incentivizes diffusion and use of information goods, while it hinders creative combinations and information bricolage.

The importance of these scenarios is not to present working alternatives to the existing copyright regime, rather they exemplify that alternative mechanisms are conceivable and – at least to an extent – may act as possible intellectual property surrogates. To be sure, each one of these alternatives comes with its own baggage of constraints and limitations, providing incentives for some activity, and discouraging other. It is important, though, to recognize that alternatives exist. Such alternative mechanisms *may* work better. Perhaps copyright itself can be reinvented and reshaped as its utility may have suffered by a change in technical and societal context. Fundamentally, copyright is but a mechanism, a proxy to achieve a bigger goal.

After the proxy battles over change agency and regulatory object, this is the third such battle and the most significant one. It is the battle over identifying and implementing the best proxy mechanism to further the societal aim of fostering the creation and diffusion of information goods. And as with the other two proxy battles it's most important for us to understand that the proxy itself isn't exclusive, we simply have a choice.[43]

Notes

1. All quotes from Statement of Jack Valenti, "Privacy & Piracy: The Paradox of Illegal File Sharing on Peer-to-Peer Networks and the Impact of Technology on the Entertainment Industry" before the Senate Committee on Government Affairs, September 30, 2003.
2. See Dan Hunter, Culture War, http://ssrn.com/abstract=586463 August 10, 2004.
3. For another binary cyberlaw debate, see Viktor Mayer-Schönberger, The Shape of Governance: Analyzing the World of Internet Regulation, 43 Virginia Journal of International Law 605 (2003).
4. Even at top modem speeds of 56 kbit/s, a single feature length movie would take 140 h to download; the numbers on US broadband users are from Broadband Growth Trends in the US (citing Nielsen Online), Web Site Optimization LLC, December 2007.
5. This situation may be different in advanced broadband nations like South Korea or Japan, where broadband speeds have reached 10 Mbit/s in 2004 and may reach 100 Mbit/s before the end of the decade. Often it is argued that users of Peer-to-Peer networks will perceive downloads as instantaneous if download time does not exceed the movie's playing time. In such cases, users could start watching the movie right away, while it is still being downloaded. This presupposes that downloaded times do not vary much, and that any slowdown that does occur can be overcome through buffering. In practice, Peer-to-Peer networks even at very fast connections show vastly varying download speeds. As Peer-to-Peer networks do not guarantee a certain level of service, users will have to expect interruptions while watching movies. Moreover, users will never know if the movie they download is in fact complete, and will download in its entirety.
6. For example, to download a high definition movie encoded with a modern compression engine in real time, i.e., the time it takes to watch the movie, a bandwidth of 17.5 Mbit/s and higher may be required.
7. Keith Ross has recently suggested that up to 70% of music files on Peer-to-Peer networks are not working, and many of them the result of decoys sent into the networks by the music industry; see Keith Ross, Pollution in Peer-to-Peer File Sharing, Presentation at CITI Peer-to-Peer Video conference, September 10, 2004.
8. See the recent case of *Altnet v. RIAA*, alleging patent infringement for automatized seeding of decoy files, http://www.infoworld.com/article/04/09/09/HNPeer-to-Peerpartner_1.html
9. See e.g., Kevin Zhu, Internet-Based Distribution of Digital Videos: The Economic Impacts of Digitization on the Motion Picture Industry, Electronic Markets, 11 (4), 273–280.
10. Philip Evans and Thomas Wuerster, Blown to Bits, HBS Press (1999).
11. Cf. Stephen Kern, The Culture of Time and Space 1880–1918, Harvard University Press. (2003); Joshua Meyerowitz, No Sense of Place: The Impact of Electronic Media on Social Behavior, Oxford University Press (1985).

