



# Corporate responses to online music piracy: Strategic lessons for the challenge of additive manufacturing



Mathew Appleyard

*Faculty of Business & Law, Leeds Metropolitan University, Leeds LS1 3HB, UK*

## KEYWORDS

3-D printing;  
Additive  
manufacturing;  
Anti-piracy strategy;  
Intellectual property;  
Online music piracy

**Abstract** Additive manufacturing, also known as 3-D printing, offers exciting opportunities for business but threatens to bring with it a new generation of prosumers (i.e., individuals who are both producers and consumers) who can infringe copyrights within their own homes based upon downloaded, digital designs. This article presents an analogous discussion of the music industry's war against online piracy to the hypothetical threat additive manufacturing poses to traditional industry. The author examines examples from contemporary media and academic literature to identify five indicative concepts that specialist and non-specialist managers should acknowledge in developing effective anti-piracy strategies: changing consumer expectations, the negative impact of legal recourse, the pervasiveness of new technology, the de facto stalemate of piracy, and the importance of networks. The author considers how these lessons can inform anti-piracy strategies and guide managers and entrepreneurs in protecting existing rights and engaging with new market paradigms.

© 2014 Kelley School of Business, Indiana University. Published by Elsevier Inc. All rights reserved.

## 1. A pirate's life for me. . .

In 1999, peer-to-peer (P2P) file-sharing service Napster altered perceptions of online intellectual property (IP) theft and forced the music industry to re-evaluate its value chain. Over a decade later, other industries stand at a similar crossroads as additive manufacturing (AM)—popularly called 3-D printing—becomes increasingly accessible to individuals. Using

case examples to inform academics and managers, this policy-focused article discusses the outcomes of corporate responses to online music piracy and applies these lessons to the hypothetical potential for AM, as a disruptive innovation, to undermine IP security. This article contributes to the currently under-represented discussion of anti-piracy strategy effectiveness and offers a unique commentary on the universality of online IP protection.

Piracy literature is divided into three streams: impacts, determinants, and responses. Positioned within the third stream, this article focuses on

*E-mail address:* [m.p.appleyard@leedsmet.ac.uk](mailto:m.p.appleyard@leedsmet.ac.uk)

corporate responses to non-deceptive online piracy. Non-deceptive piracy represents the willing (i.e., undeceived by a product's legitimacy) violation of copyrights; in contrast, counterfeiting represents the deceptive imitation of legitimate products. As the "crime of the 21<sup>st</sup> century" (Yang, Sonmez, & Bosworth, 2004, p. 459), piracy has an estimated global value of US \$200 billion (Organisation for Economic Co-operation and Development, 2007). It outpaces legitimate world trade (Jacobs, Samli, & Jedlink, 2001), threatens personal safety, and funds organized crime (Krechevsky, 2000). P2P file sharing is the transfer of data between individuals via a decentralized network. P2P technology is not illegal; however, it often facilitates the unauthorized distribution of copyrighted material. The music industry estimates that approximately 30 billion songs were illegally downloaded via P2P services between 2004 and 2009, accounting for 24% of global Internet traffic. In the United States, this led to a 53% decline in legitimate music sales between 1999 (over US \$14 billion) and 2013 (US \$7 billion) (Recording Industry Association of America, 2014).

## 2. What is additive manufacturing?

AM is the technique of constructing a physical item, layer by layer, based on a computer-aided design (CAD) model. Thermoplastic polymer or metal-based filament (i.e., powder) is repeatedly printed one layer at a time and super-heated, either by laser or electron beam, to form a structure. This contrasts with traditional reductive manufacturing (e.g., milling metals). AM offers rapid prototyping capability with the potential to create complex items limited only by imagination and technical ability. In addition, AM requires little investment in tooling: the same hardware and ancillary goods produce all items. Following initial equipment expenses—which range from thousands to hundreds of thousands US \$—the cost of manufacture is low compared to reductive manufacturing: A showerhead constructed by AM would cost less than US \$3, compared to US \$8–\$437 for a comparable product (Kelly, 2013). However, in the case of complex items, the need for assembly cannot be overlooked, nor can the consumer's responsibility for the printed product to fulfill its purpose. In addition, the outputs of current technology are often imprecise and require modification following manufacture, such as fettling to remove rough edges. Similarly, items comprised of multiple parts would require assembly. Such actions would require heightened technical competencies, thus increasing barriers to adoption.

Consumers also have a responsibility to store products and manufacture in appropriate environmental conditions; for instance, moisture can reduce the functionality of powders, thereby influencing the viability of end products. Despite an inability to provide warranties for the physical product, some level of assurance may be offered for the design.

Due to falling prices, AM hardware is increasingly accessible to a new generation of prosumers—a portmanteau of 'producer' and 'consumer.' AM's versatility highlights its disruptive potential. The technology can produce a range of complex items, from medical items to firearms, and availability of flexible filaments within the prosumer market offers incredible innovative possibilities, such as the development of training shoes that imitate the tensile nature of traditionally manufactured footwear. Nonetheless, AM remains today a specialty market. History has repeatedly proven that technology continues to become more and more affordable as markets proliferate and production methods mature. It can be surmised that the capabilities of current AM industrial hardware (costing in excess of US \$100,000) will filter down within the consumer price bracket (up to US \$5,000).

## 3. Online music piracy as an analogy for the challenge of additive manufacturing

P2P technology was disruptive to the music industry; AM potentially offers a similar disruption for manufacturers and distributors of physical goods. AM and P2P both rely upon the digital representation (i.e., computer files) of IP, music being the copyright of the composer/performing artist and AM being industrial designs. These files can be reproduced and transferred discretely and conveniently. Three significant parallels exist between P2P technologies and AM, indicating the revolutionary potential of each within their respective markets. These include: (1) IP is held as a computer file requiring hardware/software to realize; (2) piracy is undertaken in the individual's home; and (3) online communities support participation. P2P and AM require relatively limited financial investment to exploit digitally held IP: music requires a playback device and AM requires a printer and powder. Aside from ownership, the barrier to online piracy is the ability to use relevant technology effectively. Piracy undertaken in the individual's home reduces physical proximity, lessening the personal impact of the crime (Chiou, Huang, & Lee, 2005) and reducing moral opposition. The capacity for online communities to extend participation by offering a socialized

experience for music downloads is also comparable to AM.

The availability of CAD models within the surface web—the part of the Internet accessible by most users via search engines—is currently limited. As well as specialist communities<sup>1</sup>, some entrepreneurs offer CAD models via AM-specific marketplace sites<sup>2</sup>. Yet no claim can be made to suggest that more comprehensive sources do not exist within the deep web (the non-indexed Internet). However, if such a source existed, it would be inaccessible to many users due to the deep web's obscurity. Online communities reduce the cost of AM by sharing specifications (Kelly, 2013), and many monitor copyright infringement by self-regulation. Despite existing legislation governing the hosting and distribution of copyrighted properties in the Digital Millennium Copyright Act, the misbehavior of consumers—deliberate or otherwise—continues.

Regardless of analogous similarities between online music piracy and the potential of AM to infringe copyrights, discrepancies are acknowledged. The simplicity of music piracy is great, aside from security concerns and malicious software. Music benefits from a limited number of widely adopted standards; for example, CD and MP3 formats. AM is, comparatively, more complicated and subject to variations in operation. As a result, the technical capability required is significantly greater than that for the downloading and playback of music. This currently restricts widespread adoption. All actors must recognize the conceptual intangibility of IP. Consumers must be educated in order to understand that while copyrights are enacted when an idea is physically represented, as in a CD or a printed book, copyright itself is non-physical. In the case of digitally held IP, the file contains the copyright, and the purchaser is agreeing to its use in a contracted manner. The similarities between P2P and AM are centered upon the manner in which copyright is contained within, and represented by, a digital file. The process of realization—for example, music playback and construction via AM—is currently a significant point of disparity when drawing correlation. It is for this reason that the analogy is based upon a likely development of AM and a hypothetical wide-scale naturalization of the skills and knowledge required to successfully engage with this technology. From a theoretical perspective, procedure is markedly different between P2P and AM; process is less so. The

following will examine how lessons highlighted by the music industry can inform anti-piracy policy.