12. Nicholas Negroponte, Being Digital, Knopf (1995).
13. John Seely Brown and Paul Duguid, The Social Life of Information, HBS Press (2000); for a more personal take, see Michael Schrage, The Debriefing: John Seely Brown, Wired Issue 8.08 (August 2000).
14. For an analysis of why see Viktor Mayer-Schönberger, The Authority of Law in Times of Cyberspace, 2001 University of Illinois Journal of Law, Technology & Policy 1; for a complementary view see A. Michael Froomkin, Habermas@ discourse.net: Toward a Critical Theory of Cyberspace, 116 Harvard Law Review 749 (2003); Habermas famously chronicled the advent and formalization of public discourse in Jürgen Habermas, Der Strukturwandel der Öffentlichkeit, Suhrkamp (1990); in English Jürgen Habermas, The Structural Transformation of the Public Sphere: An Inquiry into a Category of Bourgeois Society, MIT Press (1989).
15. This is following Wiebe Bijker, Thomas Hughes, and Trevor Pinch (eds), The Social Construction of Technological Systems, MIT Press (1987); see also Wiebe Bijker, Of Bicycles, Bakelites, and Bulbs, MIT Press (1997); Claude S. Fischer, America Calling, University of California Press (1992).
16. See e.g., Yannis Bakos and Erik Brynjolfsson, Bundling and Competition on the Internet, Marketing Science, 19 (1) (Winter 2000) 63–82.
17. No article it seems these days can do without citing Coase; this one is no exception: Ronald H. Coase, The Nature of the Firm, 4 Economica 386 (1937); Ronald Coase, The Problem of Social Cost, 2 Journal of Law and Economics 1 (1960).
18. It is understandable that rights holders do not want to lower the price of their informational goods. More surprising is that few voices in the public debate have suggested a lowering of the price of movies as one component of rebalancing the cost equation. To be sure, given negligible transaction costs, one would have to lower the price of movies to zero to compete with free downloads via Peer-to-Peer. Transaction costs, however, do play a significant role. Price reductions may hence be potentially sufficient to rebalance the cost equation.
19. Mark Lemley and R. Anthony Reese, Reducing Digital Copyright Infringement Without Restricting Innovation, 56 Stanford Law Review 1345 (2004).
20. For a review of the general debate on how much of a threat is required, see Viktor Mayer-Schönberger, The Shape of Governance, p. 614 et seq.
21. Lemley and Reese, Reducing Digital Copyright Infringement, supra note 18, at 1351.
22. Uniform Dispute Resolution Policy, http://www.icann.org/; whether the UDRP is in fact effective, efficient, and just is the subject of an intense academic debate; see Michael Geist, Fair.Com?: An Examination of the Allegations of Systemic Unfairness in the ICANN UDRP, 27 Brooklyn Journal of International Law 903 (2002); Annette Kur, UDRP, http://www.intellecprop.mpg.de/Online-Publikationen/2002/UDRP-study-final-02.pdf
23. Lemley and Reese, supra note 18, at 1411 et seq.
24. See http://cyber.law.harvard.edu/events/Speedbumps/Speed-bumps_conference.html

25. See Elaine McArdle, Up on Downloading, Harvard Law Bulletin, Summer 2004, p. 17 at 18.
26. Volokh attributes the term to David Post; see Eugene Volokh, "Paper Books? They're So 20th Century," The Wall Street Journal, May 30, 2000, at A26, online at http://www1.law.ucla.edu/~volokh/ebook.htm
27. This is not the only technical problem. Interoparability issues pose another challenge as different flavors of DRM in different equipment will have to work together flawlessly and without user intervention.
28. A legal mandate for a particular DRM standard poses another challenge. It creates a huge incentive for hackers to break the DRM (and thus have the entire system crumble like a deck of cards).
29. Lawrence Lessig, The Future of Ideas: The Fate of the Commons in a Connected World, Vintage Books (2002).
30. Neil Weinstock Netanel, Impose a Noncommercial Use Levy to Allow Free Peer-to-Peer File-Sharing, 17 Harv. J. Law & Tec 1 (2003).
31. William W. Fisher, Promises to Keep: Technology, Law, and the Future of Entertainment, Stanford University Press (2004).
32. Netanel, supra note 29, at 32.
33. Chris Anderson, The Long Tail: Why the Future of Business Is Selling Less of More, Hyperion (2006).
34. It is different if one were to suggest a voluntary system; see Fred von Lohmann, Voluntary Collective Licensing for Music File Sharing, Communications of the ACM, 47 (10) (October 2004) 21.
35. This is, as Netanel comments, the undeniable advantages of his proposal over government reward systems to replace copyright.
36. Johann Gottlieb Fichte, Beweis der Unrechtmäßigkeit des Büchernachdrucks, Berliner Monatsschriften 1793, p. 443.
37. Lemley & Reese, Supra Note 18, at 1351.
38. For an exhaustive analysis, see Julia Ellins, Copyright Law, Urheberrecht, und Ihre Harmonisierung in der Europäischen Gemeinschaft, Duncker & Humblot (1997).
39. An analysis of this band is the central theme in Viktor Mayer-Schönberger, Information und Recht, Springer (2001), p. 66 et seq.
40. See only Jane C. Ginsburg, Have Moral Rights come of (Digital) Age in the United States?, 19 Cardozo Arts & Ent LJ 9 (2001), Natalie C. Suhl, Moral Rights Protection in the United States Under the Berne Convention: A Fictional Work?, 12 Fordham Intell. Prop. Media & Ent. L.J. 1203 (2002); Henry Hansmann & Marina Santilli, Authors' and Artists' Moral Rights: A Comparative Legal and Economic Analysis, 26 J. Legal Stud. 95 (1997).
41. US Const. art. I § 8, cl. 8 "…to promote the Progress of Science and useful Arts…"
42. What Congress can do is limited by the US Constitution's guarantee of copyright protection; see *Eldred v. Ashcroft*, 5.
43. Viktor Mayer-Schönberger is Associate Professor of Public Policy at the John F. Kennedy School of Government, Harvard University. Email: viktor_mayer-schoenberger@harvard.edu.