### 3.1. Lesson #1: Consumer expectations are relatively dynamic

“Consumers do not have rights, they have expectations.” (Samuelson, 2003, p. 44)

P2P file sharing radically changed the music market by adjusting consumer expectations. No longer were consumers restricted to physical media or specified packages such as EPs and albums; individuals could now even acquire music without leaving home! Between 2005 and 2007 Sony BMG, a 50/50 joint venture between Sony and Bertelsmann AG, used digital rights management (DRM) copy protection software on 22 million individual compact discs (CDs) across 52 titles (Wikipedia, 2014). When spun in a personal computer (PC), these CDs covertly installed software that prevented copying, communicated user data back to the record company, and created vulnerabilities in the machine that allowed access for malicious programs like viruses. This became known as the rootkit scandal. Many U.S. states, including Texas and California, took legal action against the company. The Department of Homeland Security admonished Sony BMG, and the Federal Trade Commission (FTC) ordered the firm to compensate affected users, calling the software intrusive and unlawful (Wikipedia, 2014). Consequently, in 2007 Sony BMG suspended CD-based copy protection activity. While the rootkit succeeded in restricting copying, it undermined expectations that legitimately purchased music could be transferred across devices. Sony BMG alienated consumers and demonstrated that reductions in functionality push legitimate users toward illegal sites as adherence to pre-existing standards is assured (Green, 2002).

Changes in consumption methods can adjust the relative importance of consumer expectations such as quality, reliability, and functionality. As a result of consumers using portable audio players, often with low-quality headphones, sound quality has become less important than interoperability (Bhattacharjee, Gopal, & Sanders, 2003). Interoperability is a functional compliance between products; for example, the CD audio standard indicates compatibility between compliant CDs and playback devices. Such changes in consumption habits and technologies demonstrate the need for a dynamic response (Sudler, 2013). Consumers also hold expectations regarding product pricing and cost. If exposed to an environment in which prices are comparatively reduced, regardless of legality, consumers will

<sup>1</sup> e.g., [www.therpf.com](http://www.therpf.com)—an online community specializing in replica movie props

<sup>2</sup> e.g., [www.turboquid.com](http://www.turboquid.com)

believe the legitimate source to be overpriced (Al-Rafee & Cronan, 2006). Price narrowing is an appropriate anti-piracy strategy but is unfeasible in the absence of low R&D costs, high sales figures, and low per-unit costs. Clarity within an operating environment supports an effective anti-piracy strategy (Yang et al., 2004). Legal and operational transparency reduces ambiguity (Mulhane-Clements, 2010) resulting from disparities in regional copyright laws; this lack of clarity can fuel unrealistic expectations that cannot be legitimately satisfied.

Given AMs embryonic status, this lesson can be interpreted as a portent of good practice. IP owners should ensure that anti-piracy activities do not undermine their ability to dynamically respond to changing expectations and consumption habits resulting from emerging technologies. Consumer expectations of AM are currently immature and rely largely upon media reports, company statements, and experience. AM currently lacks standardization, resulting in disparate consumer expectations. This provides a challenge (identifying current expectations) and an opportunity (establishing reasonable expectations) for the IP owner.

Interoperability must be accepted as part of a nexus of consumer expectations. Expectations are driven by consumer lifestyles that are influenced by social, cultural, and technological factors. While the relative importance of expectations may vary, all carry weight, and dismissing them can undermine success. The comparative success of P2P file sharing and the difficulties of the Sony BMG rootkit scandal illustrate that consumers are unwilling to purchase legal items if they are inferior to illegal alternatives. Although the music industry engaged with online technology, it undermined standards expected by consumers. Alternatively, Napster built upon the precedent of interoperability users had grown accustomed to, and hence succeeded.

### 3.2. Lesson #2: Legal recourse can be like using a sledgehammer to crack a nut

The music industry reacted vehemently to P2P piracy, using lawsuits to dissuade piracy (Al-Rafee & Cronan, 2006). Media attention promoted actions as a warning of legality (Yang, Fryxell, & Sie, 2008) to highlight the potential consequences of illegally using P2P networks (Jacobs et al., 2001). The strategy aimed to encourage consumers to reassess attitudes toward piracy and reassert IP rights. However, the rock band Metallica demonstrated how clumsily operated anti-piracy activities led to a backlash of negative sentiment. Metallica took legal action against Napster; universities, whose networks provided high-speed access; and fans who shared

files. The emotive backlash was heightened by drummer Lars Ulrich's public criticism of downloaders. Ten years later, Ulrich acknowledged his and Metallica's response to file sharing was handled poorly, and led to lingering image problems for the band (Masnick, 2010).

The effectiveness of this strategy relies on the consumer perceiving a risk of prosecution (Yoon, 2011). Risk is comprised of consumer concerns of social consensus on criminality, perceived risk of prosecution, and fear of public exposure (Chiou et al., 2005). The result is a theoretical correlation between negative attitudes toward piracy and the magnitude of consequence. The difficulties of legal redress are that court proceedings can be costly and lengthy, and outcomes are unpredictable (Olsen & Granzin, 1993). As an additional obstacle, people identifying themselves as being of low risk for prosecution are unlikely to disengage with piracy.

AM is an emerging technology that, like P2P, potentially offers new consumption paradigms. It can be argued that the relative importance of positive relationships differs when comparing the music industry, which relies on idolization, and other IP owners, which rely on the satisfaction of consumer requirements. Actions must balance an ability to serve as a warning of illegality while maintaining positive relationships. In the case of the music industry, a figurehead (i.e., the artist) exists for the target of animosity that may undermine later success due to idolization. Therefore, the lack of a notable figurehead would offer other IP owners a valuable opportunity when taking robust actions.

Before taking action, legal or otherwise, IP owners must consider two points. First, actions must be robust enough for pirates to perceive a likely and valid threat. Second, media attention must highlight actions. Given that legal recourse is expensive, lengthy, and unpredictable, it is a risky strategy, especially considering the potential for a negative backlash to undermine relationships. Despite this, it is a valuable tool in reasserting IP ownership. The severity of anti-piracy response correlates with a willingness of the consumer to reassess their pirate behavior. This must be weighed against any potential cost.

### 3.3. Lesson #3: You can't put a genie back in its bottle

The music industry's frantic attempts to restrict P2P use and prevent online piracy can be likened to the legend of Anglo-Scandinavian King Canute. Canute was advised, and believed, that a king of England could sit upon the sea untouched by the ebb and flow of the water. Just as Canute found that tides hold no

regard for the status of kings, the music industry found that wealth, power, and status could not contest the sweeping technological and cultural changes brought about by P2P technology. The music industry used many tactics to restrict engagement with P2P networks. These included legal actions demanding Internet service providers (ISPs) filter for illegal use and undermining P2P networks by releasing distorted sound files in an effort to frustrate use and push consumers toward legitimate sources. The industry's tactics against The Pirate Bay (TPB), a website providing links to P2P material, were ultimately unsuccessful. In 2009 the International Federation of the Phonographic Industry successfully prosecuted TPB's founders and forced ISPs to block access to the website. However, proxy sites—intermediary systems that circumvent restrictions, often used to attain online anonymity—were developed, allowing continued, unrestricted, global access. This demonstrated that, despite a restrictive speed bump (i.e., requiring proxies), users found the value proposition of illegal services attractive. When viewed in context with Apple's successful iTunes venture, TPB demonstrated that new technology cannot be legally or otherwise subdued. Apple proved that a competitive, legal alternative could be successful by exploiting new technology as opposed to the unreliability and reduced speed of illegal services.

Consumer acceptance of IP theft rests upon a nexus of cultural, moral, and ideological rationalizations (Fullerton & Punj, 2004). If consumers can develop an ideology of misbehavior, piracy can become habitual (Yoon, 2011). This can be exacerbated by consumer perceptions of large organizations as exploitative and piracy as a victimless crime (Yang et al., 2004). Within the music industry, this is a problem: artists are seen as wealthy and do not appear to suffer as a result of lost revenues (Chiou et al., 2005). Consumer willingness to pay is a key incentive for threatened IP owners to engage with new and disruptive technologies before damage is caused to markets—and consumer perceptions of the worth of products are adjusted. The growing acceptance of legitimate online services supports the use of competitive products as a method for reducing the likelihood of habitual piracy.

Low-cost AM cannot be subdued. As the music industry demonstrated, IP owners can either fight technology, seeking to suppress its use for fear of losing outright control of their copyrights, or engage with it. The music industry illustrates how legal and technical restrictions will be overcome by the willing engagement of the pirate, irrespective of legality. The music industry also demonstrates that legal disparities across borders can undermine efforts to

restrict access as pirates leverage new technology to circumvent controls. Given that AM is undertaken in the prosumer's home with CAD models available online, a similar threat is feasible.

The importance of accepting new paradigms is clear. An IP owner could expend limitless financial resources combating pirates, but as TPB demonstrated, an inexpensive technical solution (e.g., proxies) can undermine what would appear to be a decisive legal victory. Managers are often confronted with immediate threats to IP and must respond in a timely manner to prevent habitual piracy. Responses can involve multiple tactics, including legal action or competing, but the IP owner must recognize that technology and the advances it brings cannot be subdued.

### 3.4. Lesson #4: Anti-piracy strategy is a cat-and-mouse game

Anti-piracy strategy is a cat-and-mouse game between IP owners and pirates. The result of the music industry's anti-piracy activities demonstrates that IP protection must acknowledge two factors. First, a secure system for restricting the unauthorized reproduction and distribution of copyrighted digital content does not exist, as pirates will likely circumvent any copy protection (van Wijk, 2002). Second, attempts to prevent unauthorized replication can hamper legitimate use (Green, 2002). All computers can be affected by malicious code, and it is costly to reverse security protocols into existing standards without impacting interoperability. As a result, they must be considered fallible. Throughout the music industry's fight against online piracy, successes and failures can be identified from both sides—IP owner and pirate. The most infamous example of the unsuccessful, retroactive addition of copy protection to recordings is that of Sony (Reuters, 2002): its high-tech approach aimed to prevent unauthorized copying by denying use on a PC CD-ROM drive. Users circumvented the restriction by scribbling around the edge of the CD with a marker-pen. The technology only succeeded in frustrating legitimate use, as in the rootkit scandal. Similarly, the case of TPB illustrates how stalemate is maintained, regardless of legal victory. Most revealing of this deadlock is that the methods used by the music industry were financially demanding and technically complex. Alternatively, pirates used less sophisticated but highly effective tactics.

The effectiveness of copy protection tactics inversely correlates with sophistication of the pirate (Yang et al., 2004). Any attempts to up the ante by making replication more difficult, costly, or problematic will likely result in pirates co-opting technology

(Shultz & Saporito, 1996) in an effort to protect their own market. As a result, technological anti-piracy mechanisms must only be viewed as obstacles (van Wijk, 2002). Technological systems for preventing unauthorized replication, including high-tech labeling (Li, 2013), may be unaffordable to implement and maintain profitability (Jacobs et al., 2001).

The implication for AM is the need to acknowledge, assuming sophistication, a pirate's ability to thwart restrictions. In the case of AM, a lack of maturity is opportunistic for IP owners. Should a standardized AM regime be developed, DRM could be implemented proactively. This would not eliminate piracy, but it would increase complexity. Compared to retroactive copy protection on audio CDs, DVD videos featured encryption from inception. As a result, DVDs remained relatively free from consumer piracy until 2006, when the encryption was inevitably hacked.

The cat-and-mouse scenario implies a *de facto* impasse. It is representative of the constant battle between IP owner and pirate, whereby advantage may be taken but stalemate is preserved via lack of decisive victory. The pirate will only be dissuaded if the activity becomes financially or otherwise implausible and legitimate consumption is more attractive to the consumer. Use of technology should be assessed on the basis that it may undermine legitimate consumption. The decision to continually raise stakes is the choice of the IP owner and should be made based on a strategic—and financial—ability to assert IP ownership and maintain profitability. Measured response is recommended, as the decision not to engage weakens the IP owner's overall ability to protect its legitimate market.

### 3.5. Lesson #5: Networks work

Networking, willing or coercive, is important toward supporting anti-piracy strategy; consider, for example, the participation of ISPs in blocking access to TPB. The social nature of P2P technology contrasts with the singular and isolated activities of IP owners. The uncooperative state of the music industry, circa 2000, illustrates that ineffective networking correlates with ineffective IP protection. Sony's unsuccessful connect service demonstrated cooperation between Japanese content and consumer electronics companies but failed to align with market requirements. EMI, BMG, and AOL/Time Warner offered similar solutions, although all were hindered by diverse organizational goals, high prices, and restrictive usage policies. However, Apple offered an integrated system with a large catalog that could rival the efficiency and diversity of illegal alternatives. With iTunes, Apple acted as an arbitrator and became

*de facto* middleman for the music industry. This demonstrates the potential for aggrieved firms to coalesce around homogenized standards. The ensuing aggregation of competencies allows IP owners to compete effectively.

Networking—undertaken internally, externally, horizontally, and vertically—can provide rights holders with cooperative, supportive relationships (van Wijk, 2002; Yang et al., 2004). Networks offer participants the opportunity to build relationships based on complimentary skillsets and common objectives (Shultz & Saporito, 1996). They can strengthen and stabilize IP protection regimes as a result of collaborative agreements (Shultz & Saporito, 1996), lobbying governments (van Wijk, 2002), and educational campaigns (Yang et al., 2004). Networking supports the use of local counsel and expert knowledge (Krechevsky, 2000) in attaining compliance with local IP regimes and understanding cultural attitudes toward IP. Networks can be formal or informal; however, the use of formalized agreements can support adherence to specified objectives (Yang et al., 2004, 2008).

Given the immaturity of AM and variations in hardware and software, gaining concurrence among potential competitors would be challenging. Apple demonstrated two factors. First, iTunes established that consumers are willing to engage with legal services if their expectations are fulfilled. Second, Apple illustrated how an arbitrary agent can provide a platform that others gravitate toward. This scenario would, hypothetically, require several influential firms to achieve strategic synergy and increase attractiveness; for example, by achieving a tipping point.

While this discussion of networking examines the presence of an arbitrator (Apple), it is important to note that this role is metaphorical and not absolute. The position of arbitration can be achieved formally or informally, but the role must allow IP owners to coalesce. Many record companies sought to combat piracy in isolation and, as a result, were frustrated. It was the compatible competencies of the music industry and a major computer/software manufacturer that overcame the value proposition of P2P networks by aligning organizational goals and consumer requirements.

## 4. Implications for the manager

It is important to reaffirm that this article is centered on a hypothetical proposition that AM offers a disruptive profile similar to that of P2P file sharing. Given current rates of consumer adoption and technological development, it is realistic to believe that AM could revolutionize the value chains of many

industries. As in the case of the digital music industry, this prediction lies upon technological standardization. AM confronts manufacturing industries with a dual challenge of protecting existing IP while engaging with technology that risks offering greater capacity for piracy. This article contends that the nature of the effective manager is akin to that of Janus, the Roman god of beginnings and transitions: they should act as a defender of IP and as an advocate of adding value to IP through engagement with contemporary, emerging technologies and cultural phenomena. Apple can be considered a commercial embodiment of this concept. Under the guidance of Steve Jobs, Apple aggressively defended IP while taking a pathological attitude toward innovation (Isaacson, 2011).

As with any war, many battles are fought. This article presents a snapshot of some battles within the music industry's war against piracy. It cannot be considered exhaustive, but the case-backed reflective examples used offer credible evidence of phenomena. The lessons recognize (1) that consumers possess dynamic expectations and the potential for legal response to damage relationships, (2) the futility of attempting to stifle new technology, (3) awareness that the relationship between IP owner and pirate is a *de facto* stalemate, and (4) the supportive value of networks. The lessons and cases presented within this article are indicative of the wider phenomena of online piracy and the lessening, traditionally held distinction between online and offline environments.

Technology with the power to modify consumer expectations cannot be ignored. AM presents managers with a technology that can radically change how consumers acquire physical products similar to P2P and media goods. The music industry misunderstood the appeal of P2P and allowed early legitimate services to be hindered by excessive DRM. This harmed interoperability and alienated legitimate users. Similarly, legal action should be undertaken with caution. Consumers often view large firms as exploitative, and robust legal actions can exacerbate perceptions of David-and-Goliath scenarios. This may fuel negative backlash and undermine relationships. Therefore, legal recourse should only be undertaken given the ability to reassert IP ownership, the likelihood of achieving an intended resolution, and an understanding that repercussions may occur. Managers must accept that no foolproof method for online IP protection currently exists, and once a technology or service has entered the public domain, it is more difficult to combat. Piracy is a recurrent threat. A company can frustrate pirates but is unlikely to achieve a decisive victory. IP owners must concede that financially intensive

and technologically sophisticated tactics are often undermined by comparatively simple responses. This highlights the need to balance IP protection with financial feasibility. Networks, being vertical or horizontal, can support effective anti-piracy regimes by offering aggrieved firms opportunities to coalesce and gain cooperative support despite diverse organizational goals.

The success of legal music downloads demonstrates that consumers value legitimate relationships. Equally, the success of P2P technology indicates that consumers will seek a path of least resistance in fulfilling expectations. Managers should actively engage rather than ignore and stifle new technologies in order to satisfy consumers. By doing so, legal, habitual relationships can be formed before pirate services proliferate. This offers an advantage in shaping the development of markets, asserting IP ownership, and exploring cooperative opportunities.

#### **4.1. Process, procedure, and policy: Identifying generic strategies**

The main difference between P2P and AM is the level of technical complexity and user competencies involved. These differences are centered on process and procedure. However, the implications of discrepancies within the analogy offer a conceptual understanding that generic anti-piracy strategy, as policy, is reliant upon congruent technical factors. As a result, universality can only be achieved through policy. The simplicity of music has long been dictated by the interoperability of media and playback devices, but this is not the case for AM. While the universality of anti-piracy strategies cannot be claimed, these lessons offer a treatise of good practice. They intend to provoke thoughtful use of anti-piracy tactics rather than panicked response and should not be considered in isolation. The IP owner must have a technical understanding of how the operating environment influences the application of lessons. Currently, no sources comprehensively explore the effectiveness of anti-piracy strategies when undertaken in isolation, nor their interaction. The inter-relationship of anti-piracy strategies offers a valuable route for further research.

#### **4.2. An opportunity for entrepreneurs?**

This article has highlighted the immature nature of AM and, consequently, the potential role of the entrepreneur. Like early online music services, AM lacks homogenization. Using iTunes as a hypothetical benchmark, it can be argued that widespread consumer adoption of AM can be achieved when a

specific paradigm is realized: the development of standardized protocols of reduced complexity that encourage adoption by consumers who possess a reduced technical proficiency. An online marketplace offering compatible designs, replicating the iTunes store, would present a common user experience while product standardization would allow the same for supplies and accessories. Finally, P2P's use of online communities could be replicated to support enterprise and further adoption.

## References

- Al-Rafee, S., & Cronan, T. P. (2006). Digital piracy: Factors that influence attitude toward behavior. *Journal of Business Ethics*, 63(3), 237–259.
- Bhattacharjee, S., Gopal, R. D., & Sanders, G. L. (2003). Digital music and online sharing: Software piracy 2.0? *Communications of the ACM*, 46(7), 107–111.
- Chiou, J. S., Huang, C.-Y., & Lee, H.-H. (2005). The antecedents of music piracy attitudes and intentions. *Journal of Business Ethics*, 57(2), 161–174.
- Fullerton, R. A., & Punj, G. (2004). Repercussions of promoting an ideology of consumption: Consumer misbehavior. *Journal of Business Research*, 57(11), 1239–1249.
- Green, H. (2002). Digital media: Don't clamp down too hard. *Business Week*, 3803, 140–142.
- Isaacson, W. (2011). *Steve Jobs*. London: Little Brown.
- Jacobs, L., Samli, A. C., & Jedlink, T. (2001). The nightmare of international product piracy: Exploring defensive strategies. *Industrial Marketing Management*, 30(6), 499–509.
- Kelly, H. (2013, July 31). Study: At-home 3-D printing could save consumers 'thousands.' *CNN What's Next*. Retrieved March 15, 2014, from <http://whatsnext.blogs.cnn.com/2013/07/31/study-at-home-3-d-printing-could-save-consumers-thousands/>
- Krechevsky, C. (2000). The multinational approach to anti-counterfeiting. *Journal of Proprietary Rights*, 12(9), 2–12.
- Li, L. (2013). Technology designed to combat fakes in the global supply chain. *Business Horizons*, 56(2), 167–177.
- Masnick, M. (2010). Lars Ulrich: Underestimated file sharing. . .but proud we sued. *TechDirt*. Retrieved February 15, 2014, from <https://www.techdirt.com/articles/20101122/04455811965/lars-ulrich-underestimated-file-sharing-proud-we-sued.shtml>
- Mulhane-Clements, S. (2010). The impacts of the differences between UK and US copyright laws for sound recordings on musicians. *Management Decision*, 48(9), 1388–1399.
- Olsen, J. E., & Granzin, K. (1993). Using channel constructs to explain dealers' willingness to help manufacturers combat counterfeiting. *Journal of Business Research*, 27(2), 147–170.
- Organisation for Economic Co-operation and Development. (2007). *The economic impact of counterfeiting and piracy*. Retrieved October 21, 2014, from <http://www.oecd.org/dataoecd/13/12/38707619.pdf>
- Recording Industry Association of America. (2014). *Scope of the problem*. Retrieved May 8, 2014, from [http://www.riaa.com/physicalpiracy.php?content\\_selector=piracy-online-scope-of-the-problem](http://www.riaa.com/physicalpiracy.php?content_selector=piracy-online-scope-of-the-problem)
- Reuters. (2002, May 20). Sony's 'copy proof' CD fails to silence hackers. Retrieved October 15, 2013, from <http://usatoday30.usatoday.com/money/tech/2002-05-20-copyproof-cd.htm>
- Samuelson, P. (2003). DRM {and, or, vs.} the law. *Communications of the ACM*, 46(4), 41–45.
- Shultz, C. J., II, & Saporito, B. (1996). Protecting intellectual property: Strategies and recommendations to deter counterfeiting and brand piracy in global markets. *Columbia Journal of World Business*, 3(1), 18–28.
- Sudler, H. (2013). Effectiveness of anti-piracy technology: Finding appropriate solutions for evolving online piracy. *Business Horizons*, 56(2), 149–157.
- van Wijk, J. (2002). Dealing with piracy: Intellectual asset management in music and software. *European Management Journal*, 20(6), 689–698.
- Wikipedia. (2014). *Sony BMG copy protection rootkit scandal*. Retrieved May 9, 2014, from [http://en.wikipedia.org/wiki/Sony\\_BMG\\_copy\\_protection\\_rootkit\\_scandal](http://en.wikipedia.org/wiki/Sony_BMG_copy_protection_rootkit_scandal)
- Yang, D., Fryxell, G. E., & Sie, A. K. Y. (2008). Anti-piracy effectiveness and managerial confidence: Insights from multinationals in China. *Journal of World Business*, 43(3), 321–339.
- Yang, D., Sonmez, M., & Bosworth, D. (2004). Intellectual property abuses: How should multinationals respond? *Long Range Planning*, 37(5), 459–475.
- Yoon, C. (2011). Theory of planned behavior and ethics theory in digital piracy: An integrated model. *Journal of Business Ethics*, 100(3), 405–417.